

AD-787 300

PERSONNEL ARMOR

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October 1974

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**PERSONNEL ARMOR**

**A /DC BIBLIOGRAPHY**

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**OCTOBER 1974**

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Military Personnel	Buoyancy	Human Factors
Flight Crews	Metallic Textiles	Engineering
Army Personnel	Nylon	
20. ABSTRACT (Continue on reverse side if necessary and identify by block number)		
<p>This bibliography contains citations of 54 unclassified reports dealing with body armor of military personnel. Included are reports describing test methods and techniques for evaluating the technical performance and characteristics of body armor.</p> <p>Corporate Author-Monitoring Agency, Subject, Title, Personal Author, Contract, and Report Number Indexes are included.</p>		

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## F O R E W O R D

This bibliography, entitled *Personnel Armor*, contains 54 unclassified references. Bibliographic citations have been selected from documents processed into the Defense Documentation Center's data bank between January 1953 and May 1974.

The bibliography is arranged in ascending AD-number sequence.

Corporate Author-Monitoring Agency, Subject, Title, Personal Author, Contract, and Report Number Indexes are included.

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Defense Documentation Center

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# C O N T E N T S

	<u>Page</u>
FOREWORD.....	iii
AD BIBLIOGRAPHIC REFERENCES.....	1
INDEXES	
CORPORATE AUTHOR-MONITORING AGENCY.....	O-1
SUBJECT.....	D-1
TITLE.....	T-1
PERSONAL AUTHOR.....	P-1
CONTRACT.....	C-1
REPORT NUMBER.....	R-1

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD- 21 004

QUARTERMASTER RESEARCH AND ENGINEERING COMMAND NATICK  
MASS

ENERGY COST OF WEARING ARMORED VESTS AND CARRYING  
PACK LOADS ON TREADMILL, LEVEL COURSE, AND MOUNTAIN  
SLOPES (U)

MAY 53 JIP WINSMANN, FRED R.; VANDERBIE, JAN H.;  
DANIELS, FARRINGTON JR.;  
REPT. NO. EPB-208

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPT. NO. 2 ON PHYSIOLOGY OF LOAD-  
CARRYING.

DESCRIPTORS: (\*FATIGUE (PHYSIOLOGY), MEASUREMENT), (\*BODY  
ARMOR, FATIGUE (PHYSIOLOGY)), MUSCULOSKELETAL SYSTEM,  
LOADS (FORCES), WEIGHT, MILITARY PERSONNEL, MOTION,  
TERRAIN, MOUNTAINS, ENERGY, CONTAINERS, FASTENINGS,  
METABOLISM, NYLON, LAMINATES (U)  
IDENTIFIERS: TREADMILLS, WALKING (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD- 29 020  
WATERTOWN ARSENAL LABS MASS

BALLISTIC EVALUATION OF ARMORED VESTS EMPLOYING  
NYLON, DORON, AND MANGANESE STEEL AS ARMOR VEST,  
ARMOR, T52-1 VEST, ARMORED, M1951 SPOONER VEST (U)

JAN 54 11P MASCIANICA, F.S. I  
REPT. NO. WAL-710/1014  
PROJ: ORD-TB4-10

UNCLASSIFIED REPORT

DESCRIPTORS: \*BODY ARMOR, BALLISTICS, EFFECTIVENESS,  
MATERIALS (M)  
IDENTIFIERS: M-10 MOTORS (M)



UNCLASSIFIED

JDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD- 29 480 6/21

CHEMICAL CORPS MEDICAL LABS ARMY CHEMICAL CENTER MD

WOUND BALLISTICS, WOUNDED IN ACTION, KOREA, 6 AUGUST  
1953-19 AUGUST 1953 (U)

MAR 54 1V COE, GEORGE B.?  
REPT. NO. RR257

UNCLASSIFIED REPORT

DESCRIPTORS: (•BALLISTICS, SOUTH KOREA), TACTICAL  
WARFARE, NORTH KOREA, WOUNDS AND INJURIES, BATTLES,  
WOUNDS AND INJURIES, CASUALTIES, SURGERY, (U)SURGERY (M)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD- 35 448

MARINE CORPS LANDING FORCE DEVELOPMENT CENTER QUANTICO  
VA

ANCHORED VEST, MODIFIED, EX 53-1, STUDY, EVALUATION  
AND FIELD TEST OF (U)

FEB 54 IV  
REPT. NO. T 1041 1

UNCLASSIFIED REPORT

DESCRIPTORS: \*BODY ARMOR, EFFECTIVENESS, PROTECTIVE  
CLOTHING (M)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD- 37 068 1974  
MARINE CORPS LANDING FORCE DEVELOPMENT CENTER QUANTICO  
VA

BODY ARMOR (U)

JUL 54 1V  
REPT. NO. T 1041

UNCLASSIFIED REPORT

DESCRIPTORS: (\*BODY ARMOR, TEST METHODS), TERMINAL  
BALLISTICS, PENETRATION, ARMOR PLATE, ACCEPTABILITY,  
MATERIALS, DESIGN (M)

UNCLASSIFIED

DUC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD- 39 470

CHEMICAL CORPS MEDICAL LABS ARMY CHEMICAL CENTER MD

A COMPARATIVE BALLISTIC STUDY OF THE STANDARD U.S.  
ARMY VEST. M1952-A, AND OF THE CANADIAN ARMOR VEST,  
X53

(U)

JUL 54 IV MAHEUX, R.C.; STEWART, GEORGE M.;  
REPT. NO. RR300

UNCLASSIFIED REPORT

DESCRIPTORS: •BODY ARMOR, EFFECTIVENESS  
IDENTIFIERS: M-1952 ARMORED VESTS

(M)

(M)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD- 52 243

AEROJET-GENERAL CORP AZUSA CALIF

DEVELOPMENT OF PLASTIC MATERIAL FOR PERSONNEL  
ARMOR

(U)

NOV 54 IV YOUNG, D.A. ;  
CONTRACT: DAI28 017ORDP1472

UNCLASSIFIED REPORT

DESCRIPTORS: \*BODY ARMOR, PLASTICS

(M)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD- 69 734

AEROJET-GENERAL CORP AZUSA CALIF

DEVELOPMENT OF PLASTIC MATERIAL FOR PERSONNEL  
ARMOR

(U)

FEB 55 IV YOUNG, D.A. ;  
CONTRACT: DAI28 0170RDP1472

UNCLASSIFIED REPORT

DESCRIPTORS: \*BODY ARMOR, \*PLASTICS, DESIGN, MATERIAL(M)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-255 237

QUARTERMASTER CORPS WASHINGTON D C

A SET OF ANGLES OF OBLIQUITY FOR USE IN ASSESSING  
BODY ARMOR

(U)

FEB 61 IV MAISEL, HERBERT; CHANDLER, WALLACE;  
DECARLO, GERALD;

UNCLASSIFIED REPORT

DESCRIPTORS: \*BODY ARMOR, DISTRIBUTION, EFFECTIVENESS,  
PENETRATION

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-258 296

NAVAL MEDICAL FIELD RESEARCH LAB CAMP LEJEUNE N C

THE EFFECT OF SIMULATED TROPICAL CLIMATE ON THE  
PERFORMANCE OF MARINE CORPS PERSONNEL WEARING AN  
INTEGRATED BODY ARMOR-LOAD CARRYING SYSTEM (BALCS) (U)

MAY 61 IV MARTORANO, J. J.; COOK, E. B.; BLYTH, C. S.;

UNCLASSIFIED REPORT

DESCRIPTORS: \*BODY ARMOR, \*NAVAL PERSONNEL, \*STRESS  
(PHYSIOLOGY), CLIMATE, LOADING, MARINE CORPS, MILITARY  
PERSONNEL, PROTECTIVE CLOTHING, TESTS (U)

AN ATTEMPT WAS MADE TO DETERMINE TO WHAT EXTENT THE  
WEARING OF A BODY ARMOR-LOAD CARRYING SYSTEM  
(BALCS) AND THE CARRYING FORCE TOTAL LOAD OF 54  
POUNDS WOULD AFFECT THE ABILITY OF A GROUP OF U. S.  
MARINES TO DO A FIXED AMOUNT OF WORK UNDER SIMULATED  
TROPICAL CLIMATIC CONDITIONS. ALTHOUGH THE ADDITION  
OF THE INTEGRATED BODY ARMOR-LOAD CARRYING SYSTEM  
(BALCS) PRODUCED SIGNIFICANT INCREASES IN THE  
SEVERAL PHYSIOLOGICAL PARAMETERS MEASURED, INCREASES  
WERE WITHIN NORMAL PHYSIOLOGICAL LIMITS FOR THE 45-  
MIN PERIOD IN WHICH THE SUBJECTS WERE EXPOSED TO THE  
EXPERIMENTAL CONDITIONS. ASSESSMENT OF THE ADRENAL  
CORTICAL ACTIVITY, AS INDICATED BY THE MEASUREMENTS  
UTILIZED IN THIS STUDY, SUGGESTED THAT NEITHER THE  
HEAT AND HUMIDITY IN WHICH THE SUBJECTS EXERCISED NOR  
THE WEARING OF THE BALCS WAS OF A SUFFICIENT  
MAGNITUDE TO CAUSE MEASURABLE STRESS.  
(AUTHOR) (U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-259 057

MELLON INST PITTSBURGH PA

BALLISTIC PROTECTIVE BUOYANT MATERIALS

(U)

MAY 61 1V JASKOWSKI, M.C.;  
CONTRACT: N140 138 68879

UNCLASSIFIED REPORT

DESCRIPTORS: \*ARMOR, \*BODY ARMOR, \*DACRON, \*FIBERS (SYNTHETIC), \*ORLON, ANTIPERSONNEL AMMUNITION, BALLISTICS, COATINGS, EFFECTIVENESS, FIBERS, FRAGMENTATION AMMUNITION, GLASS TEXTILES, LAMINATES, METALLIC TEXTILES, MOISTUREPROOFING, PENETRATION, PLASTICS, PROJECTILES, PULSE HEIGHT ANALYZERS, STEEL, TERMINAL BALLISTICS, TEST EQUIPMENT, TEST METHODS (U)

UNBONDED STAPLE-FIBER BATTS WERE OBSERVED AS IMPEDING PROJECTILE PENETRATION BY CAUSING IT TO TUMBLE AS WELL AS INCREASING ITS EFFECTIVE SIZE BY WADDING. BATTS PREPARED FROM STEEL STAPLE FIBERS WERE INEFFECTIVE AS BALLISTIC ARMOR. HIGH-TENSILE WIRE SCREEN IN CONJUNCTION WITH AN ORLON STAPLE FIBER BATT INCREASES THE PROTECTIVE ABILITY OF THE BATT ONLY WHEN IT IS PLACED BEHIND THE FIBERS. THE BALLISTIC TEST METHOD WAS MODIFIED BY REPLACING THE AL WITNESS PLATE WITH A DEVICE CAPABLE OF ACCURATELY DETERMINING THE VELOCITIES OF THE PROJECTILES WHICH COMPLETELY PENETRATE THE ARMOR SAMPLES. USING THIS TECHNIQUE, DATA WERE OBTAINED AND PLOTTED FOR SAMPLES OF 1.0 DPF ORLON STAPLE FIBER BATTS, 1.5 DPF DACRON STAPLE FIBER BATTS AND DORON BODY ARMOR. (AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-262 076

QUARTERMASTER RESEARCH AND ENGINEERING COMMAND NATICK  
MASS

PHYSIOLOGICAL RESPONSE CHANGES OF MEN ATTRIBUTABLE TO  
BODY ARMOR, SUN, AND WORK IN A NATURAL DESERT  
ENVIRONMENT (INCLUDING NEGRO-WHITE DIFFERENCES) (U)

JUN 61 IV HANSON, HAROLD E.;

UNCLASSIFIED REPORT

DESCRIPTORS: \*BODY ARMOR, \*HEAT TOLERANCE, BODY  
TEMPERATURE, CLIMATE, CLOTHING, DESERT TESTS,  
EXERCISE (PHYSIOLOGY), HUMANS, PERSPIRATION,  
PHYSIOLOGY (U)

SWEAT PRODUCTION, RECTAL TEMPERATURE AND PULSE RATE  
WERE MEASURED OVER A 24-CONSECUTIVE-DAY PERIOD ON 16  
MEN (8 WHITE AND 8 NEGRO) IN BOTH A NATURAL AND A  
MODIFIED (SHADED) DESERT ENVIRONMENT. THESE  
INDICES WERE USED TO DETERMINE THE EFFECT OF WEARING  
BODY ARMOR, SUN, AND EXERCISE, AND TO COMPARE  
PHYSIOLOGICAL RESPONSES OF PAIRED NEGRO-WHITE  
SUBJECTS. WHEN AN INDIVIDUAL DONNED BODY ARMOR,  
AND EXERCISED IN A NATURAL HOT-DRY DESERT  
ENVIRONMENT, SIGNIFICANT INCREASES IN SWEAT  
PRODUCTION, RECTAL TEMPERATURE AND PULSE RATE  
OCCURRED. WHEN AN INDIVIDUAL WAS EXPOSED TO THE  
SUN, SIGNIFICANT INCREASES IN SWEAT PRODUCTION  
OCCURRED. WHEN AN INDIVIDUAL EXERCISED,  
SIGNIFICANT INCREASES IN SWEAT PRODUCTION, RECTAL  
TEMPERATURE AND PULSE RATE OCCURRED. HEAT  
TOLERANCE OF FULLY-CLOTHED NEGRO AND WHITE  
INDIVIDUALS WAS ABOUT EQUAL IN NATURAL HOT-DRY  
SURROUNDINGS. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-266 054  
MELLON INST PITTSBURGH PA

BALLISTIC PROTECTIVE BUOYANT MATERIALS (U)

OCT 61 IV JASKOWSKI, M.C.;  
CONTRACT: N140 138 68879

UNCLASSIFIED REPORT

DESCRIPTORS: \*BODY ARMOR, \*FIBERS (SYNTHETIC), \*NYLON,  
\*ORLON, ACRYLIC RESINS, CLEANING, CLEANING COMPOUNDS,  
DACRON, EFFECTIVENESS, FIBERS, FLOTATION, MATERIALS,  
PLASTICS, TERMINAL BALLISTICS, TEXTILES (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-269 577  
MELLON INST PITTSBURGH PA

BALLISTIC PROTECTIVE BUOYANT MATERIALS (U)

JAN 62 IV JASKOWSKI, M.C.;  
CONTRACT: N140 138 68879

UNCLASSIFIED REPORT

DESCRIPTORS: •BODY ARMOR, •DACRON, •NYLON, •ORLON,  
•PROTECTIVE CLOTHING, ACRYLIC RESINS, CLEANING, FIBERS,  
FIBERS (SYNTHETIC), FLOTATION, FRAGMENTATION, MATERIALS,  
PENETRATION, PLASTICS, TERMINAL BALLISTICS, TESTS,  
TEXTILES (U)

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AD-273 876

OFFICE OF THE DIRECTOR OF DEFENSE RESEARCH AND ENGINEERING  
WASHINGTON D C

SYMPOSIUM ON PERSONNEL ARMOR HELD AT THE U. S. NAVAL  
RESEARCH LABORATORY OCTOBER 4-5, 1961 VOLUME I (U)

61 IV

UNCLASSIFIED REPORT

DESCRIPTORS: \*BODY ARMOR, \*SYMPOSIA, LAMINATES, PHYSICAL  
PROPERTIES, PROTECTIVE CLOTHING, SHOCK RESISTANCE,  
TEXTILES (U)

CONTENTS: CHARACTERIZATION OF TEXTILE YARNS FOR  
USE UNDER BALLISTIC IMPACT CONDITIONS DYNAMIC  
BEHAVIOR OF TEXTILE FIBERS AND STRUCTURES AS  
RELATED TO PERSONNEL ARMOR A THEORETICAL STUDY OF  
PENETRATION AND RESIDUAL PROJECTILE VELOCITIES  
METHOD FOR OBTAINING YIELD STRESSES AT HIGH  
STRAIN RATES THE DYNAMIC PROPERTIES OF HIGH  
TENACITY YARNS AND THEIR RELATIONSHIP TO BALLISTIC  
RESISTANCE BUOYANT INSULATING BODY ARMORS FROM  
STAPLE FIBERS SOME U. S. ARMY RESEARCH OFFICE  
SPONSORED RESEARCH DEVELOPMENT OF QMC  
COMPOSITE ARMOR VEST THE EFFECT OF RESIN  
CONCENTRATION ON PHYSICAL PROPERTIES OF A LAMINATED  
STRUCTURE FOR A CRASH AND BALLISTIC PROTECTIVE  
FLIGHT HELMET A SET OF ANGLES OF OBLIQUITY FOR USE  
IN ASSESSING BODY ARMOR (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-276 256

MELLON INST PITTSBURGH PA

BALLISTIC PROTECTIVE BOUYANT MATERIALS

(U)

MAY 62 IV JASKOWSKI, MICHAEL C. ;  
CONTRACT: N140 138 68879

UNCLASSIFIED REPORT

DESCRIPTORS: \*BODY ARMOR, \*FIBERS (SYNTHETIC), ACRYLIC  
RESINS, BALLISTICS, DACRON, FIBERS, FRAGMENTATION  
AMMUNITION, MANUFACTURING, MATERIALS, PENETRATION,  
PLASTICS, TEXTILES

(U)

BALLISTIC PROTECTIVE BUOYANT MATERIALS: EFFECT OF FIBER  
CRIMP ON PENETRATION BALLISTICS OF DACRON AND ACRYLAN  
CARDED BATTS; CRIMPED FIBERS WERE SUPERIOR TO STRAIGHT OR  
UNCRIMPED FIBERS IN PREVENTING PASSAGE OF FRAGMENT  
SIMULATORS.

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UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-624 738 1974 6/16  
NAVAL MEDICAL FIELD RESEARCH LAB CAMP LEJEUNE N C

THE EFFECTS OF TWO TYPES OF BODY ARMOR ON BODY  
TEMPERATURE. (U)

DESCRIPTIVE NOTE: INTERIM REPT.,  
NOV 65 21P RASCH, PHILIP . . ; WHITE, PAUL  
C. , JR.; NORTON, ROBERT J. ;  
REPT. NO. VOL 15/NO. 24  
MONITOR: NAVMED , MFO22-03-04-8001-2

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*BODY ARMOR, BODY TEMPERATURE), (\*BODY  
TEMPERATURE, BODY ARMOR), HEAT, PHYSIOLOGY,  
STRESS(PHYSIOLOGY), SURFACE TEMPERATURE (U)

THE PURPOSE OF THIS STUDY WAS TO DETERMINE WHETHER  
THERE IS A DIFFERENCE IN THE BODY HEAT BUILD-UP UNDER  
THE STANDARD MARINE CORPS UPPER TORSO BODY ARMOR  
VERSUS THE NMFRL LIGHTWEIGHT PROTOTYPE BODY ARMOR.  
TWENTY YOUNG ADULT MARINES MADE TWO FORCED  
MARCHES OF 3 MI EACH, ONE WITH EACH OF THE ABOVE  
ARMORS. MEAN CHEST SKIN TEMPERATURE UNDER THE  
PROTOTYPE ARMOR WAS 2F. LESS THAN UNDER THE  
STANDARD ARMOR. NO DIFFERENCE WAS OBSERVED IN  
RECTAL, ARM, OR ABDOMINAL TEMPERATURES. (AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-658 034 6/17 19/4 5/5  
ARMY NATICK LABS MASS PIONEERING RESEARCH DIV

HUMAN FACTORS EVALUATION OF BODY-SUPPORTED  
AIRCRAWMAN'S BUTTOCKS AND CROTCH PROTECTIVE UNITS:  
(COMPARISONS OF TWO HEIGHTS OF CROTCH PROTECTOR AND  
THREE SUSPENSION SYSTEMS). (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,  
JAN 67 28P BURSE, RICHARD L. ;  
REPT. NO. EPR-14  
PROJ: DA-1C024701A121  
TASK: 1C024701A12102  
MONITOR: USA-NLABS TR-68-4-PR

UNCLASSIFIED REPORT

DESCRIPTORS: (\*BODY ARMOR, \*HUMAN FACTORS ENGINEERING),  
(\*AVIATION PERSONNEL, BODY ARMOR), DESIGN,  
ACCEPTABILITY, FLIGHT CLOTHING, ANTHROPOMETRY (U)

THE RESEARCH DESCRIBED WAS AN EVALUATION OF BODY-SUPPORTED AIRCREWMEN'S BUTTOCKS AND CROTCH PROTECTIVE UNITS IN WHICH TWO HEIGHTS OF CROTCH PROTECTOR AND THREE DIFFERENT SUSPENSION SYSTEMS WERE COMPARED WITH RESPECT TO FIT, COMFORT, EASE OF USE, ESTIMATED LENGTH OF TIME THE SYSTEM COULD BE USED AND THE ADEQUACY OF SEVERAL DIMENSIONS OF THE PROTECTIVE UNITS. IN GENERAL, BOTH TYPES OF PROTECTIVE UNITS AND ALL THREE SUSPENSION SYSTEMS WERE EQUALLY SATISFACTORY. ONE TYPE OF SUSPENSION SYSTEM AND ONE HEIGHT OF CROTCH PROTECTOR WERE SIGNIFICANTLY EASIER TO USE, HOWEVER, WHILE BOTH CROTCH PROTECTORS WERE TOO WIDE. SUBJECTS DESIRED THAT THE LONGER CROTCH PROTECTOR BE SHORTENED AND THE SHORTER CROTCH PROTECTOR BE LENGTHENED TO APPROXIMATELY THE SAME LENGTH. THIS DESIRED CHANGE APPARENTLY WAS BASED ON FACTORS OTHER THAN PHYSICAL DISCOMFORT. (AUTHOR) (U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-672 504 1974 6/5 1/2  
AVIATION SAFETY ENGINEERING AND RESEARCH PHOENIX ARIZ  
CRASHWORTHINESS OF AIRCREW PROTECTIVE ARMOR. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,  
APR 68 132P HALEY, JOSEPH L. , JR. ;  
GATLIN, CLIFFORD I. ; SCHAMADAN, JAMES L. ;  
TURNBOW, JAMES W. ;

CONTRACT: DAAG17-67-C-013B

PROJ: DA-1F141812D154

MONITOR: USA-NLABS, C/OM

TR-68-57-CM, 47

UNCLASSIFIED REPORT

DESCRIPTORS: (\*CRASH INJURIES, FLIGHT CREWS), (\*BODY  
ARMOR, FLIGHT CREWS), AVIATION ACCIDENTS, IMPACT,  
HELICOPTERS, DROP TESTS, SIMULATION, AIRCRAFT SEATS (U)  
IDENTIFIERS: CRASHWORTHINESS (U)

THE RESULTS OF A TEST PROGRAM CONDUCTED TO  
DETERMINE THE PHYSIOLOGICAL EFFECTS OF PERSONNEL  
ARMOR ON AIRCREW MEMBERS EXPOSED TO AN AIRCRAFT CRASH  
ENVIRONMENT ARE PRESENTED. EMPHASIS WAS PLACED ON  
THE EFFECTS OF ARMOR AS WORN BY AIR CREWS IN CURRENT  
MILITARY OPERATIONS. THE PROGRAM WAS DIVIDED INTO  
TWO MAJOR TASKS. THE FIRST INCLUDED A LITERATURE  
SEARCH TO OBTAIN DESIGN DATA ON HUMAN INJURY  
SIMULATION TECHNIQUES, A CONFERENCE TO OBTAIN  
INFORMATION FROM A GROUP OF COMBAT-EXPERIENCED US  
ARMY MEDICAL HELICOPTER CREWMEN ON THE IMPACT  
BEHAVIOR OF THE ARMOR IN OBSERVED ACCIDENTS, AND  
MODIFICATIONS TO ANTHROPOMORPHIC DUMMIES TO EFFECT  
RECORDINGS OF MECHANICAL 'INJURIES' TO VITAL BODY  
AREAS. THE SECOND TASK CONSISTED OF THREE TYPES OF  
DYNAMIC TESTS: VERTICAL DROP TOWER TESTS,  
HORIZONTAL ACCELERATOR TESTS, AND A FULL-SCALE  
HELICOPTER CRASH TEST. TEST RESULTS INDICATED THAT  
THE POTENTIALLY DANGEROUS EFFECTS OF THE ARMOR DURING  
A CRASH SITUATION ARE RELATIVELY FEW. THE MOST  
SERIOUS PROBLEM APPEARS TO BE THE POSSIBLE COLLAPSE  
OF THE TRACHEA FOLLOWING AN IMPACT OF THE UPPER EDGE  
OF THE ARMOR WITH THE FRONT OF THE NECK.  
(AUTHOR) (U)

UNCLASSIFIED

GDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-676 689 6/19 5/10 1974  
NAVAL MEDICAL FIELD RESEARCH LAB CAMP LEJEUNE N C

BODY ARMOR IN A HOT HUMID ENVIRONMENT. PART I.  
STUDIES IN UNACCLIMATIZED MEN. (U)

DESCRIPTIVE NOTE: INTERIM REPT.,  
SEP 68 197 YARGER, WILLIAM E. ; CRONAU,  
LESLIE H. , JR. ; GOLDMAN, RALPH F. ;  
REPT. NO. NMFRL-VOL-XVIII/NO-16  
MONITOR: NAVMED MF12.524.007-8008-1

UNCLASSIFIED REPORT

DESCRIPTORS: (\*BODY ARMOR, TROPICAL TESTS),  
PERFORMANCE(HUMAN), ACCLIMATIZATION, STRESS(PHYSIOLOGY),  
HEAT TOLERANCE, PERFORMANCE(HUMAN), MOTOR REACTIONS,  
PERSPIRATION, BODY TEMPERATURE, BODY WEIGHT (U)

THIS STUDY IN UNACCLIMATIZED INDIVIDUALS IS PART OF  
AN OVERALL PLAN OF INVESTIGATION DESIGNED TO GIVE TO  
THE FIELD COMMANDERS A REASONABLE METHOD OF  
PREDICTING HEAT CASUALTIES IN THEIR MEN, KNOWING  
CONDITIONS OF CLIMATE, LOAD, TERRAIN, AND THE  
PRESENCE OR ABSENCE OF BODY ARMOR. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. ZAA14

AD-682 689 6/17 1974 6/19  
NAVAL MEDICAL FIELD RESEARCH LAB CAMP LEJEUNE N C

BODY ARMOR IN A HOT HUMID ENVIRONMENT. PART II.  
STUDIES IN HEAT ACCLIMATIZED MEN. (U)

DESCRIPTIVE NOTE: INTERIM REPT.,  
JAN 69 49P YARGER, WILLIAM E. ; LITT, B.  
D. ; GOLDMAN, RALPH F. ;  
REPT. NO. NMFRL-VOL-XIX/NO-1  
MONITOR: NAVMED MF12.524.007-8008-2

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO PART I, AD-676 689.

DESCRIPTORS: (•BODY ARMOR, TROPICAL TESTS),  
PERFORMANCE (HUMAN), ACCLIMATIZATION, STRESS (PHYSIOLOGY),  
HEAT TOLERANCE, BODY TEMPERATURE, PERSPIRATION, TROPICAL  
REGIONS, METABOLISM, STATISTICAL ANALYSIS (U)

THE STANDARD ISSUE MARINE CORPS PERSONNEL BODY  
ARMOR VEST (M1955) WAS TESTED FOR ITS EFFECT ON  
MEN WORKING UNDER HOT HUMID CONDITIONS APPROXIMATING  
THOSE SEEN IN SOUTHEAST ASIA. THIS VEST IS  
LARGELY IMPERVIOUS TO THE PASSAGE OF WATER VAPOR AND  
THEREBY IMPEDES EVAPORATIVE COOLING OVER THE CHEST.  
BODY ARMOR PRODUCES A PRONOUNCED EFFECT REFLECTED  
BY AN INCREASE IN RECTAL TEMPERATURE IN THE SUBJECTS  
WHEN THEY ARE WEARING THE ARMOR. THIS EFFECT IS  
RESTRICTED TO A RANGE OF ENVIRONMENT BRACKETED BY 82  
TO 88F WBGT (APPROXIMATELY). BELOW THIS  
LEVEL, HEAT LOSS FROM AREAS OTHER THAN THE CHEST IS  
SUFFICIENT TO DISSIPATE BODY HEAT EFFECTIVELY.  
ABOVE THIS RANGE, THE STRESS OF THE ENVIRONMENT IS  
SO GREAT AND THE EVAPORATION OF SWEAT IS SO  
INEFFICIENT THAT WEARING BODY ARMOR MAKES LITTLE  
DIFFERENCE. THE EFFECT OF WEARING ARMOR IN THIS  
RANGE (82-88F) IS EQUIVALENT TO A 5F INCREASE  
IN THE WBGT FOR UNARMORED MEN. THE EXPERIMENT  
WAS DESIGNED TO ELIMINATE THE WEIGHT OF THE ARMOR AS  
A SOURCE OF DIFFERENCE. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-685 838 1/2 13/12 6/17  
DYNAMIC SCIENCE PHOENIX ARIZ AVSER FACILITY

A STUDY OF FORCES CAUSED BY HEAD IMPACT ON AIRCREW  
PERSONNEL ARMOR UNDER SIMULATED CRASH CONDITIONS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,  
NOV 68 ;DBP GATLIN, CLIFFORD I. ;  
SCHAMADAN, JAMES L. ;BARRON, EDWARD R. ;  
YANENHOLTZ, STANLEY D. ;  
CONTRACT: DAAG17-67-C-0138  
PROJ: DA-1-F-141812-D-154  
MONITOR: USA-NLABS, C/PLSEL TR-69-49-CE, 59

UNCLASSIFIED REPORT

DESCRIPTORS: (\*AVIATION ACCIDENTS, FORCE(MECHANICS)),  
(\*HEAD(ANATOMY), IMPACT), (\*BODY ARMOR, IMPACT TESTS),  
HELMETS, TEST FACILITIES, SIMULATION, ANTHROPOMETRY,  
TRACHEA, FACE(ANATOMY), CRASH INJURIES, PROBABILITY,  
DECELERATION, ARMY AIRCRAFT, FLIGHT CREWS (U)  
IDENTIFIERS: CRASH TESTS (U)

THE RESULTS OF A TEST PROGRAM CONDUCTED TO  
DETERMINE THE MAGNITUDE, DURATION AND SHAPE OF THE  
FORCE-TIME RELATIONSHIP RESULTING FROM HEAD IMPACT ON  
PERSONNEL ARMOR IN A CRASH SITUATION ARE PRESENTED.  
THE PROGRAM WAS DIVIDED INTO TWO MAJOR TASKS.  
THE FIRST INCLUDED MODIFICATION OF AN ARMOR FRONT  
TORSO PLATE TO CARRY THE TEST INSTRUMENTATION,  
MODIFICATION OF THE ANTHROPOMORPHIC DUMMY TO IMPROVE  
HUMAN SIMULATION, AND MODIFICATION OF THE UH-1B/  
D ARMORED CREW SEAT TO PREVENT FAILURE. THE  
SECOND TASK INVOLVED THE PERFORMANCE OF 12 DYNAMIC  
TESTS USING TWO DIFFERENT TYPES OF AIRCREW PERSONNEL  
ARMOR, BOTH WITH AND WITHOUT A PROTECTIVE HELMET.  
THE TEST RESULTS INDICATED THAT SIGNIFICANT HEAD/  
ARMOR IMPACT OCCURS MOST FREQUENTLY IN THE CHIN AREA.  
SUCH CONTACT PRODUCED IMPACT PULSES THAT WERE  
TRIANGULAR IN SHAPE WITH PEAK LOADS RANGING FROM 27  
TO 500 POUNDS AND TIME DURATION RANGING FROM 0.025 TO  
0.045 SECONDS. LOADS ON THE CHIN OF THIS MAGNITUDE  
AND DURATION WOULD NOT BE EXPECTED TO PRODUCE SERIOUS  
INJURY TO A HUMAN BEING. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-687 953 6/17  
AVIATION (M L) CO LTD (GT BRIT)

PHYSIOLOGICAL COSTS OF BODY ARMOR, (U)

69 8P GOLDMAN, RALPH F. ;

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN MILITARY MEDICINE, V134 N3  
P204-210 MAR 69.

DESCRIPTORS: (\*BODY ARMOR, PHYSIOLOGY), PERSPIRATION,  
BODY TEMPERATURE, SKIN(ANATOMY), HEAT TRANSFER,  
EVAPORATION, PERFORMANCE(HUMAN), MODEL TESTS,  
PERMEABILITY (U)

THE DISCUSSION TOUCHES ON THE HEAT PRODUCTION OF  
SOLDIERS CARRYING TYPICAL LOADS AND HOW THIS IS  
RELATED TO MAN'S ENERGY EXPENDITURE, EXPRESSED AS  
KILOCALORIES OF HEAT PRODUCTION PER HOUR PER POUND OF  
WEIGHT CARRIED. THE DISCUSSION FURTHER TOUCHES ON  
THE IMPERMEABILITY OF BODY ARMOR, ON SWEAT COOLING,  
ON THE HEAT LOSS AS A FUNCTION OF THE CLOTHING WORN  
AS EXPRESSED IN 'CLO' UNITS. DESCRIPTION OF MODEL  
TESTS IS ENCLOSED. FINALLY THE DISCUSSION TOUCHES  
VERY BRIEFLY ON THE EFFECTS OF PERFORATING  
IMPERMEABLE MATERIALS IN ORDER TO IMPROVE THEIR  
EVAPORATIVE TRANSFER CHARACTERISTICS. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-688 122 1974 5/9  
ARMY NATICK LABS MASS CLOTHING AND PERSONAL LIFE SUPPORT  
EQUIPMENT LAB

BODY ARMOR FOR AIRCREWMEN. (U)

DESCRIPTIVE NOTE: SUMMARY REPT. 1962-1967,  
JAN 69 31P BARRON, EDWARD R. ; ALESI,  
ANTHONY L. ; PARK, ALICE F. ;  
REPT. NO. C/ED-50  
PROJ: DA-1-F-164204-D-154  
MONITOR: USA-NLABS TR-69-43-CE

UNCLASSIFIED REPORT

DESCRIPTORS: (\*FLIGHT CREWS, \*BODY ARMOR), (\*AERIAL  
GUNNERY, PROTECTION), DESIGN, COMPOSITE MATERIALS, GLASS  
TEXTILES, CERAMIC MATERIALS, COMPATIBILITY (U)

BODY ARMOR WHICH PROTECTS ARMY AIRCREWS OF LOW-  
FLYING AIRCRAFT AGAINST 7.62 MM/CALIBER .30 AP  
SMALL ARMS GROUND FIRE HAS BEEN DEVELOPED BY THE U.  
S. ARMY NATICK LABORATORIES. THE ARMOR  
UTILIZES A RELATIVELY LIGHTWEIGHT COMPOSITE OF  
CERAMIC BONDED TO FIBERGLASS. THE U. S. ARMY  
NATICK LABORATORIES IMPROVED ON EARLIER CERAMIC  
COMPOSITE ARMOR MADE OF FLAT, MULTIPLE CERAMIC TILES  
BY DEVELOPING SEPARATE FRONT AND BACK ONE-PIECE  
COMPOSITE PANELS WHICH ARE CURVED TO FIT THE TORSO.  
A CLOTH CARRIER WITH LARGE FRONT AND BACK POCKETS  
WAS DESIGNED TO HOLD THE ARMOR PANELS, PERMITTING THE  
AIRMAN TO WEAR THE ARMOR COMFORTABLY AND WITHOUT  
INTERFERENCE WITH HIS OPERATIONS. EXPERIMENTAL  
ARMOR FOR LEG PROTECTION AGAINST SMALL ARMS WEAPONS  
HAS ALSO BEEN MADE OF THE CERAMIC COMPOSITE.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-871 075 2.4 2.17 2.17 2.1  
ADVISORY GROUP FOR AEROSPACE RESEARCH AND DEVELOPMENT  
PARIS (FRANCE)

PATTERN RECOGNITION. BODY ARMOUR AND AIRCREW  
EQUIPMENT ASSEMBLIES. CURRENT SPACE MEDICAL  
PROBLEMS. AEROMEDICAL EVACUATION. (U)

DESCRIPTIVE NOTE: CONFERENCE PROCEEDINGS.  
OCT 68 288P  
REPT. NO. AGARD-CP-41

UNCLASSIFIED REPORT

DESCRIPTORS: (\*PATTERN RECOGNITION, SYMPOSIA), (\*BODY  
ARMOR, SYMPOSIA), (\*AEROSPACE MEDICINE, SYMPOSIA),  
(\*EVACUATION, SYMPOSIA), TARGET ACQUISITION, PROTECTIVE  
CLOTHING, CONTROLLED ATMOSPHERES, AIR TRANSPORTATION,  
FLASHBLINDNESS, LIFE SUPPORT, AIR FORCE OPERATIONS (U)

THE VOLUME CONTAINS THE TEXT OF 29 PAPERS PRESENTED  
AT THE 25TH MEETING OF THE AEROSPACE MEDICAL  
PANEL OF AGARD. THE PAPERS ARE GROUPED UNDER  
THE FOUR SUBJECT HEADINGS COVERED IN THE PROGRAM,  
NAMELY, PATTERN RECOGNITION, BODY ARMOUR AND AIRCREW  
EQUIPMENT ASSEMBLIES, CURRENT SPACE MEDICAL PROBLEMS  
AND AEROMEDICAL EVACUATION. IN ADDITION, THERE IS  
A TECHNICAL SUMMARY WHICH INCLUDES INFORMATION  
DERIVED FROM THE DISCUSSIONS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-691 739 1974  
IIT RESEARCH INST CHICAGO ILL

CONSTRUCTION OF BALLISTIC MATERIAL SAMPLES FOR  
AIRCREW ARMOR SYSTEMS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,  
JAN 69 28P RODZEN, R. A.; LAMBER, C.  
F.; SCRIBANO, F. C.; BURNS, M.;  
CONTRACT: DA-19-129-AMC-641(N)  
PROJ: DA-1-F-162203-A-150  
TASK: 1-F-162203-A-15004  
MONITOR: USA-NLABS, C/PLSEL TR-69-61-CE.62

UNCLASSIFIED REPORT

DESCRIPTORS: (\*BODY ARMOR, \*FLIGHT CREWS), (\*CERAMIC  
MATERIALS, BODY ARMOR), MANUFACTURING, ALUMINA,  
MOLDINGS, CONFIGURATION (U)  
IDENTIFIERS: \*ARMOR, \*CERAMIC MATERIALS (U)

THE REPORT DESCRIBES THE INVESTIGATIVE, RESEARCH  
AND EXPERIMENTAL EFFORT NECESSARY TO VERIFY THE  
COMMERCIAL PRODUCIBILITY OF THE AIRCREW ARMOR  
CONFIGURATIONS DEVELOPED UNDER THE CONTRACT. THIS  
WAS A COOPERATIVE EFFORT WITH INDUSTRY, TO IDENTIFY  
TYPICAL PROBLEM AREAS, SOLUTIONS AND COMPROMISES  
NECESSARY TO MAKE SUCH ARMOR PRODUCIBLE. ALSO  
DESCRIBED AND ILLUSTRATED ARE THE CERAMIC SAMPLES  
WHICH WERE FABRICATED TO VERIFY PRODUCIBILITY OF THE  
ARMOR CONFIGURATIONS. (AUTHOR) (U)



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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-695 644 1974 11/5  
TEXTILE RESEARCH INST PRINCETON N J

A STUDY OF FELTS FOR PERSONAL ARMOR. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,  
AUG 69 29P LYONS, W. JAMES ; SCARDINO,  
FRANK L. ; GOSWAMI, B. C. ;  
CONTRACT: JAAG17-68-C0040  
PROJ: DA-1-M-624101-D-504  
MONITOR: USA-NLABS, C/PLSEL TR-70-13-CE, TS-164

UNCLASSIFIED REPORT

DESCRIPTORS: (•BODY ARMOR, TEXTILES), SYNTHETIC FIBERS,  
GEOMETRIC FORMS, MECHANICAL PROPERTIES, MANUFACTURING,  
SURFACE ROUGHNESS, FRICTION, TEST METHODS, RUPTURE-  
NYLON, PROPENES, TENSILE PROPERTIES, PROTECTION,  
POLYETHYLENE PLASTICS (U)  
IDENTIFIERS: COHESION, FELTS, POLYPROPYLENE (U)  
FIBERS

THE STUDY WAS CONCERNED WITH THE INFLUENCE OF  
VARIOUS GEOMETRIC AND MECHANICAL CHARACTERISTICS OF  
THE CONSTITUENT FIBERS, AND SOME PROCESSING FACTORS  
SUCH AS THE AMOUNT OF NEEDLING AND THE BLENDING OF  
FIBERS, ON THE COHESION OF NEEDLE FELTS. TESTS  
WERE CONDUCTED ON SINGLE FIBERS FOR SURFACE-ROUGHNESS  
AND FRICTIONAL FORCE CHARACTERISTICS AND MECHANICAL  
PROPERTIES. LENGTH ANALYSES WERE ALSO MADE ON  
GROUPS OF FIBER SAMPLES. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-696 481 1974 5/9  
ARMY NATICK LABS MASS PIONEERING RESEARCH LAB

EVALUATION ON ARMY AIRCREW PROTECTIVE ARMOR IN  
VIETNAM. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,  
JUN 59 60P MCGINNIS, JOHN M. ;BURSE,  
RICHARD L. ;BARRON, EDWARD R. ;  
REPT. NO. EPT-9  
PROJ: DA-1-C-024701-A-121  
TASK: 1CG24701A12102  
MONITOR: USA-NLABS TR-69-79-PR

UNCLASSIFIED REPORT

DESCRIPTORS: (AERIAL WARFARE, VIETNAM), (PILOTS, BODY  
ARMOR), (BODY ARMOR, COMPATIBILITY), HUMAN FACTORS  
ENGINEERING, HELICOPTERS, ARMOR PIERCING AMMUNITION,  
ACCEPTABILITY (U)  
IDENTIFIERS: EVALUATION (U)

THIRTY FIVE U. S. ARMY HELICOPTER CREW  
MEMBERS EVALUATED THE DESIGN FEATURES AND  
ACCEPTABILITY OF .30 CALIBER ARMOR-PIERCING  
PROTECTIVE ARMOR ON PRACTICE OR ACTUAL LIVE-FIRE  
AERIAL MISSIONS IN SOUTH VIETNAM. TWENTY  
PILOTS USED TORSO FRONT PROTECTIVE ARMOR, AND  
15 CREW CHIEFS AND DOOR GUNNERS USED TORSO FRONT  
PROTECTIVE ARMOR, TORSO BACK PROTECTIVE  
ARMOR AND SEAT/GROIN PROTECTIVE UNITS.  
THEY RATED THE FOLLOWING VARIABLES: FIT,  
COMFORT, INTERFERENCE WITH MOVEMENT, SUITABILITY OF  
OUTLINE AND CONTOUR, ACCEPTABILITY OF ARMOR BEFORE  
AND AFTER EXPERIENCE WITH THE LATEST ITEMS,  
DESIRABILITY OF PARTICULAR ITEMS ON PARTICULAR  
MISSIONS AND BODY AREAS REQUIRING PROTECTION.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-707 910 11/5 1974  
ARMY NATICK LABS MASS CLOTHING AND PERSONAL LIFE SUPPORT  
EQUIPMENT LAB

A REVIEW OF THE DEVELOPMENT OF BALLISTIC NEEDLE-  
PUNCHED FELTS.

(U)

DESCRIPTIVE NOTE: SUMMARY REPT. 1961-69,  
OCT 69 56P LAIRLE, ROY C. HENRY,  
MALCOLM C. ;

REPT. NO. C/PSEL-TS-167  
PROJ: DA-1-T-062105-A-329  
TASK: 1-T-062105-A-32902  
MONITOR: USA-NLAAS

TR-70-32-CE

UNCLASSIFIED REPORT

DESCRIPTORS: (\*TEXTILES, \*BODY ARMOR), TERMINAL  
BALLISTICS, DENSITY, MANUFACTURING, THICKNESS  
IDENTIFIERS: \*FELTS

(U)

(U)

AS PART OF THE CONTINUING EFFORT TO IMPROVE  
BALLISTIC MATERIALS FOR PERSONNEL ARMOR, THE FIBER  
AND FABRICATION PARAMETERS, DYNAMICS OF FELT IMPACT,  
AND PREDICTIVE EQUATIONS ATTEMPTING TO CONNECT  
BALLISTIC RESISTANCE TO KNOWN MEASURABLE PARAMETERS  
WERE REVIEWED FOR NEEDLE-PUNCHED FELTS. THE  
BALLISTIC RESISTANCE OF NEEDLE-PUNCHED FELTS AT LOW  
AREAL DENSITIES WAS FOUND TO BE SUPERIOR TO THAT OF  
ANY OTHER KNOWN MATERIAL. ON THE OTHER HAND, AT  
INCREASED AREAL DENSITIES AND AGAINST HIGHER VELOCITY  
MISSILES, OTHER MATERIALS BECOME COMPETITIVE. THE  
EXTENT TO WHICH NEEDLE-PUNCHED FELTS MAINTAIN THEIR  
SUPERIORITY TO OTHER MATERIALS AT MODERATE AREAL  
DENSITIES IS DEPENDENT UPON CERTAIN FIBER AND  
FABRICATION PROPERTIES. THE HIGHEST TENACITY  
POLYAMIDE FIBERS ARE CURRENTLY THE BEST AVAILABLE  
MATERIAL. IN THE CASE OF FABRICATION, A RELATIVELY  
LOW DEGREE OF NEEDLING FURNISHES THE BEST BALLISTIC  
PROPERTIES. IN GENERAL, THE THICKER THE FELT THAT  
CAN BE TOLERATED (AT THE SAME WEIGHT AND AREAL  
DENSITY), THE BETTER THE BALLISTIC RESISTANCE. IN  
ADDITION, IT IS APPARENT THAT THE LEVEL OF BALLISTIC  
PROTECTION VARIES DEPENDING UPON THE METHOD OF  
ATTAINING THE DESIRED THICKNESS. THE NEED IS SHOWN  
FOR ADDITIONAL WORK TO DETERMINE THE EFFECT OF FIBER  
PROPERTIES SUCH AS FIBER DENIER, MOLECULAR WEIGHT,  
MOLECULAR WEIGHT DISTRIBUTION, AND ELONGATION UPON  
THE BALLISTIC PROPERTIES OF THE RESULTING FELTS.

29

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-711 876 1974 5/5 14/2  
IIT RESEARCH INST CHICAGO ILL

DESIGN, DEVELOPMENT AND FABRICATION OF A PERSONNEL  
ARMOR LOAD PROFILE ANALYZER. (U)

DESCRIPTIVE NOTE: FINAL REPT.,  
APR 70 100P SCHIBANO, F. ; BURNS, M. ;  
BARRON, E. R. ;  
CONTRACT: DAAG17-69-C-0008  
PROJ: DA-1-F-1642J4-D-154, IITRI-J6162-FR  
MONITOR: USA-NLABS, C/PLSEL TR-70-65-CE, 75

UNCLASSIFIED REPORT

DESCRIPTORS: (\*BODY ARMOR, \*DETECTORS), ANTHROPOMETRY,  
PERFORMANCE(HUMAN), POSITIONING REACTIONS, LOAD  
DISTRIBUTION, DISPLAY SYSTEMS, RELIABILITY(ELECTRONICS),  
PSYCHOPHYSIOLOGY, PERCEPTION, SENSITIVITY (U)

THE PURPOSE OF THE PROGRAM WAS TO DESIGN, DEVELOP,  
AND FABRICATE AN INSTRUMENT WHICH COULD LOCATE AND  
SENSE LOADS INDUCED ON THE BODY OF A PERSON WEARING  
PROTECTIVE ARMOR, AND TO COMPARE SUSPENSIONS AND  
SUGGEST IMPROVEMENTS WHICH COULD BE INCORPORATED IN  
CURRENT OR FUTURE LOAD-CARRYING SYSTEMS. THE  
DEVELOPMENT OF A 'PERSONNEL ARMOR LOAD  
PROFILE ANALYZER' SAW THE ATTAINMENT OF A METHOD  
OF SENSING LOADS, THE INTEGRATION AND POSITIONING OF  
SENSORS IN A SUITABLE GARMENT, A METHOD OF DISPLAYING  
INFORMATION, AND THE CORRELATION OF OUTPUT DATA TO  
TORSO SENSITIVITY. IT WAS FOUND THAT ARMOR  
SUSPENSION SYSTEMS COULD EFFECTIVELY BE EVALUATED  
USING THIS INSTRUMENT. STATIC AND DYNAMIC LOAD  
PATTERNS WERE DISPLAYED AND THE SHIFT IN THESE  
PATTERNS WITH ARTICULATION COULD BE OBSERVED. THE  
DATA OBTAINED FROM THE DISPLAY COULD PROVIDE  
GUIDELINES FOR IMPROVING SUSPENSION SYSTEM DESIGN BY  
DETERMINING WHETHER A PARTICULAR SUSPENSION WAS  
EFFECTIVE IN DISTRIBUTING LOADS ON THE OPTIMUM LOAD-  
BEARING AREAS OF THE TORSO. THE PROGRESSIVE  
ELECTRICAL CONTACT SENSOR APPROACH PROVIDED A DIRECT  
READING SYSTEM WITH MAXIMUM RELIABILITY, RUGGEDNESS,  
AND VERSATILITY. IN ADDITION, THE SYSTEM DID NOT  
REQUIRE SPECIAL SIGNAL CONDITIONING EQUIPMENT. THE  
VARIABLE INDUCTANCE SENSOR APPROACH PRODUCED AN  
ANALOG SENSOR OUTPUT CONVERTED TO A DIGITAL DISPLAY.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL No. /ZAA14

AD-713 016 1974  
IIT RESEARCH INST CHICAGO ILL

ADVANCED AIRCREW ARMOR SUSPENSION SYSTEMS. (U)

DESCRIPTIVE NOTE: FINAL REPT. 7 AUG 68-30 APR 69,  
JAN 70 96F SCRIBANO, FRANK C. BURNS,  
MARVIN ;

CONTRACT: JAAG17-68-C-0029

PROJ: DA-1-F-162203-A-150, IITRI-J6053

MONITOR: USA-WLABS, C/PLSEL

TR-70-51-CE, 74

UNCLASSIFIED REPORT

DESCRIPTORS: (BODY ARMOR, SUSPENSION DEVICES), FLIGHT  
CREWS, CONFIGURATION, OPTIMIZATION, DESIGN (U)

THE IMPROVEMENT OF AIRCREW ARMOR SUSPENSION SYSTEMS WAS THE GOAL OF THIS PROJECT. DEFICIENCIES IN ARMOR CARRIERS WERE RECOGNIZED IN EARLIER ARMOR PROGRAMS. ATTEMPTS WERE MADE TO ELIMINATE THESE DEFICIENCIES, BUT THE RESULTS WERE MINIMAL SINCE THE MAJOR DESIGN EFFORT WAS FOCUSED ON THE OPTIMIZATION OF ARMOR CONFIGURATIONS AND THE DEVELOPMENT OF AN ARMOR SIZING SYSTEM. ARMOR SUSPENSION SYSTEMS RECEIVED PRIME CONSIDERATION IN THIS PROGRAM, AND THE GOALS WERE TO DESIGN THOSE WHICH WOULD IMPROVE COMFORT, MOBILITY, PERIPHERAL PROTECTION, VENTILATION, AND RAPID DOFFING CHARACTERISTICS WERE ALSO GIVEN CONSIDERATION. THE SUSPENSION AND LOAD DISTRIBUTION PRINCIPLES USED IN OTHER FIELDS INVOLVING LOAD-BEARING EQUIPMENT WERE SURVEYED AND APPLIED WHEREVER PRACTICABLE IN THE IMPROVEMENT OF ARMOR SUSPENSIONS. THE AIRCREW ARMOR SUSPENSION SYSTEMS DESIGNED, DEVELOPED AND FABRICATED DURING THE STUDY INDICATE SIGNIFICANT ADVANCES OVER PREVIOUS ARMOR CARRIERS. THE SUSPENSION CONCEPTS DEVELOPED ARE REVIEWED. THE PROTOTYPES INCORPORATING THE SUSPENSION TECHNIQUES DERIVED FROM THE STUDY ARE DISCUSSED IN DETAIL, AND THE RESULTS OF A PROTOTYPE EVALUATION STUDY CONDUCTED ON A GROUP OF TEST SUBJECTS ARE PRESENTED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-719 212 1974 14/2  
ARMY TEST AND EVALUATION COMMAND ABERDEEN PROVING GROUND  
MD

BALLISTIC TESTING OF PERSONNEL ARMOR  
MATERIALS. (U)

DESCRIPTIVE NOTE: MATERIEL TEST PROCEDURE.  
OCT 68 19P  
REPT. NO. MTP-10-2-506

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SUPERSEDES ORDNANCE PROOF MANUAL  
50-30.

DESCRIPTORS: (BODY ARMOR, TEST METHODS), PENETRATION,  
PROJECTILES, PROTECTION (U)  
IDENTIFIERS: BALLISTICS, PROTECTION, COMMON  
ENGINEERING TEST PROCEDURES (U)

THE OBJECTIVE OF THIS TEST PROCEDURE IS TO EVALUATE  
THE RESISTANCE OF THE MATERIAL USED IN PERSONNEL  
ARMOR TO PENETRATION BY PROJECTILE FRAGMENTS AND  
SMALL ARMS AMMUNITION. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-719 551 1974  
ARMY FOREIGN SCIENCE AND TECHNOLOGY CENTER CHARLOTTESVILLE  
VA

KNIGHTS OF THE TWENTIETH CENTURY (RYTSALI  
DVADTSATEGO VEKA),

(U)

SEP 70 14P ZHOLONKOVSKII, O. ;  
REPT. NO. FSTC-MI-23-1051-70

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: TRANS. FROM TEKNIKA MOLODEZHI  
(USSR) V37 N11 1969.

DESCRIPTORS: (BODY ARMOR, HISTORY), USSR  
IDENTIFIERS: TRANSLATIONS

(U)

(U)

THE REPORT TRACES THE DEVELOPMENT OF PROTECTIVE  
ARMOR WORN BY SOLDIERS FROM ANCIENT TIMES TO THE  
PRESENT. ARMOR WAS WIDELY UTILIZED DURING THE  
MIDDLE AGES, BUT ITS USE DECLINED AS FIREARMS BECAME  
MORE SOPHISTICATED. WORLD WAR I, HOWEVER, SAW  
THE RETURN OF PROTECTIVE PLATES AND HELMETS. THE  
BRITISH FIRM OF BARRATS WAS ESPECIALLY NOTED FOR  
ITS PRODUCTION OF BULLET-PROOF VESTS AND STEEL  
DERBYS. DURING WORLD WAR II BULLET PROOF  
ARMOR WAS ADOPTED BY INDIVIDUAL UNITS OF THE SOVIET  
ARMY. STEEL ARMOR COVERED THE CHEST, STOMACH,  
AND BACK OF RED SOLDIERS. RUSSIAN HELMETS ALSO  
PROVED TO BE VERY GOOD; THEY HAVE BEEN RETAINED  
WITHOUT CHANGE UP TO OUR TIME. WITH THE DEVELOPMENT  
OF POLYMER CHEMISTRY, EXPERIMENTS ON THE COMPOSITION  
OF HELMETS MADE FROM NEW, SYNTHETIC MATERIALS BEGAN  
TO BE CONDUCTED IN MANY ARMIES OF THE WORLD.  
SCIENTIFIC RESEARCH CENTERS ARE ALSO MAKING  
MILITARY ARMOR VESTS. DESIGNERS ARE ALSO CONCERNED  
ABOUT SOLDIERS FEET; A STEEL, V-SHAPED PLATE IS  
ATTACHED TO THE SOLE OF BOOTS TO REFLECT SHRAPNEL  
FROM ANTI-PERSONNEL MINES. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-726 918 1974 11/5  
UNIRGYAL INC WAYNE N J

BICOMPONENT AND BICONSTITUENT FIBERS IN  
BALLISTIC FABRIC FOR PERSONNEL ARMOR. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,  
APR 71 27P OLSON, M. W. BRICE, G. H.

CONTRACT: DAAG17-70-C-0032  
PROJ: DA-1-T-062105-A-329  
MONITOR: USA-NLABS,C/PLSEL TR-71-48-CE,  
TS-173

UNCLASSIFIED REPORT

DESCRIPTORS: (\*BODY ARMOR, \*SYNTHETIC FIBERS),  
(\*TEXTILES, BODY ARMOR), POLYESTER PLASTICS, NYLON,  
POLYETHYLENE PLASTICS, MIXTURES (U)  
IDENTIFIERS: POLYESTER FIBERS, POLYPROPYLENE  
FIBERS (U)

EXPERIMENTAL FIBERS HAVE BEEN SPUN FROM INTIMATE MIXTURES OF NYLON, POLYPROPYLENE AND POLYESTER PLASTICS (BICONSTITUENT TYPE) FOLLOWING AN EXTENSIVE SCREENING PROGRAM TO DETERMINE COMPATIBILITIES. FIBERS OF THE BICOMPONENT TYPE (SHELL/CORE AND BILATERAL) HAVE ALSO BEEN SPUN FROM SEVERAL COMBINATIONS. A TOTAL OF SIX COMBINATIONS OF BOTH TYPES PLUS A 100% NYLON CONTROL HAVE BEEN SPUN IN SUFFICIENT QUANTITY TO BE WOVEN INTO BALLISTIC FABRIC AND TESTED ON A FIRING RANGE. ALL SEVEN FABRICS SHOWED AN APPRECIABLY LOWER BALLISTIC RESISTANCE (V50) THAN A STANDARD NYLON BALLISTIC FABRIC BUT PROCESSING DIFFICULTIES DURING THE SPINNING OPERATION MAY HAVE BEEN RESPONSIBLE, AT LEAST IN PART, FOR THE POOR SHOWING. WHEN COMPARISONS ARE MADE WITHIN THE SERIES THERE IS EVIDENCE THAT A SHELL/CORE FIBER MADE FROM NYLON AND POLYPROPYLENE COULD BE DEVELOPED INTO AN IMPROVED BALLISTIC FABRIC. (AUTHOR) (U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-729 353 1974  
ARMY NATICK LABS MASS CLOTHING AND PERSONAL LIFE SUPPORT  
EQUIPMENT LAB

A HISTORY OF THE DEVELOPMENT OF AN ARMOR  
ENSEMBLE FOR MINE CLEARANCE PERSONNEL. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,  
OCT 70 40P LASTNIK, ABRAHAM L. ;  
REPT. NO. C/PLSEL-64  
MONITOR: USA-NLABS TR-71-30-CE

UNCLASSIFIED REPORT

DESCRIPTORS: (•BODY ARMOR, •MINE CLEARANCE), MILITARY  
REQUIREMENTS, HAZARDS, SAFETY, PROTECTIVE CLOTHING,  
MATERIALS, MANUFACTURING METHODS (U)

MINE CLEARANCE TEAMS HAVE ALWAYS TRIED TO ADAPT  
AVAILABLE ARMOR CLOTHING TO THEIR OPERATIONS WITH  
VARYING DEGREES OF SUCCESS. THE REPORT IS  
CONCERNED WITH THE HISTORY OF THE DEVELOPMENT OF A  
FULL BODY COVERAGE ARMOR FOR MINE CLEARANCE PERSONNEL  
TO SATISFY MILITARY REQUIREMENTS. DISCUSSIONS ARE  
CONCERNED WITH THE HAZARDS OF MINE CLEARANCE  
VULNERABLE BODY AREAS, OPERATIONAL CONCEPTS, DESIGN,  
PROTECTIVE CHARACTERISTICS AND FABRICATION OF THE  
ENSEMBLE, AND ITS EVALUATION. A SUMMARY OF RECENT  
ARMOR MATERIAL DEVELOPMENTS AND TYPICAL APPLICATIONS  
IS INCLUDED. THESE MATERIALS MAY BE APPLIED TO ANY  
FUTURE CONCEPTS FOR FULL BODY ARMOR. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-730 775 11/5 1974  
MONSANTO RESEARCH CORP DURHAM N C

EXPERIMENTAL ORGANIC FIBER MATERIALS FOR  
PERSONNEL ARMOR. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,  
JAN 71 44P LILYQUIST, MARVIN R. ;  
CONTRACT: DAAG17-69-C0079  
PROJ: DA-1-J-662708-DJ-40  
MONITOR: USA-NLABS, C/PLSEL TR-71-47-CE,  
TS-177

UNCLASSIFIED REPORT

DESCRIPTORS: (•BODY ARMOR, •FIBERS(SYNTHETIC)), TERMINAL  
BALLISTICS, TENSILE PROPERTIES, MODULUS OF ELASTICITY,  
PLASTICS, LAMINATES, DENSITY, TEXTILES, DUCTILITY (U)  
IDENTIFIERS: EVALUATION, FELTS (U)

A NEW HIGH PERFORMANCE ORGANIC FIBER HAVING AN  
UNUSUALLY BROAD RANGE OF POSSIBLE FIBER PHYSICAL  
PROPERTIES, DESIGNATED AS X-500, WAS STUDIED IN  
VARIOUS CONSTRUCTIONS FOR BALLISTIC PERFORMANCE AS A  
POSSIBLE MATERIAL FOR IMPROVING PERSONAL BODY ARMOR.  
TENSILE PROPERTIES OF THIS FIBER SPAN A WIDE RANGE  
OF VALUES FROM THOSE SIMILAR TO NYLON AND POLYESTER  
TO THOSE SIMILAR TO FIBERGLASS. THE MODULUS,  
HOWEVER, IS HIGHER THAN THAT FOR NYLON OR POLYESTER  
FIBERS. THREE TYPES OF THIS FIBER WERE SPUN HAVING  
SINGLE FILAMENT PROPERTIES SPANNING THE ACHIEVABLE  
RANGE OF THE X-500 FIBER SYSTEM. WORK WAS DIVIDED  
INTO FOUR DISTINCT PHASES OF EVALUATION: FIBER  
YARN; BALLISTIC FABRIC; BALLISTIC FELTS; AND  
BALLISTIC FABRIC-RESIN LAMINATES. IN EACH PHASE,  
SAMPLES WERE TESTED USING EXISTING BALLISTIC  
MATERIALS SPECIFICATIONS AS GUIDELINES.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-731 000 6/7 1974  
MONSANTO RESEARCH CORP DAYTON OHIO

FOAM FLOTATION SYSTEMS FOR PERSONNEL  
WEARING BODY ARMOR. (U)

DESCRIPTIVE NOTE: FINAL REPT. FEB 69-SEP 70,  
JUL 71 114P SALTER, I. O. ; SCHWENDEMAN,  
J. L. ; WOJTOVICZ, A. ; JEFFERSON, R. T. ; SUN,  
S. M. ;

CONTRACT: DAAG17-69-C-0017

PROJ: DA-1-F-164207-DC-52

MONITOR: USA-NLABS, C/PLSEL

72-3-CE, 87

UNCLASSIFIED REPORT

DESCRIPTORS: (\*BODY ARMOR, \*FLOTATION), (\*EXPANDED  
PLASTICS, FLOTATION), (\*FOAMS, FLOTATION), (\*SEA RESCUE  
EQUIPMENT, FEASIBILITY STUDIES), AIR FORCE PERSONNEL,  
AIR-SEA RESCUES, PLASTICS (U)  
IDENTIFIERS: POLYURETHANE FOAMS, URETHANES (U)

A FEASIBILITY STUDY WAS CONDUCTED ON APPROACHES TO  
USING FOAMS IN FLOTATION SYSTEMS FOR PERSONNEL  
WEARING BODY ARMOR. FLOTATION SYSTEMS SHOULD BE  
RAPIDLY DEPLOYABLE (10 SECONDS) AND PROVIDE  
FLOTATION FOR AT LEAST SIX HOURS, EVEN IF DAMAGED.  
THESE SYSTEMS SHOULD NOT INTERFERE WITH THE WEARER  
AS HE PERFORMS HIS DUTIES. THREE APPROACHES WERE  
INVESTIGATED: (1) THE USE OF PREFORMED FLEXIBLE  
FOAM; (2) INSTANTLY GENERATED POLYSTYRENE FOAM;  
AND (3) FAST REACTING TWO-COMPONENT URETHANE  
FOAMS. ONLY THE PREFORMED FLEXIBLE FOAM PERFORMED  
WELL WHEN FABRICATED INTO A JACKET AND TESTED ON A  
MAN. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-737 725 11/5 1974  
UNIVERSITY OF MANCHESTER INST OF SCIENCE AND TECHNOLOGY  
(ENGLAND)

RESEARCH ON ENERGY ABSORPTION BY NONWOVEN  
FABRICS.

(U)

DESCRIPTIVE NOTE: FINAL TECHNICAL REPT. OCT 70-SEP 71,  
NOV 71 46P HEARLE, J. W. S. PURDY,

A. T. ;

CONTRACT: DAJA37-71-C-0554

PROJ: DA-1-J-652708-D-504

UNCLASSIFIED REPORT

DESCRIPTORS: (\*TEXTILES, \*TERMINAL BALLISTICS), (\*BODY  
ARMOR, COMPOSITE MATERIALS), PROJECTILES, PENETRATION,  
TESTS, DEFORMATION, SHOCK RESISTANCE, TENSILE  
PROPERTIES, THICKNESS, GREAT BRITAIN (U)  
IDENTIFIERS: ENERGY ABSORBERS (U)

THE OBJECT OF THE WORK HAS BEEN TO GAIN A GREATER  
UNDERSTANDING OF THE MEANS BY WHICH NEEDLED FABRIC  
ABSORBS ENERGY WHEN STRUCK TRANSVERSELY BY A  
PROJECTILE. NEEDLE PUNCHED FABRIC HAS BEEN  
SUBJECTED TO A SLOW SPEED PENETRATION TEST USING A  
RIGID STEEL PROBE, AND TO IMPACT WITH A FREE FLYING  
PROJECTILE. THE FIRST METHOD OF TEST HELPED  
ESTABLISH THE MECHANISM BY WHICH THIS MATERIAL  
DEFORMS DURING IMPACT. DURING HIGH SPEED TESTS  
DEFORMATION WAS STUDIED USING HIGH SPEED CINE  
PHOTOGRAPHY AND VARIOUS PHENOMENA OBSERVED.  
DETAILED OBSERVATION OF FABRIC BEHAVIOUR AROUND THE  
IMPACT POINT WHEN MULTILAYER SAMPLES ARE IN USE HAS  
BEEN CARRIED OUT USING AN EMBEDDING AND SECTIONING  
TECHNIQUE. PROJECTILES EXTEND FABRIC UNTIL  
THICKNESS IS REDUCED AND NO FURTHER RESISTANCE IS  
OFFERED. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-751 155 1974 14/2  
ARMY TEST AND EVALUATION COMMAND ABERDEEN PROVING GROUND  
MD

BODY ARMOR. (U)

DESCRIPTIVE NOTE: FINAL REPT. ON TEST OPERATIONS  
PROCEDURE.

JUL 72 16P

REPT NO. TOP-10-3-022

UNCLASSIFIED REPORT

DESCRIPTORS: (•BODY ARMOR, TEST METHODS), SAFETY,  
MILITARY TRAINING, TESTS, RELIABILITY, HUMAN FACTORS  
ENGINEERING (U)

THE DOCUMENT DESCRIBES A METHOD FOR EVALUATION OF  
BODY ARMOR FUNCTIONAL PERFORMANCE CHARACTERISTICS.  
IT IDENTIFIES SUPPORTING TESTS, FACILITIES, AND  
EQUIPMENT REQUIRED, AND PROVIDES PROCEDURES FOR  
PREOPERATIONAL INSPECTION, PHYSICAL CHARACTERISTICS,  
SAFETY, PERSONNEL TRAINING, SIZING, FITTING,  
COMPATIBILITY WITH COMBAT TASKS, DURABILITY,  
RELIABILITY, CARE, MAINTENANCE, HUMAN FACTORS, AND  
VALUE ANALYSIS. APPRECIABLE TO BODY ARMOR DESIGNED  
FOR PROTECTION OF SELECTED AREAS FROM THE NECK TO THE  
ANKLES. EXCLUDES HEAD ARMOR, FOOT ARMOR, AND  
BALLISTIC TESTING. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-752 792 1974  
NAVY CLOTHING AND TEXTILE RESEARCH UNIT NATICK MASS

THE DEVELOPMENT OF A NAVY, BUOYANT, ANTI-FRAGMENT, BULLETPROOF VEST: PROTECTION AGAINST LOW-VELOCITY FRAGMENTS, SECONDARY (SPALL) FRAGMENT DAMAGE, AND 30-CALIBER-BALL PROJECTILES.

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,  
NAVY 72 29P SILVIA, JOHN ; KEINS, DALE A.  
; SHARPINE, JAMES C. ;  
REPT. NO. TR-105, 2-72

UNCLASSIFIED REPORT

DESCRIPTORS: (BODY ARMOR, DESIGN), NAVAL EQUIPMENT, PROTECTIVE CLOTHING, ARMOR PLATE, BUOYANCY, STRESS (PHYSIOLOGY), TEST METHODS

(U)

THE NAVY CLOTHING AND TEXTILE RESEARCH UNIT HAS DEVELOPED TWO, EXPERIMENTAL, BUOYANT, ANTI-FRAGMENT, BULLETPROOF VESTS WHICH PROVIDE LOW-VELOCITY PROTECTION AGAINST MORTAR SHELL BURSTS AND SECONDARY FRAGMENTS (SPALL), PROVIDE PROTECTION AGAINST 30-CALIBER, SMALL-ARMS FIRE AND PROVIDE EMERGENCY, INHERENT BUOYANCY. EACH MODEL CONSISTS OF A CARRIER WHICH HAS FRONT AND BACK PANELS THAT CONTAIN A 30-CALIBER-BALL, BODY-ARMOR PLATE, A COMBINATION OF FELT AND/OR WOVEN BALLISTIC MATERIALS AND LAYERS OF BUOYANT, UNICELLULAR FOAM.

(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-752 903 5/9 5/5 1974  
HUMAN ENGINEERING LAB ABERDEEN PROVING GROUND MD

EVALUATION OF RIFLE-FIRING BEHAVIOR OF  
TROOPS EQUIPPED WITH BODY ARMOR: A  
PILOT STUDY.

(U)

DESCRIPTIVE NOTE: TECHNICAL NOTE,  
SEP 72 13P CORONA, BERNARD M. ELLIS,  
PAUL H. JONES, R. DOUGLAS PANDALL, R.  
BRADLEY SCHLETZ, HAYDEN A. ;  
REPT. NO. HEL-TN-14-72

UNCLASSIFIED REPORT

DESCRIPTORS: (ARMY PERSONNEL, PERFORMANCE (HUMAN)),  
(BODY ARMOR, ARMY PERSONNEL), ADAPTATION (PHYSIOLOGY),  
REACTION (PSYCHOLOGY), PERFORMANCE (HUMAN),  
ADJUSTMENT (PSYCHOLOGY), FIRING TESTS (ORDNANCE), ANALYSIS  
OF VARIANCE, HUMAN FACTORS ENGINEERING (U)  
IDENTIFIERS: EVALUATION (U)

TWENTY ENLISTED MEN, EQUIPPED WITH TWO TYPES OF  
BODY ARMOR FIRED THE M16 AT POP-UP TARGETS. THE  
RANGE WAS ELECTRONICALLY INSTRUMENTED TO RECORD SHOTS  
AND HITS, AS WELL AS RELATIONSHIPS BETWEEN THESE  
EVENTS. EACH SUBJECT FIRED 180 ROUNDS AT TARGETS  
WHICH APPEARED FOR TWO, FOUR AND SIX-SECOND  
PRESENTATION INTERVALS. THE RESULTS SHOWED NO  
SIGNIFICANT DIFFERENCE BETWEEN STANDARD NYLON VEST,  
NYLON TITANIUM VEST OR NO-VEST CONDITIONS AS SUBJECTS  
FIRED FROM THE STANDING POSITION. FURTHER, IT WAS  
EVIDENT THAT THE SHOOTER'S PERFORMANCE DURING TWO-  
SECOND PRESENTATIONS DIFFERED SIGNIFICANTLY FROM  
PERFORMANCE DURING FOUR AND SIX-SECOND EXPOSURES.  
IT WAS CONCLUDED THAT BODY ARMOR ALONE DOES NOT  
AFFECT RIFLE-FIRING BEHAVIOR FOR EITHER ACCURACY OR  
FIRING TIME, THAT SUBSEQUENT INVESTIGATIONS NEED NOT  
INCLUDE FOUR OR SIX SECOND PRESENTATION TIMES, AND  
THAT FURTHER RESEARCH ON RIFLE-FIRING BEHAVIOR SHOULD  
EXPLORE COMPLETE EQUIPMENT ENSEMBLES, INCLUDING LOAD-  
CARRYING DEVICES. (AUTHOR) (U)

UNCLASSIFIED

DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-753 73/ 1974 5/5  
ARMY NATICK LABS MASS

SOME EFFECTS OF BODY ARMOR ON MOTOR  
PERFORMANCE. PART I. EFFECTS OF STANDARD  
(135 PLATE) AND EXPERIMENTAL (48 PLATE)  
TITANIUM-NYLON BODY ARMOR ON MOTOR  
PERFORMANCE. PART II. ARMOR AND LOAD  
INDUCED PATTERNS OF PRESSURE ON THE TORSO  
DURING MOTOR PERFORMANCE.

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,  
OCT 72 51P MCGINNIS, JOHN M. ;  
REPT. NO. USA-NLABS-TR-73-13-PR  
PROJ: DA-1-J-664713-DL-40, DA-1-T-062106-A-121  
TASK: 1-J-664713-DL-4043, 1-T-062106-A-12102

UNCLASSIFIED REPORT

DESCRIPTORS: (BODY ARMOR, PERFORMANCE(HUMAN)), HUMAN  
FACTORS ENGINEERING, TITANIUM, NYLON, TEXTILES,  
PRESSURE, DETECTORS, ANALYSIS OF VARIANCE, PHYSIOLOGY(U)  
IDENTIFIERS: COMFORT (U)

NINE PSYCHOMOTOR TASKS DESIGNED FOR LABORATORY USE  
MEASURED THE PERFORMANCE OF 18 SOLDIER TEST SUBJECTS  
WHILE WEARING M1956 LIGHTWEIGHT LOAD CARRYING  
EQUIPMENT (LCE) ALONE AND OVER STANDARD (135  
PLATE) AND EXPERIMENTAL (48 PLATE) TITANIUM-  
NYLON BODY ARMOR. SCORES BASED ON LCE ONLY, ON  
EXPERIMENTAL ARMOR AND LCE, AND ON STANDARD ARMOR  
PLUS LCE ARE COMPARED. IN LABORATORY INTERVIEWS,  
SUBJECTS APPEARED TO PREFER LOAD CARRYING EQUIPMENT  
WORN WITHOUT ARMOR TO LCE WORN OVER EITHER TYPE OF  
ARMOR, AND THEY COMMENTED ON SPECIFIC ARMOR PROBLEMS.  
NEXT, A LIGHTWEIGHT CLOTH SENSOR GARMENT  
INCORPORATING PRESSURE SENSORS WAS USED TO MEASURE  
PRESSURE AT VARIOUS LOCATIONS ON A TEST SUBJECT'S  
TORSO AS HE PERFORMED TASK. PERFORMANCE AND DISPLAY  
WERE RECORDED IN COLOR ON THE SAME MOTION PICTURE  
FILM, FOR EACH OF SIX ARMOR-LOAD COMBINATIONS.  
(AUTHOR)

(U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-756 367 1974  
ARMY NATICK LABS MASS CLOTHING AND PERSONAL LIFE SUPPORT  
EQUIPMENT LAB

BALLISTIC AND SPALL TESTS FOR AIRCREW BODY  
ARMOR. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,  
AUG 72 74P JUDGE, THOMAS H. ; BUTTKUS,  
PAUL J. ;  
REPT. NO. C/PULSEL-98  
PROJ: DA-1-F-164207-DC-52  
MONITOR: USA-VLABS TR-73-9-CE

UNCLASSIFIED REPORT

DESCRIPTORS: (\*BODY ARMOR, \*TERMINAL BALLISTICS),  
(\*FLIGHT CREWS, BODY ARMOR), FRAGMENTATION, PROTECTION,  
PROJECTILES, TEXTILES, DESIGN, NYLON (U)  
IDENTIFIERS: \*SPALLING (U)

A NEW INTEGRATED BODY ARMOR CARRIER SYSTEM IS  
DESIGNED TO REDUCE SPALL WHEN THE ARMOR PLATE IS  
IMPACTED BY .30 CALIBER SMALL ARMS FIRE. BALLISTIC  
TESTS, WHEN COMPARED TO PREVIOUS DATA, SHOWED THIS  
SYSTEM EXHIBITED GREATER SPALL SUPPRESSION THAN THE  
STANDARD AIRCREW ARMOR IN USE IN VIETNAM. THE  
SYSTEM ALSO PROVIDES SECONDARY FRAGMENTATION  
PROTECTION TO AREAS OF THE TORSO NOT COVERED BY THE  
PLATE INSERT. RESULTS INDICATE THAT THE NEW VEST-  
CARRIER SYSTEM MADE OF NYLON 128 SHOULD BE TYPE  
CLASSIFIED AS STANDARD 'A'. INJURY BY FLYING  
SPALL HAS BEEN REDUCED, BUT A CONTINUING PROGRAM IS  
NEEDED TO ESTABLISH ADVANCED DESIGN CRITERIA, TEXTILE  
AND OTHER MATERIAL CAPABILITIES TO SUPPRESS ALL  
SPALL, GENERATED FROM OBLIQUITY STRIKES ON AIRCREW  
ARMOR BY .30 CALIBER AP PROJECTILES.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-758 910 14/2 6/14 19/4  
IIT RESEARCH INST CHICAGO ILL

DESIGN AND DEVELOPMENT OF A FULL-SCALE  
ANATOMICAL LOAD DISTRIBUTION ANALYZER.

(U)

DESCRIPTIVE NOTE: FINAL REPT. MAY 70-FEB 72,  
NOV 72 60P RODZEN,R. ;OGDEN,C. ;  
SCRIBANG,F. ;BURNS,M. ;BARRON,E. R. ;  
CONTRACT: JAAG17-70-C-0161  
PROJ: DA-1-F-164204-D-154  
MONITOR: C/PSEL,USA-NLABS 99,TR-73-18-CE

UNCLASSIFIED REPORT

DESCRIPTORS: (•TEST EQUIPMENT, DESIGN); (•ANTHROPOMETRY,  
•BODY ARMOR), ARMY RESEARCH, MEASUREMENT, HUMAN BODY,  
LOADS(FORCES), PRESSURE, DETECTORS, PRESSURE GAGES (U)

IN A CONTINUING EFFORT TO REDUCE DISCOMFORT IN THE WEARING OF CERAMIC BODY ARMOR, THE MEASUREMENT OF STRESSES UPON THE BODY HAS BEEN AN IMPORTANT APPROACH TOWARD ACHIEVING THE BEST POSSIBLE CONFIGURATION FOR RIGID PLATES. A DEVICE FOR MAKING SUCH MEASUREMENTS HAS BEEN DEVELOPED WHICH IS CAPABLE OF SIMULTANEOUSLY MEASURING AND DISPLAYING PRESSURE, PRESSURE CHANGES, LOAD MAGNITUDE AND THE DISTRIBUTION OF FORCES TRANSMITTED TO THE TORSO BY AIRCREW AND INFANTRY ARMOR, LOAD CARRYING EQUIPMENT, COMBAT CLOTHING, SEAT CONFIGURATIONS AND SEAT RESTRAINT AND PARACHUTE HARNESSES. THE SYSTEM CONSISTS OF A SENSOR VEST INCORPORATING 248 MINIATURE SENSORS. A THREE-DIMENSIONAL ANATOMICAL UNIT VISUALLY DISPLAYS LOAD MAGNITUDES AND DISTRIBUTION OF FORCES TRANSMITTED TO THE TORSO BY LIGHTS WHICH CHANGE COLOR DEPENDING UPON THE LOAD. (AUTHOR MODIFIED ABSTRACT)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-759 493 1974 5/5  
HUMAN ENGINEERING LAB ABERDEEN PROVING GROUND MD

HUMAN FACTOR EVALUATION OF THE USMC M1955  
ARMORED VEST AND THE PROPOSED TITANIUM  
NYLON IMPROVED CONVENTIONAL MUNITIONS  
PROTECTIVE ARMORED VEST (48 PLATE). (U)

DESCRIPTIVE NOTE: TECHNICAL MEMO.,  
MAR 73 77P SCHEETZ, HAYDEN A. ; CORONA,  
BERNARD M. ; TELLIS, PAUL H. ; JONES, R. DOUGLAS  
; RANDALL, R. BRADLEY ;  
REPT. NO. HEL-TM-8-73

UNCLASSIFIED REPORT

DESCRIPTORS: (BODY ARMOR, HUMAN FACTORS ENGINEERING),  
TITANIUM, ANTHROPOMETRY, NYLON, PERFORMANCE (HUMAN),  
ADAPTATION (PHYSIOLOGY), FIRING TESTS (ORDNANCE),  
PERFORMANCE (HUMAN), ARMY EQUIPMENT (U)

A HUMAN FACTORS EVALUATION OF THE ARMY  
SIMPLIFIED 48-PLATE TITANIUM/NYLON ARMORED  
VEST AND THE M1955 USMC DORON ARMORED  
VEST WAS CONDUCTED BY THE U.S. ARMY HUMAN  
ENGINEERING LABORATORY. THE VESTS WERE  
COMPARED AS TO PHYSICAL CHARACTERISTICS,  
ANTHROPOMETRIC MEASUREMENTS, VEST MOVEMENT AND STATIC  
EXERCISE, EMPLOYMENT OF SMALL ARMS BY TROOPS EQUIPPED  
WITH THE VESTS, AND USER ACCEPTANCE. THE RESULTS  
YIELDED MANY POINTS OF CONTRAST BETWEEN VESTS, BUT NO  
OVERRIDING SUPERIORITY OF EITHER VEST WAS NOTED.  
RECOMMENDATIONS ARE MADE TO IMPROVE THE QUALITIES  
OF THE SIMPLIFIED 48-PLATE TITANIUM/NYLON  
CONFIGURATION, BASED ON THE CONCLUSION THAT A GREATER  
POTENTIAL FOR FURTHER DEVELOPMENT IS SEEN IN THE  
ARTICULATED CONFIGURATION. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-763 165 1974

EDGEWOOD ARSENAL ABERDEEN PROVING GROUND MD

A SYSTEMS EFFECT STUDY ON THE EVALUATION OF  
LIGHTWEIGHT BODY ARMOR. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT. DEC 72-SEP 72,  
JUN 73 34P SACCO, WILLIAM J. ISHEAR,  
RALPH E. ;

REPT. NO. EA-TR-4729

PROJ: DA-1-J-662713-DJ-4U, DA-1-T-062110-A-027

UNCLASSIFIED REPORT

DESCRIPTORS: (BODY ARMOR, RELIABILITY), EFFECTIVENESS,  
PROTECTION, FRAGMENTATION, PENETRATION, TERMINAL  
BALLISTICS, NONLINEAR PROGRAMMING, THORAX (U)  
IDENTIFIERS: EVALUATION (U)

CONTENTS: FRAGMENT THREATS; THE FRAGMENT  
SIMULATOR; THE THORACIC DEFENSE SYSTEM; MEDICAL  
EVALUATION PHASE. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-765 423 11/8 1974  
ALLIED CHEMICAL CORP PETERSBURG VA

EXPERIMENTAL NYLON 6 FOR PERSONNEL  
ARMOR.

(U)

DESCRIPTIVE NOTE: FINAL REPT.,  
DEC 72 41P MAYER, RICHARD E. ;  
CONTRACT: DAAG17-70-C-0029  
PROJ: DA-1-T-U62105-A-329  
TASK: 1-T-U62105-A-329C2  
MONITOR: USA-NLABS TR-73-28-CE

UNCLASSIFIED REPORT

DESCRIPTORS: (•BODY ARMOR, •NYLON), TERMINAL BALLISTICS,  
TEXTILES, TESTS, SPINNING (INDUSTRIAL PROCESSES),  
PRODUCTION (U)  
IDENTIFIERS: NYLON 6 (U)

THE WORK WAS AN EFFORT TO DETERMINE WHETHER THE  
PERFORMANCE OF THE NEW TYPE NYLON 6 FOR PERSONNEL  
ARMOR COULD BE FURTHER OPTIMIZED BY VARIATIONS IN  
MOLECULAR WEIGHT, MOLECULAR WEIGHT DISTRIBUTION,  
ORIENTATION AND CRYSTALLINITY. THE RESULTS  
ALTHOUGH NEGATIVE IN RESPECT TO THE GOAL OF LIGHT,  
NEVERTHELESS SHOW THAT AN INVESTIGATION OF  
FUNDAMENTALLY DIFFERENT TYPES OF FIBER IS NEEDED TO  
OBTAIN SIGNIFICANT IMPROVEMENTS IN TENACITY, WORK-TO-  
RUPTURE, AND ATTENDANT INCREASES IN IMPACT  
RESISTANCE. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-766 296 1974  
HUMAN ENGINEERING LAB ABERDEEN PROVING GROUND MD

A HUMAN FACTORS ENGINEERING ASSESSMENT OF  
AN ANATOMICALLY CONFORMING AIRCREW BODY  
ARMOR SYSTEM.

(U)

DESCRIPTIVE NOTE: TECHNICAL MEMO.,  
JUN 73 90P CORONA, BERNARD M. JONES,  
R. DOUGLAS ;  
REPT. NO. HEL-TM-9-73

UNCLASSIFIED REPORT

DESCRIPTORS: (BODY ARMOR, FLIGHT CREWS), COMPATIBILITY,  
ARMY RESEARCH (U)

AN ANATOMICALLY CONFORMING, FOUR-SIZE, AIRCREW BODY  
ARMOR (ACBA) SYSTEM, DEVELOPED BY US ARMY  
NATICK LABORATORIES, WAS ASSESSED TO DETERMINE  
ITS COMPATIBILITY WITH ARMY AVIATOR BODY SIZES,  
FLIGHT TASK REQUIREMENTS AND AIRCREW STATION  
GEOMETRY. AS A BASE FOR ALL COMPARISONS THE  
STANDARD THREE-SIZE, AIRCREW BODY ARMOR (SBA)  
SYSTEM WAS USED. WHERE POSSIBLE AN ATTEMPT WAS  
MADE TO INTEGRATE AND UTILIZE ELEMENTS OF THE HEL  
ARMOR SYSTEM DEVELOPMENT/EVALUATION  
GUIDELINE, TM 18-69. THIRTY ENLISTED MEN AND  
SIX OFFICER PILOTS WERE USED AS SUBJECTS. AS A  
RESULT OF THIS HFE ASSESSMENT IT HAS BEEN  
DETERMINED THAT THE ACBA SYSTEM WAS NOT SUITABLE AS  
PROPOSED, THE SBA SYSTEM HAS SERIOUS SHORTCOMINGS,  
AND THE HEL TM 18-69 CANNOT BE UTILIZED FOR THE  
DEVELOPMENT OR EVALUATION OF BODY-WORN ARMOR SYSTEMS.  
(AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-815 561 1974  
ARMY CONCEPT TEAM IN VIETNAM SAN FRANCISCO CALIF  
96243

BODY ARMOR.

(U)

DESCRIPTIVE NOTE: FINAL REPT. 15 JAN-30 MAY 67,  
JUN 67 7P SPICELY, SAMUEL B. ;  
PROJ: ACTIV-ACL-24/67:

UNCLASSIFIED REPORT

DESCRIPTORS: (BODY ARMOR, ACCEPTABILITY), INFANTRY,  
CONFIGURATION, TEST EQUIPMENT, HUMAN FACTORS  
ENGINEERING, WEIGHT, PERFORMANCE(ENGINEERING),  
VIETNAM  
IDENTIFIERS: COMFORT

(U)

(U)

TROOP ACCEPTANCE DURABILITY, AND OPERATIONAL  
SUITABILITY OF ARMOR, INFANTRY SMALL ARMS,  
PROTECTIVE FRONT AND BACK WITH CARRIER, AND  
BODY ARMOR, FRAGMENTATION PROTECTIVE,  
LIGHTWEIGHT WERE DETERMINED IN VIETNAM. BODY  
ARMOR, FRAGMENTATION PROTECTIVE, LIGHTWEIGHT  
IS DURABLE BUT IS NOT ACCEPTABLE FOR WEAR BY FOOT  
MOBILE TROOPS WHILE ENGAGED IN SEARCH AND DESTROY  
OPERATIONS, PATROLLING, OR RECONNAISSANCE OPERATIONS.  
ARMOR, INFANTRY SMALL ARMS, PROTECTIVE  
FRONT AND BACK WITH CARRIER IS DURABLE AND  
ACCEPTABLE FOR USE BY PERSONNEL ENGAGED IN CONVOY  
ESCORT DUTY, MOTORIZED PATROLS, AND SIMILAR  
FUNCTIONS. CONTINUED R AND D EMPHASIS SHOULD  
BE PLACED ON REDUCING THE WEIGHT OF BODY ARMOR.  
ARMOR INFANTRY SMALL ARMS, PROTECTIVE  
FRONT AND BACK WITH CARRIER, SHOULD BE MADE  
AVAILABLE FOR ISSUE TO TROOPS ENGAGED IN CONVOY  
ESCORT DUTY, MOTORIZED PATROLS, AND SIMILAR  
FUNCTIONS. (AUTHOR)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-618 141 1974  
ARMY INFANTRY BOARD FORT BENNING GA

SERVICE TEST OF LIGHTWEIGHT BODY ARMOR, BASIC VEST,  
T66-1. (U)

DESCRIPTIVE NOTE: FINAL TEST REPT. 6 JAN-6 MAY 67,  
JUN 67 63P DRYANT, JAMES A. ;  
REPT. NO. USAIB-3174  
PROJ: RDT/E-16643303D54730, USAYECOM-6-7-6510-02

UNCLASSIFIED REPORT

DESCRIPTORS: (BODY ARMOR, ACCEPTABILITY), HUMAN FACTORS  
ENGINEERING, PROTECTION, CLOTHING, ARMY PERSONNEL,  
QUALITY CONTROL, FAILURE, TEST METHODS, MOISTURE (U)  
IDENTIFIERS: HUMAN FACTORS ENGINEERING,  
LINCLOE (LIGHTWEIGHT INDIVIDUAL COMBAT CLOTHING AND E,  
PARACHUTISTS (U)

THE SERVICE TEST OF LIGHTWEIGHT BODY  
ARMOR, BASIC VEST, T66-1, WAS CONDUCTED BY  
THE US ARMY INFANTRY BOARD FROM 6 JANUARY  
1967 TO 6 MAY 1967. THE PURPOSE OF THE TEST WAS  
TO DETERMINE THE SUITABILITY OF THE T66-1 VEST FOR  
US ARMY USE; TO DETERMINE TO WHAT EXTENT THE  
T66-1 VEST MET THE REQUIREMENTS OF THE LINCLOE  
QMR; AND TO DETERMINE THE SUITABILITY OF THE T66-  
1 VEST FOR PARACHUTIST'S USE AND USE WITH LOWERING  
DEVICES. FOUR DEFICIENCIES AND THREE SHORTCOMINGS  
WERE FOUND. THE DEFICIENCIES WERE: LACK OF  
DURABILITY OF THE T66-1 VEST, ALL SIZES OF THE  
T66-1 VEST EXCEED THE WEIGHT LIMITATIONS SPECIFIED  
IN LINCLOE QMR; THE T66-1 VEST RESTRICTED HEAD  
AND BODY MOVEMENT AND BREATHING TO A GREATER DEGREE  
THAN THE STANDARD VEST AND CONSEQUENTLY FAILED TO  
IMPROVE, OVER THE STANDARD VEST, THE WEARER'S ABILITY  
TO PERFORM A COMBAT RELATED ACTIVITY; THE T66-1  
VEST PREVENTED PARACHUTISTS FROM CHECKING THEIR  
ENTIRE CANOPIES FOR MALFUNCTION OR DAMAGE, THUS  
CREATING A SAFETY HAZARD TO PARACHUTISTS. THE  
SHORTCOMINGS WERE: THE INADEQUACY OF THE AND  
GRENADES; INADEQUACY OF THE CLOSURE SYSTEM ON THE  
BELLOWS-TYPE BREAST POCKETS FOR KEEPING THE POCKETS  
CLOSED; AND OMISSION OF INSTRUCTIONS IN THE POH;  
FOR WASHING THE T66-1 VEST. THE US ARMY  
INFANTRY BOARD CONCLUDES THAT THE T66-1 VEST IS  
UNSUITABLE FOR US ARMY USE UNTIL CORRECTION OF THE  
DEFICIENCIES AND AS MANY SHORTCOMINGS AS PRACTICABLE.

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JDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-826 999 5/9 6/17 19/4  
ARMY CONCEPT TEAM IN VIETNAM SAN FRANCISCO CALIF 96384

AIRCREW PROTECTIVE ARMOR. (U)

DESCRIPTIVE NOTE: FINAL REPT. OCT-DEC 67,  
JAN 68 13P YOST, DEVERNE R. ;  
PROJ: ACTIV-ACA-55/67-1

UNCLASSIFIED REPORT

DESCRIPTORS: (BODY ARMOR, FLIGHT CREWS), MILITARY  
EQUIPMENTS, EFFECTIVENESS, PROTECTIVE CLOTHING,  
CERAMIC MATERIALS, GLASS TEXTILES, DESIGN, NYLON (U)

THE PRESENT AIRCREW ARMOR WILL NOT CONTAIN THE  
BULLET SPLASH NOR THE SPALL WHEN STRUCK BY A  
PROJECTILE. NATICK LABORATORY DESIGNED AND  
FABRICATED A NYLON FELT FILLED VEST TO CARRY THE  
CERAMIC, FIBER GLASS PLATES. NATICK LABORATORY  
TESTS CONFIRMED THE CREDIBILITY OF DESIGN. THE  
ARMY CONCEPT TEAM IN VIETNAM (ACTIV)  
EVALUATED THE ITEMS TO DETERMINE IF THE EQUIPMENT WAS  
COMFORTABLE AND WOULD NOT INTERFERE WITH PERFORMANCE  
OF CREW DUTIES. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-828 884 1974 11/9  
ARMY GENERAL EQUIPMENT TEST ACTIVITY FORT LEE VA

ENGINEERING TEST OF LIGHTWEIGHT BODY ARMOR, BASIC  
VEST, T66-1. (U)

DESCRIPTIVE NOTE: FINAL REPT.,  
AUG 67 95P MANGUM, EDWIN W. I  
PROJ: PDT/E-1-M-643303-D-547, USATECOM-876510  
TASK: 1-M-643303-D-54730, 87651001

UNCLASSIFIED REPORT

DESCRIPTORS: (BODY ARMOR, ACCEPTABILITY), SAFETY, HUMAN  
FACTORS ENGINEERING, FLAMMABILITY, QUESTIONNAIRES,  
NYLON, VISUAL INSPECTION, VENTILATION, BURNING RATE,  
WEAR RESISTANCE, ENVIRONMENTAL TESTS, RELIABILITY (U)  
IDENTIFIERS: HEAT, PROTECTION (U)

AN ENGINEERING TEST OF LIGHTWEIGHT BODY  
ARMOR, BASIC VEST, T66-1 WAS CONDUCTED FROM 9  
JANUARY THROUGH 30 JUNE 1967 TO DETERMINE THE  
TECHNICAL PERFORMANCE AND SAFETY CHARACTERISTICS OF  
THE T66-1 VEST IN CONSIDERATION OF ALL TECHNICAL  
CHARACTERISTICS FOR LIGHTWEIGHT BODY ARMOR IN  
THE QMR FOR A SYSTEM OF LIGHTWEIGHT INDIVIDUAL  
CLOTHING AND EQUIPMENT (LINCLOE) WITH THE  
EXCEPTION OF THOSE RELATED TO BALLISTICS LIMITS,  
MAINTENANCE, AND TRAINING DEVICES. IT IS  
RECOMMENDED THAT THE LIGHTWEIGHT BODY ARMOR,  
BASIC VEST, T66-1 BE MODIFIED TO INCLUDE A  
NONFLAMMABLE BINDER IN THE NYLON FELT FILLER, TO  
PROVIDE INCREASED VENTILATION, AND TO ELIMINATE  
INTERFERENCE WITH POSITIONING AND FIRING THE RIFLE. (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-867 357 1974 6/17  
ARMY TEST AND EVALUATION COMMAND ABERDEEN PROVING GROUND  
MD

ARCTIC ENVIRONMENTAL TEST OF BODY ARMOR AND  
HELMETS. (U)

DESCRIPTIVE NOTE: FINAL REPT. ON MATERIEL TEST PROCEDURE.  
NOV 69 16P  
REPT. NO. WTP-10-4-009  
PROJ: AMCR-310-6

UNCLASSIFIED REPORT

DESCRIPTORS: (\*HELMETS, COLD WEATHER TESTS), (\*BODY  
ARMOR, COLD WEATHER TESTS), SAFETY, HUMAN FACTORS  
ENGINEERING, DROP TESTS, MAINTAINABILITY, PHYSICAL  
PROPERTIES, ARMY RESEARCH, ARCTIC REGIONS (U)

THE REPORT DESCRIBES TEST METHODS AND TECHNIQUES  
FOR EVALUATING THE PERFORMANCE AND CHARACTERISTICS OF  
BODY ARMOR AND HELMETS UNDER ARCTIC WINTER  
ENVIRONMENTAL CONDITIONS, RELATIVE TO THE  
REQUIREMENTS EXPRESSED IN QUALITATIVE MATERIEL  
REQUIREMENTS, SMALL DEVELOPMENT REQUIREMENTS,  
OR OTHER APPLICABLE DOCUMENTATION CONTAINING DESIGN  
REQUIREMENTS. THE END OBJECTIVE OF TESTING IS TO  
ASCERTAIN WHETHER THE TEST ITEM IS SUITABLE FOR  
MILITARY SERVICE USE UNDER ARCTIC WINTER  
ENVIRONMENTAL CONDITIONS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZAA14

AD-872 651 1974 14/2  
ARMY TEST AND EVALUATION COMMAND ABERDEEN PROVING GROUND  
MD

BODY ARMOR. (U)

DESCRIPTIVE NOTE: FINAL REPT. ON MATERIEL TEST PROCEDURE.  
JUN 70 24P  
REPT. NO. MTP-10-2-206  
PROJ: AMCR-310-6

UNCLASSIFIED REPORT

DESCRIPTORS: (\*BODY ARMOR; TEST METHODS), ARMY  
EQUIPMENT, STANDARDS; TEST EQUIPMENT, RELIABILITY,  
ENVIRONMENTAL TESTS, TRANSPORTATION, MAINTENANCE, LIFE  
EXPECTANCY, SAFETY, HUMAN FACTORS ENGINEERING, QUALITY  
CONTROL (U)

IDENTIFIERS: \*COMMON ENGINEERING TEST PROCEDURES,  
EVALUATION, LIGHTWEIGHT INDIVIDUAL CLOTHING AND  
EQUIPMENT, LINCLOE (LIGHTWEIGHT INDIVIDUAL CLOTHING AND  
EQUIPMENT (U)

THE ENGINEERING TEST PROCEDURE DESCRIBES TEST  
METHODS AND TECHNIQUES FOR EVALUATING THE TECHNICAL  
PERFORMANCE AND CHARACTERISTICS OF BODY ARMOR, AND  
FOR DETERMINING ITS SUITABILITY TO BE SUBJECTED TO  
FURTHER TEST FOR SERVICE USE BY THE U. S. ARMY.  
THE EVALUATION IS RELATED TO CRITERIA EXPRESSED IN  
APPLICABLE QUALITATIVE MATERIEL REQUIREMENTS (QMR),  
SMALL DEVELOPMENT REQUIREMENTS (SDR), TECHNICAL  
CHARACTERISTICS (TC), OR OTHER APPROPRIATE DESIGN  
REQUIREMENTS AND SPECIFICATIONS. (U)

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CORPORATE AUTHOR - MONITORING AGENCY

\*ADVISORY GROUP FOR AEROSPACE RESEARCH  
AND DEVELOPMENT PARIS (FRANCE)

\* \* \*  
AGARD-CP-41  
PATTERN RECOGNITION. BODY  
ARMOUR AND AIRCREW EQUIPMENT  
ASSEMBLIES. CURRENT SPACE MEDICAL  
PROBLEMS. AEROMEDICAL EVACUATION.  
AD-691 092

\*AEROJET-GENERAL CORP AZUSA CALIF

\* \* \*  
DEVELOPMENT OF PLASTIC MATERIAL  
FOR PERSONNEL ARMOR  
AD-052 243

\* \* \*  
DEVELOPMENT OF PLASTIC MATERIAL  
FOR PERSONNEL ARMOR  
AD-069 734

\*ALLIED CHEMICAL CORP PETERSBURG VA

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EXPERIMENTAL NYLON 6 FOR  
PERSONNEL ARMOR.  
(USA-NLABS-TR-73-28-CE)  
AD-765 423

\*ARMY CONCEPT TEAM IN VIETNAM SAN  
FRANCISCO CALIF 96243

\* \* \*  
BODY ARMOR.  
AD-815 561

\*ARMY CONCEPT TEAM IN VIETNAM SAN  
FRANCISCO CALIF 96384

\* \* \*  
AIRCREW PROTECTIVE ARMOR.  
AD-826 999

\*ARMY FOREIGN SCIENCE AND TECHNOLOGY  
CENTER CHARLOTTESVILLE VA

\* \* \*  
FSTC-HT-23-1651-70  
KNIGHTS OF THE TWENTIETH  
CENTURY (RYTSALI DVADTSATEGO VEKA),  
AD-719 551

\*ARMY GENERAL EQUIPMENT TEST ACTIVITY  
FORT LEE VA

\* \* \*  
ENGINEERING TEST OF LIGHTWEIGHT

BODY ARMOR, BASIC VEST, T66-1.  
AD-828 884

\*ARMY INFANTRY BOARD FORT BENNING GA

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USAIB-3174  
SERVICE TEST OF LIGHTWEIGHT  
BODY ARMOR, BASIC VEST, T66-1.  
AD-818 141

\*ARMY NATICK LABS MASS

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USA-NLABS-72-3-CE  
FOAM FLOTATION SYSTEMS FOR  
PERSONNEL WEARING BODY ARMOR.  
AD-731 000

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USA-NLABS-TR-68-4-PR  
HUMAN FACTORS EVALUATION OF  
BODY-SUPPORTED AIRCREWMAN'S  
BUTTOCKS AND CROTCH PROTECTIVE  
UNITS: (COMPARISONS OF TWO HEIGHTS  
OF CROTCH PROTECTOR AND THREE  
SUSPENSION SYSTEMS).  
AD-658 034

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USA-NLABS-TR-68-57-CM  
CRASHWORTHINESS OF AIRCREW  
PROTECTIVE ARMOR.  
AD-672 504

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USA-NLABS-TR-69-43-CE  
BODY ARMOR FOR AIRCREWMEN.  
AD-688 122

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USA-NLABS-TR-69-49-CE  
A STUDY OF FORCES CAUSED BY  
HEAD IMPACT ON AIRCREW PERSONNEL  
ARMOR UNDER SIMULATED CRASH  
CONDITIONS.  
AD-685 838

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USA-NLABS-TR-69-61-CE  
CONSTRUCTION OF BALLISTIC  
MATERIAL SAMPLES FOR AIRCREW ARMOR  
SYSTEMS.  
AD-691 739

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USA-NLABS-TR-69-79-PR  
EVALUATION OF ARMY AIRCREW  
PROTECTIVE ARMOR IN VIETNAM.

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AD-696 481

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 USA-NLABS-TR-70-13-CE  
 A STUDY OF FELTS FOR PERSONAL  
 ARMOR.  
 AD-695 644

\* \* \*  
 USA-NLABS-TR-70-32-CE  
 A REVIEW OF THE DEVELOPMENT OF  
 BALLISTIC NEEDLE-PUNCHED FELTS.  
 AD-777 918

\* \* \*  
 USA-NLABS-TR-70-51-CE  
 ADVANCED AIRCREW ARMOR  
 SUSPENSION SYSTEMS.  
 AD-713 016

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 USA-NLABS-TR-70-65-CE  
 DESIGN, DEVELOPMENT AND  
 FABRICATION OF A PERSONNEL ARMOR  
 LOAD PROFILE ANALYZER.  
 AD-711 876

\* \* \*  
 USA-NLABS-TR-71-30-CE  
 A HISTORY OF THE DEVELOPMENT OF  
 AN ARMOR ENSEMBLE FOR MINE  
 CLEARANCE PERSONNEL.  
 AD-729 353

\* \* \*  
 USA-NLABS-TR-71-47-CE  
 EXPERIMENTAL ORGANIC FIBER  
 MATERIALS FOR PERSONNEL ARMOR.  
 AD-730 775

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 USA-NLABS-TR-71-48-CE  
 BICOMPONENT AND BICONSTITUENT  
 FIBERS IN BALLISTIC FABRIC FOR  
 PERSONNEL ARMOR.  
 AD-726 918

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 USA-NLABS-TR-73-9-CE  
 BALLISTIC AND SPALL TESTS FOR  
 AIRCREW BODY ARMOR.  
 AD-756 367

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 USA-NLABS-TR-73-13-PR  
 SOME EFFECTS OF BODY ARMOR ON  
 MOTOR PERFORMANCE. PART I.  
 EFFECTS OF STANDARD (135 PLATE) AND  
 EXPERIMENTAL (48 PLATE) TITANIUM-  
 NYLON BODY ARMOR ON MOTOR

PERFORMANCE. PART II. ARMOR AND  
 LOAD INDUCED PATTERNS OF PRESSURE  
 ON THE TORSO DURING MOTOR  
 PERFORMANCE.  
 AD-753 937

\* \* \*  
 USA-NLABS-TR-73-18-CE  
 DESIGN AND DEVELOPMENT OF A  
 FULL-SCALE ANATOMICAL LOAD  
 DISTRIBUTION ANALYZER.  
 AD-758 918

\* \* \*  
 USA-NLABS-TR-73-28-CE  
 EXPERIMENTAL NYLON 6 FOR  
 PERSONNEL ARMOR.  
 AD-765 423

\*ARMY NATICK LABS MASS PIONEERING  
 RESEARCH DIV

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 EPR-14  
 HUMAN FACTORS EVALUATION OF  
 BODY-SUPPORTED AIRCREWMAN'S  
 BUTTOCKS AND CROTCH PROTECTIVE  
 UNITS: (COMPARISONS OF TWO HEIGHTS  
 OF CROTCH PROTECTOR AND THREE  
 SUSPENSION SYSTEMS).  
 (USA-NLABS-TR-68-4-PR)  
 AD-658 034

\*ARMY NATICK LABS MASS CLOTHING AND  
 ORGANIC MATERIALS LAB

\* \* \*  
 C/OM-47  
 CRASHWORTHINESS OF AIRCREW  
 PROTECTIVE ARMOR.  
 AD-672 504

\*ARMY NATICK LABS MASS CLOTHING AND  
 PERSONAL LIFE SUPPORT EQUIPMENT LAB

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 C/ED-50  
 BODY ARMOR FOR AIRCREWMEN.  
 (USA-NLABS-TR-69-43-CE)  
 AD-688 122

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 C/PLSEL-59  
 A STUDY OF FORCES CAUSED BY  
 HEAD IMPACT ON AIRCREW PERSONNEL  
 ARMOR UNDER SIMULATED CRASH  
 CONDITIONS.

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AD-685 838

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C/PLSEL-62  
CONSTRUCTION OF BALLISTIC  
MATERIAL SAMPLES FOR AIRCREW ARMOR  
SYSTEMS.  
AD-691 739

\* \* \*  
C/PLSEL-74  
ADVANCED AIRCREW ARMOR  
SUSPENSION SYSTEMS.  
AD-713 016

\* \* \*  
C/PLSEL-75  
DESIGN, DEVELOPMENT AND  
FABRICATION OF A PERSONNEL ARMOR  
LOAD PROFILE ANALYZER.  
AD-711 876

\* \* \*  
C/PLSEL-84  
A HISTORY OF THE DEVELOPMENT OF  
AN ARMOR ENSEMBLE FOR MINE  
CLEARANCE PERSONNEL.  
(USA-NLABS-TR-71-30-CE)  
AD-729 353

\* \* \*  
C/PLSEL-87  
FOAM FLOTATION SYSTEMS FOR  
PERSONNEL WEARING BODY ARMOR.  
AD-731 000

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C/PLSEL-98  
BALLISTIC AND SPALL TESTS FOR  
AIRCREW BODY ARMOR.  
(USA-NLABS-TR-73-9-CE)  
AD-756 367

\* \* \*  
C/PLSEL-TS-164  
A STUDY OF FELTS FOR PERSONAL  
ARMOR.  
AD-695 644

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C/PLSEL-TS-173  
BICOMPONENT AND BICONSTITUENT  
FIBERS IN BALLISTIC FABRIC FOR  
PERSONNEL ARMOR.  
AD-726 918

\* \* \*  
C/PLSEL-TS-177  
EXPERIMENTAL ORGANIC FIBER  
MATERIALS FOR PERSONNEL ARMOR.

AD-730 775

\* \* \*  
C/PSEL-TS-167  
A REVIEW OF THE DEVELOPMENT OF  
BALLISTIC NEEDLE-PUNCHED FELTS.  
(USA-NLABS-TR-70-32-CE)  
AD-707 918

\*ARMY NATICK LABS MASS PIONEERING  
RESEARCH LAB

\* \* \*  
EPT-9  
EVALUATION OF ARMY AIRCREW  
PROTECTIVE ARMOR IN VIETNAM.  
(USA-NLABS-TR-69-79-PR)  
AD-696 481

\*ARMY TEST AND EVALUATION COMMAND  
ABERDEEN PROVING GROUND MD

\* \* \*  
MTP-10-2-206  
BODY ARMOR.  
AD-872 651

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MTP-10-2-506  
BALLISTIC TESTING OF PERSONNEL  
ARMOR MATERIALS.  
AD-719 212

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MTP-10-4-009  
ARCTIC ENVIRONMENTAL TEST OF  
BODY ARMOR AND HELMETS.  
AD-867 357

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TOP-10-3-022  
BODY ARMOR.  
AD-751 155

\*AVIATION (M L) CO LTD (GT BRIT)

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PHYSIOLOGICAL COSTS OF BODY  
ARMOR.  
AD-687 953

\*AVIATION SAFETY ENGINEERING AND  
RESEARCH PHOENIX ARIZ

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CRASHWORTHINESS OF AIRCREW  
PROTECTIVE ARMOR.  
(USA-NLABS-TR-68-57-CM)  
AD-672 504

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\*CHEMICAL CORPS MEDICAL LABS ARMY  
CHEMICAL CENTER MD

RR257  
WOUND BALLISTICS, WOUNDED IN  
ACTION, KOREA, 6 AUGUST 1953-19  
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AD-029 480

RR300  
A COMPARATIVE BALLISTIC STUDY  
OF THE STANDARD U.S. ARMY VEST,  
M1952-A, AND OF THE CANADIAN ARMOR  
VEST, X53  
AD-039 470

\*DYNAMIC SCIENCE PHOENIX ARIZ AVSER  
FACILITY

A STUDY OF FORCES CAUSED BY  
HEAD IMPACT ON AIRCREW PERSONNEL  
ARMOR UNDER SIMULATED CRASH  
CONDITIONS.  
(USA-NLABS-TR-69-49-CE)  
AD-685 838

\*EDGEWOOD ARSENAL ABERDEEN PROVING  
GROUND MD

EA-TR-4729  
A SYSTEMS EFFECT STUDY ON THE  
EVALUATION OF LIGHTWEIGHT BODY  
ARMOR.  
AD-763 165

\*HUMAN ENGINEERING LAB ABERDEEN  
PROVING GROUND MD

HEL-TM-8-73  
HUMAN FACTOR EVALUATION OF THE  
USMC M1955 ARMORED VEST AND THE  
PROPOSED TITANIUM NYLON IMPROVED  
CONVENTIONAL MUNITIONS PROTECTIVE  
ARMORED VEST (46 PLATE).

AD-759 493

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HEL-TM-9-73  
A HUMAN FACTORS ENGINEERING  
ASSESSMENT OF AN ANATOMICALLY  
CONFORMING AIRCREW BODY ARMOR  
SYSTEM.  
AD-766 296

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HEL-TN-14-72  
EVALUATION OF RIFLE-FIRING  
BEHAVIOR OF TROOPS EQUIPPED WITH  
BODY ARMOR: A PILOT STUDY.  
AD-752 903

\*IIT RESEARCH INST CHICAGO ILL

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CONSTRUCTION OF BALLISTIC  
MATERIAL SAMPLES FOR AIRCREW ARMOR  
SYSTEMS.  
(USA-NLABS-TR-69-61-CE)  
AD-691 739

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DESIGN, DEVELOPMENT AND  
FABRICATION OF A PERSONNEL ARMOR  
LOAD PROFILE ANALYZER.  
(USA-NLABS-TR-70-65-CE)  
AD-711 876

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ADVANCED AIRCREW ARMOR  
SUSPENSION SYSTEMS.  
(USA-NLABS-TR-70-51-CE)  
AD-713 016

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DESIGN AND DEVELOPMENT OF A  
FULL-SCALE ANATOMICAL LOAD  
DISTRIBUTION ANALYZER.  
AD-750 918

\*MARINE CORPS LANDING FORCE  
DEVELOPMENT CENTER QUANTICO VA

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T 1041  
BODY ARMOR  
AD-037 068

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T 1041 1  
ARMORED VEST, MODIFIED, EX 53-  
1, STUDY, EVALUATION AND FIELD TEST  
OF  
AD-035 448

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MEL-GUA

\*MELLON INST PITTSBURGH PA

\*\*\*  
BALLISTIC PROTECTIVE BUOYANT  
MATERIALS  
AD-259 057

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BALLISTIC PROTECTIVE BUOYANT  
MATERIALS  
AD-266 054

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BALLISTIC PROTECTIVE BUOYANT  
MATERIALS  
AD-269 577

\*\*\*  
BALLISTIC PROTECTIVE BUOYANT  
MATERIALS  
AD-276 256

\*MONSANTO RESEARCH CORP DAYTON OHIO

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FOAM FLOTATION SYSTEMS FOR  
PERSONNEL WEARING BODY ARMOR.  
(USA-NLABS-72-3-CE)  
AD-731 000

\*MONSANTO RESEARCH CORP DURHAM N C

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EXPERIMENTAL ORGANIC FIBER  
MATERIALS FOR PERSONNEL ARMOR.  
(USA-NLABS-TR-71-47-CE)  
AD-730 775

\*NAVAL MEDICAL FIELD RESEARCH LAB CAMP  
LEJEUNE N C

\*\*\*  
THE EFFECT OF SIMULATED  
TROPICAL CLIMATE ON THE PERFORMANCE  
OF MARINE CORPS PERSONNEL WEARING  
AN INTEGRATED BODY ARMOR-LOAD  
CARRYING SYSTEM (BALCS)  
AD-258 296

\*\*\*  
THE EFFECTS OF TWO TYPES OF  
BODY ARMOR ON BODY TEMPERATURE.  
AD-624 738

\*\*\*  
BODY ARMOR IN A HOT HUMID  
ENVIRONMENT. PART I. STUDIES IN  
UNACCLIMATIZED MEN.  
AD-676 689

\*\*\*

BODY ARMOR IN A HOT HUMID  
ENVIRONMENT. PART II. STUDIES IN  
HEAT ACCLIMATIZED MEN.  
AD-682 689

\*NAVY CLOTHING AND TEXTILE RESEARCH  
UNIT NATICK MASS

\*\*\*

2-72  
THE DEVELOPMENT OF A NAVY,  
BUOYANT, ANTI-FRAGMENT, BULLETPROOF  
VEST: PROTECTION AGAINST LOW-  
VELOCITY FRAGMENTS, SECONDARY  
(SPALL) FRAGMENT DAMAGE, AND 30-  
CALIBER-BALL PROJECTILES.  
AD-752 792

\*\*\*

TR-105

THE DEVELOPMENT OF A NAVY,  
BUOYANT, ANTI-FRAGMENT, BULLETPROOF  
VEST: PROTECTION AGAINST LOW-  
VELOCITY FRAGMENTS, SECONDARY  
(SPALL) FRAGMENT DAMAGE, AND 30-  
CALIBER-BALL PROJECTILES.  
AD-752 792

\*OFFICE OF THE DIRECTOR OF DEFENSE  
RESEARCH AND ENGINEERING WASHINGTON  
D C

\*\*\*

SYMPOSIUM ON PERSONNEL ARMOR  
HELD AT THE U. S. NAVAL RESEARCH  
LABORATORY OCTOBER 4-5, 1961 VOLUME  
I  
AD-273 876

\*QUARTERMASTER CORPS WASHINGTON D C

\*\*\*

A SET OF ANGLES OF OBLIQUITY  
FOR USE IN ASSESSING BODY ARMOR  
AD-255 237

\*QUARTERMASTER RESEARCH AND  
ENGINEERING COMMAND NATICK MASS

\*\*\*

PHYSIOLOGICAL RESPONSE CHANGES  
OF MEN ATTRIBUTABLE TO BODY ARMOR,  
SUN, AND WORK IN A NATURAL DESERT  
ENVIRONMENT (INCLUDING NEGRO-WHITE  
DIFFERENCES)  
AD-262 076

0-5

UNCLASSIFIED

/ZAA14

UNCLASSIFIED

TEX-WAT

\* \* \*  
EPB-208  
ENERGY COST OF WEARING ARMORED  
VESTS AND CARRYING PACK LOADS ON  
TREADMILL, LEVEL COURSE, AND  
MOUNTAIN SLOPES  
AD-021 004

\*TEXTILE RESEARCH INST PRINCETON N J  
\* \* \*  
A STUDY OF FELTS FOR PERSONAL  
ARMOR.  
(USA-NLABS-TR-70-13-CE)  
AD-695 644

\*UNIROYAL INC WAYNE N J  
\* \* \*  
BICOMPONENT AND BICONSTITUENT  
FIBERS IN BALLISTIC FABRIC FOR  
PERSONNEL ARMOR.  
(USA-NLABS-TR-71-48-CE)  
AD-726 918

\*UNIVERSITY OF MANCHESTER INST OF  
SCIENCE AND TECHNOLOGY (ENGLAND)  
\* \* \*  
RESEARCH ON ENERGY ABSORPTION  
BY NONWOVEN FABRICS.  
AD-737 725

\*WATERTOWN ARSENAL LABS MASS  
\* \* \*  
WAL-710/1014  
BALLISTIC EVALUATION OF ARMORED  
VESTS EMPLOYING NYLON, DORON, AND  
MANGANESE STEEL AS ARMOR VEST,  
ARMOR, T52-1 VEST, ARMORED, M1951  
SPOONER VEST  
AD-029 020

0-6  
UNCLASSIFIED /ZAA14

UNCLASSIFIED

SUBJECT INDEX

- AERIAL GUNNERY PROTECTION  
BODY ARMOR FOR AIRCREWMEN.\*  
AD-684 172
- AERIAL WARFARE VIETNAM  
EVALUATION OF ARMY AIRCREW PROTECTIVE ARMOR IN VIETNAM.\*  
AD-694 481
- AEROSPACE MEDICINE SYMPOSIA  
PATTERN RECOGNITION. BODY ARMOR AND AIRCREW EQUIPMENT ASSEMBLIES. CURRENT SPACE MEDICAL PROBLEMS. AEROMEDICAL EVACUATION.\*  
AD-691 092
- ANTHROPOMETRY  
BODY ARMOR DESIGN AND DEVELOPMENT OF A FULL-SCALE ANATOMICAL LOAD DISTRIBUTION ANALYZER.\*  
AD-754 913
- ARMOR  
BALLISTIC PROTECTIVE BUOYANT MATERIALS.\*  
AD-759 057
- ARMY PERSONNEL PERFORMANCE (HUMAN)  
EVALUATION OF RIFLE-FIRING BEHAVIOR OF TROOPS EQUIPPED WITH BODY ARMOR: A PILOT STUDY.\*  
AD-752 903
- AVIATION ACCIDENTS FORCE (MECHANICS)  
A STUDY OF FORCES CAUSED BY HEAD IMPACT ON AIRCREW PERSONNEL ARMOR UNDER SIMULATED CRASH CONDITIONS.\*  
AD-685 032
- AVIATION PERSONNEL BODY ARMOR  
HUMAN FACTORS EVALUATION OF BODY-SUPPORTED AIRCREWMAN'S BUTTOCKS AND CROTCH PROTECTIVE UNITS: (COMPARISONS OF TWO HEIGHTS OF CROTCH PROTECTOR AND THREE SUSPENSION SYSTEMS).  
AD-658 034
- BALLISTICS  
SOUTH KOREA  
WOUND BALLISTICS, WOUNDED IN ACTION, KOREA, 6 AUGUST 1953-19 AUGUST 1953.\*  
AD-029 480
- BODY ARMOR  
BALLISTIC EVALUATION OF ARMORED VESTS EMPLOYING NYLON, DORON, AND MANGANESE STEEL AS ARMOR VEST, ARMOR, T52-1 VEST, ARMORED, M1951 SPOONER VEST.\*  
AD-029 020  
ARMORED VEST, MODIFIED, EX 53-1, STUDY, EVALUATION AND FIELD TEST OF.\*  
AD-035 448  
A COMPARATIVE BALLISTIC STUDY OF THE STANDARD U.S. ARMY VEST, M1952-A, AND OF THE CANADIAN ARMOR VEST, X53.\*  
AD-039 470  
DEVELOPMENT OF PLASTIC MATERIAL FOR PERSONNEL ARMOR.\*  
AD-052 243  
DEVELOPMENT OF PLASTIC MATERIAL FOR PERSONNEL ARMOR.\*  
AD-069 734  
A SET OF ANGLES OF OBLIQUITY FOR USE IN ASSESSING BODY ARMOR.\*  
AD-255 237  
THE EFFECT OF SIMULATED TROPICAL CLIMATE ON THE PERFORMANCE OF MARINE CORPS PERSONNEL WEARING AN INTEGRATED BODY ARMOR-LOAD CARRYING SYSTEM (BALCS).  
AD-258 296  
BALLISTIC PROTECTIVE BUOYANT MATERIALS.\*  
AD-259 057  
PHYSIOLOGICAL RESPONSE CHANGES OF MEN ATTRIBUTABLE TO BODY ARMOR.

D-1

UNCLASSIFIED

774414

UNCLASSIFIED

SIJ-W00

SUN, AND WORK IN A NATURAL DESERT ENVIRONMENT (INCLUDING NEGRO-WHITE DIFFERENCES)\*  
AD-262 576  
BALLISTIC PROTECTIVE BUOYANT MATERIALS\*  
AD-265 054  
BALLISTIC PROTECTIVE BUOYANT MATERIALS\*  
AD-274 577  
SYMPOSIUM ON PERSONNEL ARMOR HELD AT THE U. S. NAVAL RESEARCH LABORATORY OCTOBER 4-5, 1961 VOLUME 1\*  
AD-273 876  
BALLISTIC PROTECTIVE BUOYANT MATERIALS: EFFECT OF FIBER CRIMP ON PENETRATION BALLISTICS OF DACRON AND ACRYLON CAROED MATTS; CRIMPED FIBERS WERE SUPERIOR TO STRAIGHT OR UNCRIMPED FIBERS IN PREVENTING PASSAGE OF FRAGMENT SIMULATORS.  
AD-276 255

ACCEPTABILITY  
BODY ARMOR\*\*  
AD-815 561  
SERVICE TEST OF LIGHTWEIGHT BODY ARMOR, BASIC VEST, T66-1\*\*  
AD-818 141  
ENGINEERING TEST OF LIGHTWEIGHT BODY ARMOR, BASIC VEST, T66-1\*\*  
AD-825 884

ANTHROPOMETRY  
DESIGN AND DEVELOPMENT OF A FULL-SCALE ANATOMICAL LOAD DISTRIBUTION ANALYZER\*  
AD-755 915

ARMY PERSONNEL  
EVALUATION OF RIFLE-FIRING BEHAVIOR OF TROOPS EQUIPPED WITH BODY ARMOR: A PILOT STUDY\*  
AD-757 505

BODY TEMPERATURE  
EFFECTS OF TWO TYPES OF BODY ARMOR ON BODY TEMPERATURES.  
AD-624 738

COLD WEATHER TESTS  
ARCTIC ENVIRONMENTAL TEST OF BODY ARMOR AND HELMETS\*\*  
AD-867 357

COMPATIBILITY  
EVALUATION OF ARMY AIRCRAFT PROTECTIVE ARMOR IN VIETNAM\*\*  
AD-692 481

COMPOSITE MATERIALS  
RESEARCH ON ENERGY ABSORPTION BY NONWOVEN FABRICS\*  
AD-737 725

DESIGN  
THE DEVELOPMENT OF A NAVY, BUOYANT, ANTI-FRAGMENT, BULLETPROOF VEST: PROTECTION AGAINST LOW-VELOCITY FRAGMENTS, SECONDARY (SPALL) FRAGMENT DAMAGE, AND 30-CALIBER-BALL PROJECTILES\*\*  
AD-752 792

DETECTORS  
DESIGN, DEVELOPMENT AND FABRICATION OF A PERSONNEL ARMOR LOAD PROFILE ANALYZER\*\*  
AD-711 876

FATIGUE (PHYSIOLOGY)  
ENERGY COST OF WEARING ARMORED VESTS AND CARRYING PACK LOADS ON TREADMILL, LEVEL COURSE, AND MOUNTAIN SLOPES\*  
AD-021 004

FIBERS (SYNTHETIC)  
EXPERIMENTAL ORGANIC FIBER MATERIALS FOR PERSONNEL ARMOR\*\*  
AD-730 775

FLIGHT CREWS  
CRASHWORTHINESS OF AIRCRAFT PROTECTIVE ARMOR\*\*  
AD-672 504  
BODY ARMOR FOR AIRCREWMEN\*\*  
AD-688 122  
CONSTRUCTION OF BALLISTIC MATERIAL SAMPLES FOR AIRCRAFT ARMOR SYSTEMS\*\*

D-2  
UNCLASSIFIED

/ZAA14

UNCLASSIFIED

STU-WOU

AL-691 739

A HUMAN FACTORS ENGINEERING  
ASSESSMENT OF AN ANATOMICALLY  
CONFORMING AIRCREW BODY ARMOR  
SYSTEM.\*\*

AD-766 296

AIRCREW PROTECTIVE ARMOR.\*\*

AD-476 494

FLOTATION

FOAM FLOTATION SYSTEMS FOR  
PERSONNEL WEARING BODY ARMOR.\*\*

AD-731 000

HISTORY

KNIGHTS OF THE TWENTIETH CENTURY-  
TRANSLATION.

AD-719 551

HUMAN FACTORS ENGINEERING

HUMAN FACTORS EVALUATION OF BODY-  
SUPPORTED AIRCREWMAN'S BUTTOCKS AND  
CROTCH PROTECTIVE UNITS;  
(COMPARISONS OF TWO HEIGHTS OF  
CROTCH PROTECTOR AND THREE  
SUSPENSION SYSTEMS).\*\*

AD-658 034

HUMAN FACTOR EVALUATION OF THE  
USMC M1955 ARMORED VEST AND THE  
PROPOSED TITANIUM NYLON IMPROVED  
CONVENTIONAL MUNITIONS PROTECTIVE  
ARMORED VEST (48 PLATE).\*\*

AD-759 493

IMPACT TESTS

A STUDY OF FORCES CAUSED BY HEAD  
IMPACT ON AIRCREW PERSONNEL ARMOR  
UNDER SIMULATED CRASH CONDITIONS.\*\*

AD-665 638

MINE CLEARANCE

A HISTORY OF THE DEVELOPMENT OF  
AN ARMOR ENSEMBLE FOR MINE  
CLEARANCE PERSONNEL.\*\*

AD-729 353

NYLON

EXPERIMENTAL NYLON 6 FOR  
PERSONNEL ARMOR.\*\*

AD-744 423

PERFORMANCE (HUMAN)

SOME EFFECTS OF BODY ARMOR ON  
MOTOR PERFORMANCE. PART I.  
EFFECTS OF STANDARD (135 PLATE) AND  
EXPERIMENTAL (48 PLATE) TITANIUM-  
NYLON BODY ARMOR ON MOTOR  
PERFORMANCE. PART II. ARMOR AND  
LOAD INDUCED PATTERNS OF PRESSURE  
ON THE TORSO DURING MOTOR  
PERFORMANCE.\*\*

AD-753 937

PHYSIOLOGY

REPRINT: PHYSIOLOGICAL COSTS OF  
BODY ARMOR.

AD-687 953

RELIABILITY

A SYSTEMS EFFECT STUDY ON THE  
EVALUATION OF LIGHTWEIGHT BODY  
ARMOR.\*\*

AD-763 165

SUSPENSION DEVICES

ADVANCED AIRCREW ARMOR  
SUSPENSION SYSTEMS.\*\*

AD-713 016

SYMPOSIA

PATTERN RECOGNITION. BODY  
ARMOR AND AIRCREW EQUIPMENT  
ASSEMBLIES. CURRENT SPACE MEDICAL  
PROBLEMS. AEROMEDICAL EVACUATION.\*\*

AD-691 092

SYNTHETIC FIBERS

BICOMPONENT AND BICONSTITUENT  
FIBERS IN BALLISTIC FABRIC FOR  
PERSONNEL ARMOR.\*\*

AD-726 918

TERMINAL BALLISTICS

BALLISTIC AND SPALL TESTS FOR  
AIRCREW BODY ARMOR.\*\*

AD-756 367

TEST METHODS

BODY ARMOR.

AD-037 068

BALLISTIC TESTING OF PERSONNEL  
ARMOR MATERIALS.\*\*

UNCLASSIFIED

72A414

## UNCLASSIFIED

AD-714 412

AD-714 412  
BODY ARMOR\*\*  
AD-751 155  
BODY ARMOR\*\*  
AD-877 551

## TEXTILES

A STUDY OF FELTS FOR PERSONAL  
ARMOR\*\*  
AD-695 644  
A REVIEW OF THE DEVELOPMENT OF  
BALLISTIC NEEDLE-PUNCHED FELTS\*\*  
AD-747 918

## TROPICAL TESTS

BODY ARMOR IN A HOT HUMID  
ENVIRONMENT. PART I. STUDIES IN  
UNACCLIMATIZED MEN\*\*  
AD-676 689  
BODY ARMOR IN A HOT HUMID  
ENVIRONMENT. PART II. STUDIES IN  
HEAT ACCLIMATIZED MEN\*\*  
AD-646 675

## \*BODY TEMPERATURE

BODY ARMOR  
EFFECTS OF TWO TYPES OF BODY  
ARMOR ON BODY TEMPERATURES.  
AD-674 736

## \*CERAMIC MATERIALS

BODY ARMOR  
CONSTRUCTION OF BALLISTIC  
MATERIAL SAMPLES FOR AIRCREW ARMOR  
SYSTEMS\*\*  
AD-691 734

## \*CRASH INJURIES

FLIGHT CREWS  
CRASHOR WINESS OF AIRCREW  
PROTECTIVE ARMOR\*\*  
AD-673 584

## \*DACRON

BALLISTIC PROTECTIVE BUOYANT

MATERIALS\*  
AD-259 057  
BALLISTIC PROTECTIVE BUOYANT  
MATERIALS\*  
AD-269 577

## \*DETECTORS

BODY ARMOR  
DESIGN, DEVELOPMENT AND  
FABRICATION OF A PERSONNEL ARMOR  
LOAD PROFILE ANALYZER\*\*  
AD-711 876

## \*EVACUATION

SYMPOSIA  
PATTERN RECOGNITION. BODY  
ARMOR AND AIRCREW EQUIPMENT  
ASSEMBLIES. CURRENT SPACE MEDICAL  
PROBLEMS. AEROMEDICAL EVACUATION\*\*  
AD-691 092

## \*EXPANDED PLASTICS

FLOTATION  
FOAM FLOTATION SYSTEMS FOR  
PERSONNEL WEARING BODY ARMOR\*\*  
AD-731 000

## \*FATIGUE (PHYSIOLOGY)

MEASUREMENT  
ENERGY COST OF WEARING ARMORED  
VESTS AND CARRYING PACK LOADS ON  
TREADMILL, LEVEL COURSE, AND  
MOUNTAIN SLOPES\*  
AD-621 004

## \*FIBERS (SYNTHETIC)

BALLISTIC PROTECTIVE BUOYANT  
MATERIALS\*  
AD-259 057  
BALLISTIC PROTECTIVE BUOYANT  
MATERIALS\*  
AD-266 054  
BALLISTIC PROTECTIVE BUOYANT  
MATERIALS: EFFECT OF FIBER CRIMP ON  
PENETRATION BALLISTICS OF DACRON  
AND ACRILAN CARD<sup>TM</sup> BATTS: CRIMPED  
FIBERS WERE SUPERIOR TO STRAIGHT  
OR UNCRIMPED FIBERS IN  
PREVENTING PASSAGE OF FRAGMENT  
SIMULATORS.  
AD-276 256

D-4

UNCLASSIFIED

/ZAA\*4

UNCLASSIFIED

FIB-NYL

•FIBERS(SYNTHETIC)  
BODY ARMOR  
EXPERIMENTAL ORGANIC FIBER  
MATERIALS FOR PERSONNEL ARMOR••  
AD-730 773

•FLIGHT CREWS  
BODY ARMOR  
BODY ARMOR FOR AIRCREWMEN••  
AD-688 122  
CONSTRUCTION OF BALLISTIC  
MATERIAL SAMPLES FOR AIRCREW ARMOR  
SYSTEMS••  
AD-691 737  
BALLISTIC AND SPALL TESTS FOR  
AIRCREW BODY ARMOR••  
AD-756 367

•FLOTATION  
BODY ARMOR  
FOAM FLOTATION SYSTEMS FOR  
PERSONNEL WEARING BODY ARMOR••  
AD-731 000

•FOAMS  
FLOTATION  
FOAM FLOTATION SYSTEMS FOR  
PERSONNEL WEARING BODY ARMOR••  
AD-731 000

•HEAD(ANATOMY):  
IMPACT  
A STUDY OF FORCES CAUSED BY HEAD  
IMPACT ON AIRCREW PERSONNEL ARMOR  
UNDER SIMULATED CRASH CONDITIONS••  
AD-684 835

•HEAT TOLERANCE  
PHYSIOLOGICAL RESPONSE CHANGES

OF MEN ATTRIBUTABLE TO BODY ARMOR,  
SUN, AND WORK IN A NATURAL DESERT  
ENVIRONMENT (INCLUDING NEGRO-WHITE  
DIFFERENCES)••  
AD-262 076

•HELMETS  
COLD WEATHER TESTS  
ARCTIC ENVIRONMENTAL TEST OF  
BODY ARMOR AND HELMETS••  
AD-867 357

•HUMAN FACTORS ENGINEERING  
BODY ARMOR  
HUMAN FACTORS EVALUATION OF BODY-  
SUPPORTED AIRCREWMAN'S BUTTOCKS AND  
CROTCH PROTECTIVE UNITS:  
(COMPARISONS OF TWO HEIGHTS OF  
CROTCH PROTECTOR AND THREE  
SUSPENSION SYSTEMS)••  
AD-658 035  
HUMAN FACTOR EVALUATION OF THE  
USMC M1955 ARMORED VEST AND THE  
PROPOSED TITANIUM NYLON IMPROVED  
CONVENTIONAL HUNITIONS PROTECTIVE  
ARMORED VEST (48 PLATE)••  
AD-759 493

•MINE CLEARANCE  
BODY ARMOR  
A HISTORY OF THE DEVELOPMENT OF  
AN ARMOR ENSEMBLE FOR MINE  
CLEARANCE PERSONNEL••  
AD-729 353

•NAVAL PERSONNEL  
THE EFFECT OF SIMULATED TROPICAL  
CLIMATE ON THE PERFORMANCE OF  
MARINE CORPS PERSONNEL WEARING AN  
INTEGRATED BODY ARMOR-LOAD CARRYING  
SYSTEM (BALCS)••  
AD-258 296

•NYLON  
BALLISTIC PROTECTIVE BUOYANT  
MATERIALS••  
AD-266 054  
BALLISTIC PROTECTIVE BUOYANT  
MATERIALS••  
AD-269 577

D-5  
UNCLASSIFIED

/ZAA14

- BODY ARMOR**  
EXPERIMENTAL NYLON 6 FOR  
PERSONNEL ARMOR\*\*  
AD-765 474
- \*ORLON**  
BALLISTIC PROTECTIVE BUOYANT  
MATERIALS\*  
AD-269 557  
BALLISTIC PROTECTIVE BUOYANT  
MATERIALS\*  
AD-269 554  
BALLISTIC PROTECTIVE BUOYANT  
MATERIALS\*  
AD-269 577
- \*PATTERN RECOGNITION  
SYMPOSIUM**  
PATTERN RECOGNITION, BODY  
ARMOR AND AIRCRAFT EQUIPMENT  
ASSEMBLY, CURRENT SPACE MEDICAL  
PROBLEMS, AIRMEDICAL EVACUATION\*\*  
AD-691 092
- \*PILOTS  
BODY ARMOR**  
EVALUATION OF ARMY AIRCRAFT  
PROTECTIVE ARMOR IN VIETNAM\*\*  
AD-696 701
- DEVELOPMENT OF PLASTIC MATERIAL  
FOR PERSONNEL ARMOR\*\*  
AD-069 734
- \*PROTECTIVE CLOTHING**  
BALLISTIC PROTECTIVE BUOYANT  
MATERIALS\*  
AD-269 577
- \*SEA RESCUE EQUIPMENT  
FEASIBILITY STUDIES**  
FOAM FLUTATION SYSTEMS FOR  
PERSONNEL WEARING BODY ARMOR\*\*  
AD-731 000
- \*STRESS (PHYSIOLOGY)**
- THE EFFECT OF SIMULATED TROPICAL  
CLIMATE ON THE PERFORMANCE OF  
MARINE CORPS PERSONNEL WEARING AN  
INTEGRATED BODY ARMOR-LOAD CARRYING  
SYSTEM (BALCS)\*  
AD-258 296
- \*SYMPOSIUM**  
SYMPOSIUM ON PERSONNEL ARMOR  
HELD AT THE U. S. NAVAL RESEARCH  
LABORATORY OCTOBER 4-5, 1961 VOLUME  
1\*  
AD-273 876
- \*SYNTHETIC FIBERS  
BODY ARMOR**  
BICOMPONENT AND BICONSTITUENT  
FIBERS IN BALLISTIC FABRIC FOR  
PERSONNEL ARMOR\*\*  
AD-726 918
- \*TERMINAL BALLISTICS  
BODY ARMOR**  
BALLISTIC AND SPALL TESTS FOR  
AIRCRAFT BODY ARMOR\*\*  
AD-750 367
- TEXTILES**  
RESEARCH ON ENERGY ABSORPTION BY  
NONWOVEN FABRICS\*\*  
AD-737 725
- \*TEST EQUIPMENT  
DESIGN**  
DESIGN AND DEVELOPMENT OF A FULL-  
SCALE ANATOMICAL LOAD DISTRIBUTION  
ANALYZER\*\*  
AD-758 918
- \*TEXTILES  
BODY ARMOR**  
A REVIEW OF THE DEVELOPMENT OF  
BALLISTIC NEEDLE-PUNCHED FELTS\*\*  
AD-707 918  
BICOMPONENT AND BICONSTITUENT  
FIBERS IN BALLISTIC FABRIC FOR  
PERSONNEL ARMOR\*\*  
AD-726 918
- TERMINAL BALLISTICS**  
RESEARCH ON ENERGY ABSORPTION BY



UNCLASSIFIED

ORL-TEX

NONWOVEN FABRICS ••  
AD-737 / 75

U-7  
UNCLASSIFIED /ZAA14

## UNCLASSIFIED

## TITLE INDEX

ADVANCED AIRCREW ARMOR SUSPENSION SYSTEMS.(U)	AD-713 016	*BODY ARMOR	
*BODY ARMOR		BODY ARMOR FOR AIRCREWMEN.(U)	AD-688 122
AIRCREW PROTECTIVE ARMOR.(U)	AD-826 999	*FLIGHT CREWS	
*BODY ARMOR		BODY ARMOR IN A HOT HUMID ENVIRONMENT. PART I. STUDIES IN UNACCLIMATIZED MEN.(U)	AD-676 689
ARCTIC ENVIRONMENTAL TEST OF BODY ARMOR AND HELMETS.(U)	AD-467 357	*BODY ARMOR	
*HELMETS		BODY ARMOR IN A HOT HUMID ENVIRONMENT. PART II. STUDIES IN HEAT ACCLIMATIZED MEN.(U)	AD-682 689
ARMORED VEST, MODIFIED, EA 53-1, STUDY, EVALUATION AND FIELD TEST OF(U)	AD-035 448	*BODY ARMOR	
*BODY ARMOR		BODY ARMOR(U)	AD-037 068
BALLISTIC AND SPALL TESTS FOR AIRCREW BODY ARMOR.(U)	AD-754 367	*BODY ARMOR	
*BODY ARMOR		BODY ARMOR.(U)	AD-751 156
BALLISTIC EVALUATION OF ARMORED VESTS EMPLOYING NYLON, BORON, AND MANGANESE STEEL AS ARMOR VEST, ARMOR, 152-1 VEST, ARMORED, M1951 SPONNER VEST(U)	AD-029 020	*BODY ARMOR	
*BODY ARMOR		BODY ARMOR.(U)	AD-816 561
BALLISTIC PROTECTIVE BUOYANT MATERIALS(U)	AD-276 256	*BODY ARMOR	
*BODY ARMOR		BODY ARMOR.(U)	AD-872 651
BALLISTIC PROTECTIVE BUOYANT MATERIALS(U)	AD-259 057	A COMPARATIVE BALLISTIC STUDY OF THE STANDARD U.S. ARMY VEST, M1952-A, AND OF THE CANADIAN ARMOR VEST, X53(U)	AD-039 470
*ARMOR		*BODY ARMOR	
BALLISTIC PROTECTIVE BUOYANT MATERIALS(U)	AD-266 054		
*BODY ARMOR		CONSTRUCTION OF BALLISTIC MATERIAL SAMPLES FOR AIRCREW ARMOR SYSTEMS.(U)	AD-491 739
BALLISTIC PROTECTIVE BUOYANT MATERIALS(U)	AD-269 577	*BODY ARMOR	
*BODY ARMOR		CRASHWORTHINESS OF AIRCREW PROTECTIVE ARMOR.(U)	AD-672 504
BALLISTIC TESTING OF PERSONNEL ARMOR MATERIALS.(U)	AD-719 212	*CRASH INJURIES	
*BODY ARMOR		DESIGN AND DEVELOPMENT OF A FULL-SCALE ANATOMICAL LOAD	AD-758 918
BICOMPONENT AND BICONSTITUENT FIBERS IN BALLISTIC FABRIC FOR PERSONNEL ARMOR.(U)	AD-726 918		

T-1  
UNCLASSIFIED

/ZAA14

UNCLASSIFIED

DISTRIBUTION ANALYZER.(U)  
\*TEST EQUIPMENT

DESIGN, DEVELOPMENT AND FABRICATION OF A PERSONNEL ARMOR LOAD PROFILE ANALYZER.(U)  
\*BODY ARMOR

THE DEVELOPMENT OF A NAVY, BUOYANT, ANTI-FRAGMENT, BULLETPROOF VEST: PROTECTION AGAINST LOW-VELOCITY FRAGMENTS, SECONDARY (SPALL) FRAGMENT DAMAGE, AND 30-CALIBER-BALL PROJECTILES.(U)  
\*BODY ARMOR

DEVELOPMENT OF PLASTIC MATERIAL FOR PERSONNEL ARMOR(U)  
\*BODY ARMOR

DEVELOPMENT OF PLASTIC MATERIAL FOR PERSONNEL ARMOR(U)  
\*BODY ARMOR

THE EFFECT OF SIMULATED TROPICAL CLIMATE ON THE PERFORMANCE OF MARINE CORPS PERSONNEL WEARING AN INTEGRATED BODY ARMOR-LOAD CARRYING SYSTEM (HALCS)(U)  
\*BODY ARMOR

THE EFFECTS OF TWO TYPES OF BODY ARMOR ON BODY TEMPERATURE.(U)  
\*BODY ARMOR

ENERGY COST OF WEARING ARMORED VESTS AND CARRYING PACK LOADS ON TREADMILL, LEVEL COURSE, AND MOUNTAIN SLOPES(U)  
\*FATIGUE(PHYSIOLOGY)

ENGINEERING TEST OF LIGHTWEIGHT BODY ARMOR, BASIC VEST, T66-1.(U)  
\*BODY ARMOR

EVALUATION OF RIFLE-FIRING BEHAVIOR OF TROOPS EQUIPPED WITH BODY ARMOR: A PILOT STUDY.(U)  
\*ARMY PERSONNEL

EVALUATION OF ARMY AIRCREW PROTECTIVE ARMOR IN VIETNAM.(U)  
\*AERIAL WARFARE

EXPERIMENTAL NYLON 6 FOR PERSONNEL ARMOR.(U)  
\*BODY ARMOR

EXPERIMENTAL ORGANIC FIBER MATERIALS FOR PERSONNEL ARMOR.(U)  
\*BODY ARMOR

FOAM FLOTATION SYSTEMS FOR PERSONNEL WEARING BODY ARMOR.(U)  
\*BODY ARMOR

A HISTORY OF THE DEVELOPMENT OF AN ARMOR ENSEMBLE FOR MIN. CLEARANCE PERSONNEL.(U)  
\*BODY ARMOR

HUMAN FACTOR EVALUATION OF THE USMC M1955 ARMORED VEST AND THE PROPOSED TITANIUM NYLON IMPROVED CONVENTIONAL MUNITIONS PROTECTIVE ARMORED VEST (48 PLATE).(U)  
\*BODY ARMOR

A HUMAN FACTORS ENGINEERING ASSESSMENT OF AN ANATOMICALLY CONFORMING AIRCREW BODY ARMOR SYSTEM.(U)  
\*BODY ARMOR

HUMAN FACTORS EVALUATION OF BODY-SUPPORTED AIRCREWMAN'S BUTTOCKS AND CROTCH PROTECTIVE UNITS: (COMPARISONS OF TWO HEIGHTS OF CROTCH PROTECTION AND THREE SUSPENSION SYSTEMS).(U)  
\*BODY ARMOR

KNIGHTS OF THE TWENTIETH CENTURY (RYTSAL) DVADTSATEGO VEKA).(U)  
\*BODY ARMOR

T-2  
UNCLASSIFIED

/ZAA14

UNCLASSIFIED

PAT-WOU

PATTERN RECOGNITION. AD-691 092  
BODY ARMOR AND AIRCREW EQUIPMENT  
ASSEMBLIES. CURRENT SPACE MEDICAL  
PROBLEMS. AEROMEDICAL  
EVALUATION.(U)  
\*PATTERN RECOGNITION

PHYSIOLOGICAL COSTS OF AD-687 953  
BODY ARMOR.(U)  
\*BODY ARMOR

PHYSIOLOGICAL RESPONSE AD-262 076  
CHANGES OF MEN ATTRIBUTABLE TO BODY  
ARMOR, SUN, AND WORK IN A NATURAL  
DESERT ENVIRONMENT (INCLUDING NEGRO-  
WHITE DIFFERENCES)(U)  
\*BODY ARMOR

RESEARCH ON ENERGY AD-737 725  
ABSORPTION BY NONWOVEN FABRICS.(U)  
\*TEXTILES

A REVIEW OF THE AD-707 918  
DEVELOPMENT OF BALLISTIC NEEDLE-  
PUNCHED FELTS.(U)  
\*TEXTILES

SERVICE TEST OF AD-818 141  
LIGHTWEIGHT BODY ARMOR, BASIC VEST,  
766-1.(U)  
\*BODY ARMOR

A SET OF ANGLES OF AD-255 237  
OBLIQUITY FOR USE IN ASSESSING BODY  
ARMOR(U)  
\*BODY ARMOR

SOME EFFECTS OF BODY AD-753 937  
ARMOR ON MOTOR PERFORMANCE. PART  
I. EFFECTS OF STANDARD (135 PLATE)  
AND EXPERIMENTAL (48 PLATE)  
TITANIUM-NYLON BODY ARMOR ON MOTOR  
PERFORMANCE. PART II. ARMOR AND  
LOAD INDUCED PATTERNS OF PRESSURE  
ON THE THORAX DURING MOTOR  
PERFORMANCE.(U)  
\*BODY ARMOR

A STUDY OF FELTS FOR AD-695 644  
PERSONAL ARMOR.(U)  
\*BODY ARMOR

A STUDY OF FORCES AD-685 838  
CAUSED BY HEAD IMPACT ON AIRCREW  
PERSONNEL ARMOR UNDER SIMULATED  
CRASH CONDITIONS.(U)  
\*AVIATION ACCIDENTS

SYMPOSIUM ON PERSONNEL AD-273 876  
ARMOR HELD AT THE U. S. NAVAL  
RESEARCH LABORATORY OCTOBER 4-5,  
1961 VOLUME 1(U)  
\*BODY ARMOR

A SYSTEMS EFFECT STUDY AD-743 165  
ON THE EVALUATION OF LIGHTWEIGHT  
BODY ARMOR.(U)  
\*BODY ARMOR

WOUND BALLISTICS. AD-029 480  
WOUNDED IN ACTION, KOREA, 6 AUGUST  
1953-19 AUGUST 1953(U)  
\*BALLISTICS

T-3  
UNCLASSIFIED

/ZAA14

UNCLASSIFIED

PERSONAL AUTHOR INDEX

- \*ALESI, ANTHONY L.  
\* \* \*  
BODY ARMOR FOR AIRCREWMEN.  
AD-688 122
- \*BARRON, E. R.  
\* \* \*  
DESIGN, DEVELOPMENT AND FABRICATION  
OF A PERSONNEL ARMOR LOAD PROFILE  
ANALYZER.  
AD-711 876
- \* \* \*  
DESIGN AND DEVELOPMENT OF A FULL-  
SCALE ANATOMICAL LOAD DISTRIBUTION  
ANALYZER.  
AD-758 918
- \*BARRON, EDWARD R.  
\* \* \*  
A STUDY OF FORCES CAUSED BY HEAD  
IMPACT ON AIRCREW PERSONNEL ARMOR  
UNDER SIMULATED CRASH CONDITIONS.  
AD-685 838
- \* \* \*  
BODY ARMOR FOR AIRCREWMEN.  
AD-688 122
- \* \* \*  
EVALUATION OF ARMY AIRCREW  
PROTECTIVE ARMOR IN VIETNAM.  
AD-696 481
- \*BLYTH, C.S.  
\* \* \*  
THE EFFECT OF SIMULATED TROPICAL  
CLIMATE ON THE PERFORMANCE OF  
MARINE CORPS PERSONNEL WEARING AN  
INTEGRATED BODY ARMOR-LOAD CARRYING  
SYSTEM (BALCS)  
AD-258 296
- \*BRICE, G. H.  
\* \* \*  
BICOMPONENT AND BICONSTITUENT  
FIBERS IN BALLISTIC FABRIC FOR  
PERSONNEL ARMOR.  
AD-726 918
- \*BRYANT, JAMES A.  
\* \* \*  
SERVICE TEST OF LIGHTWEIGHT BODY  
ARMOR, BASIC VEST, T66-1.
- AD-818 141
- \*BURNS, M.  
\* \* \*  
CONSTRUCTION OF BALLISTIC MATERIAL  
SAMPLES FOR AIRCREW ARMOR SYSTEMS.  
AD-691 739
- \* \* \*  
DESIGN, DEVELOPMENT AND FABRICATION  
OF A PERSONNEL ARMOR LOAD PROFILE  
ANALYZER.  
AD-711 876
- \* \* \*  
DESIGN AND DEVELOPMENT OF A FULL-  
SCALE ANATOMICAL LOAD DISTRIBUTION  
ANALYZER.  
AD-758 918
- \*BURNS, MARVIN  
\* \* \*  
ADVANCED AIRCREW ARMOR SUSPENSION  
SYSTEMS.  
AD-713 016
- \*BURSE, RICHARD L.  
\* \* \*  
HUMAN FACTORS EVALUATION OF BODY-  
SUPPORTED AIRCREWMAN'S BUTTOCKS AND  
CROTCH PROTECTIVE UNITS:  
(COMPARISONS OF TWO HEIGHTS OF  
CROTCH PROTECTOR AND THREE  
SUSPENSION SYSTEMS).  
AD-658 034
- \* \* \*  
EVALUATION OF ARMY AIRCREW  
PROTECTIVE ARMOR IN VIETNAM.  
AD-696 481
- \*BUTTKUS, PAUL J.  
\* \* \*  
BALLISTIC AND SPALL TESTS FOR  
AIRCREW BODY ARMOR.  
AD-756 367
- \*CHANDLER, WALLACE  
\* \* \*  
A SET OF ANGLES OF OBLIQUITY FOR  
USE IN ASSESSING BODY ARMOR  
AD-255 237
- \*COE, GEORGE B

UNCLASSIFIED

00-60'

\* \* \*  
WOUND BALLISTICS, WOUNDED IN  
ACTION, KOREA, 6 AUGUST 1953-19  
AUGUST 1953  
AD-029 480

\*COOK, E.B.

\* \* \*  
THE EFFECT OF SIMULATED TROPICAL  
CLIMATE ON THE PERFORMANCE OF  
MARINE CORPS PERSONNEL WEARING AN  
INTEGRATED BODY ARMOR-LOAD CARRYING  
SYSTEM (BALCS)  
AD-258 296

\*CORONA, BERNARD M.

\* \* \*  
EVALUATION OF RIFLE-FIRING BEHAVIOR  
OF TROOPS EQUIPPED WITH BODY ARMOR:  
A PILOT STUDY.  
AD-752 903

\* \* \*  
HUMAN FACTOR EVALUATION OF THE USMC  
M1955 ARMORED VEST AND THE PROPOSED  
TITANIUM NYLON IMPROVED  
CONVENTIONAL MUNITIONS PROTECTIVE  
ARMORED VEST (48 PLATE).  
AD-759 493

\* \* \*  
A HUMAN FACTORS ENGINEERING  
ASSESSMENT OF AN ANATOMICALLY  
CONFORMING AIRCREW BODY ARMOR  
SYSTEM.  
AD-766 296

\*CRONAU, LESLIE H., JR

\* \* \*  
BODY ARMOR IN A HOT HUMID  
ENVIRONMENT. PART I. STUDIES IN  
UNACCLIMATIZED MEN.  
AD-676 689

\*DANIELS, FARRINGTON JR

\* \* \*  
ENERGY COST OF WEARING ARMORED  
VESTS AND CARRYING PACK LOADS ON  
TREADMILL, LEVEL COURSE, AND  
MOUNTAIN SLOPES  
AD-021 004

\*DECARLO, GERALD

\* \* \*  
A SET OF ANGLES OF OBLIQUITY FOR  
USE IN ASSESSING BODY ARMOR  
AD-255 237

\*ELLIS, PAUL H.

\* \* \*  
EVALUATION OF RIFLE-FIRING BEHAVIOR  
OF TROOPS EQUIPPED WITH BODY ARMOR:  
A PILOT STUDY.  
AD-752 903

\* \* \*  
HUMAN FACTOR EVALUATION OF THE USMC  
M1955 ARMORED VEST AND THE PROPOSED  
TITANIUM NYLON IMPROVED  
CONVENTIONAL MUNITIONS PROTECTIVE  
ARMORED VEST (48 PLATE).  
AD-759 493

\*GATLIN, CLIFFORD I.

\* \* \*  
CRASHWORTHINESS OF AIRCREW  
PROTECTIVE ARMOR.  
AD-672 504

\* \* \*  
A STUDY OF FORCES CAUSED BY HEAD  
IMPACT ON AIRCREW PERSONNEL ARMOR  
UNDER SIMULATED CRASH CONDITIONS.  
AD-685 838

\*GOLDMAN, RALPH F.

\* \* \*  
BODY ARMOR IN A HOT HUMID  
ENVIRONMENT. PART I. STUDIES IN  
UNACCLIMATIZED MEN.  
AD-676 689

\* \* \*  
BODY ARMOR IN A HOT HUMID  
ENVIRONMENT. PART II. STUDIES IN  
HEAT ACCLIMATIZED MEN.  
AD-682 689

\* \* \*  
PHYSIOLOGICAL COSTS OF BODY ARMOR.  
AD-687 953

\*GOSWAMI, B. C.

\* \* \*  
A STUDY OF FELTS FOR PERSONAL  
ARMOR.  
AD-695 644

UNCLASSIFIED

HAL-LIL

\*HALEY, JOSEPH L., JR  
\* \* \*  
CRASHWORTHINESS OF AIRCREW  
PROTECTIVE ARMOR.  
AD-672 504

\*HANSON, HAROLD E  
\* \* \*  
PHYSIOLOGICAL RESPONSE CHANGES OF  
MEN ATTRIBUTABLE TO BODY ARMOR,  
SUN, AND WORK IN A NATURAL DESERT  
ENVIRONMENT (INCLUDING NEGRO-WHITE  
DIFFERENCES)  
AD-262 076

\*HEARLE, J. W. S.  
\* \* \*  
RESEARCH ON ENERGY ABSORPTION BY  
NONWOVEN FABRICS.  
AD-737 725

\*HENRY, MALCOLM C.  
\* \* \*  
A REVIEW OF THE DEVELOPMENT OF  
BALLISTIC NEEDLE-PUNCHED FELTS.  
AD-707 918

\*JASKOWSKI, M.C.  
\* \* \*  
BALLISTIC PROTECTIVE BUOYANT  
MATERIALS  
AD-259 057

\* \* \*  
BALLISTIC PROTECTIVE BUOYANT  
MATERIALS  
AD-266 054

\* \* \*  
BALLISTIC PROTECTIVE BUOYANT  
MATERIALS  
AD-269 577

\*JASKOWSKI, MICHAEL C  
\* \* \*  
BALLISTIC PROTECTIVE BUOYANT  
MATERIALS  
AD-276 256

\*JEFFERSON, R. T.  
\* \* \*  
FOAM FLOTATION SYSTEMS FOR  
PERSONNEL WEARING BODY ARMOR.

AD-731 000

\*JONES, R. DOUGLAS  
\* \* \*  
EVALUATION OF RIFLE-FIRING BEHAVIOR  
OF TROOPS EQUIPPED WITH BODY ARMOR:  
A PILOT STUDY.  
AD-752 903

\* \* \*  
HUMAN FACTOR EVALUATION OF THE USMC  
M1955 ARMORED VEST AND THE PROPOSED  
TITANIUM NYLON IMPROVED  
CONVENTIONAL MUNITIONS PROTECTIVE  
ARMORED VEST (48 PLATE).  
AD-759 493

\* \* \*  
A HUMAN FACTORS ENGINEERING  
ASSESSMENT OF AN ANATOMICALLY  
CONFORMING AIRCREW BODY ARMOR  
SYSTEM.  
AD-766 296

\*JUDGE, THOMAS H.  
\* \* \*  
BALLISTIC AND SPALL TESTS FOR  
AIRCREW BODY ARMOR.  
AD-756 367

\*LAIBLE, ROY C.  
\* \* \*  
A REVIEW OF THE DEVELOPMENT OF  
BALLISTIC NEEDLE-PUNCHED FELTS.  
AD-707 918

\*LAMBER, C. F.  
\* \* \*  
CONSTRUCTION OF BALLISTIC MATERIAL  
SAMPLES FOR AIRCREW ARMOR SYSTEMS.  
AD-691 739

\*LASTNIK, ABRAHAM L.  
\* \* \*  
A HISTORY OF THE DEVELOPMENT OF AN  
ARMOR ENSEMBLE FOR MINE CLEARANCE  
PERSONNEL.  
AD-729 353

\*LILYQUIST, MARVIN R.  
\* \* \*  
EXPERIMENTAL ORGANIC FIBER  
MATERIALS FOR PERSONNEL ARMOR.

P-3  
UNCLASSIFIED

/ZAA14

## UNCLASSIFIED

LIT-PUR

- AD-730 775
- \*LITT, B. D. \* \* \*  
BODY ARMOR IN A HOT HUMID ENVIRONMENT. PART II. STUDIES IN HEAT ACCLIMATIZED MEN.  
AD-682 689
- \*LYONS, W. JAMES \* \* \*  
A STUDY OF FELTS FOR PERSONAL ARMOR.  
AD-695 644
- \*MAHEUX, R.C. \* \* \*  
A COMPARATIVE BALLISTIC STUDY OF THE STANDARD U.S. ARMY VEST, M1952-A, AND OF THE CANADIAN ARMOR VEST, X53  
AD-039 470
- \*MAISEL, HERBERT \* \* \*  
A SET OF ANGLES OF OBLIQUITY FOR USE IN ASSESSING BODY ARMOR  
AD-255 237
- \*MANGUM, EDWIN W. \* \* \*  
ENGINEERING TEST OF LIGHTWEIGHT BODY ARMOR, BASIC VEST, T66-1.  
AD-828 884
- \*MARTORANO, J.J. \* \* \*  
THE EFFECT OF SIMULATED TROPICAL CLIMATE ON THE PERFORMANCE OF MARINE CORPS PERSONNEL WEARING AN INTEGRATED BODY ARMOR-LOAD CARRYING SYSTEM (BALCS)  
AD-258 296
- \*MASCIANICA, F.S. \* \* \*  
BALLISTIC EVALUATION OF ARMORED VESTS EMPLOYING NYLON, DORON, AND MANGANESE STEEL AS ARMOR VEST, ARMOR, T52-1 VEST, ARMORED, M1951 SPOONER VEST
- AD-029 020
- \*MAYER, RICHARD E. \* \* \*  
EXPERIMENTAL NYLON 6 FOR PERSONNEL ARMOR.  
AD-765 423
- \*MCGINNIS, JOHN M. \* \* \*  
EVALUATION OF ARMY AIRCREW PROTECTIVE ARMOR IN VIETNAM.  
AD-696 481
- \* \* \*  
SOME EFFECTS OF BODY ARMOR ON MOTOR PERFORMANCE. PART I. EFFECTS OF STANDARD (135 PLATE) AND EXPERIMENTAL (48 PLATE) TITANIUM-NYLON BODY ARMOR ON MOTOR PERFORMANCE. PART II. ARMOR AND LOAD INDUCED PATTERNS OF PRESSURE ON THE TORSO DURING MOTOR PERFORMANCE.  
AD-753 937
- \*NORTON, ROBERT J. \* \* \*  
THE EFFECTS OF TWO TYPES OF BODY ARMOR ON BODY TEMPERATURE.  
AD-624 738
- \*OBDEN, C. \* \* \*  
DESIGN AND DEVELOPMENT OF A FULL-SCALE ANATOMICAL LOAD DISTRIBUTION ANALYZER.  
AD-758 918
- \*OLSON, M. W. \* \* \*  
BICOMPONENT AND BICONSTITUENT FIBERS IN BALLISTIC FABRIC FOR PERSONNEL ARMOR.  
AD-726 918
- \*PARK, ALICE F. \* \* \*  
BODY ARMOR FOR AIRCREWMEN.  
AD-688 122
- \*PURDY, A. T.

p-4

UNCLASSIFIED

/ZAA14



UNCLASSIFIED

RAN-SCR

\* \* \*  
RESEARCH ON ENERGY ABSORPTION BY  
NONWOVEN FABRICS.  
AD-737 725

\*RANDALL, R. BRADLEY

\* \* \*  
EVALUATION OF RIFLE-FIRING BEHAVIOR  
OF TROOPS EQUIPPED WITH BODY ARMOR:  
A PILOT STUDY.  
AD-752 903

\* \* \*  
HUMAN FACTOR EVALUATION OF THE USMC  
M1955 ARMORED VEST AND THE PROPOSED  
TITANIUM NYLON IMPROVED  
CONVENTIONAL MUNITIONS PROTECTIVE  
ARMORED VEST (48 PLATE).  
AD-759 493

\*RASCH, PHILIP J.

\* \* \*  
THE EFFECTS OF TWO TYPES OF BODY  
ARMOR ON BODY TEMPERATURE.  
AD-624 738

\*REINS, DALE A.

\* \* \*  
THE DEVELOPMENT OF A NAVY, BUOYANT,  
ANTI-FRAGMENT, BULLETPROOF VEST:  
PROTECTION AGAINST LOW-VELOCITY  
FRAGMENTS, SECONDARY (SPALL)  
FRAGMENT DAMAGE, AND 30-CALIBER-  
BALL PROJECTILES.  
AD-752 792

\*RODZEN, R.

\* \* \*  
DESIGN AND DEVELOPMENT OF / FULL-  
SCALE ANATOMICAL LOAD DISTRIBUTION  
ANALYZER.  
AD-758 918

\*RODZEN, R. A.

\* \* \*  
CONSTRUCTION OF BALLISTIC MATERIAL  
SAMPLES FOR AIRCREW ARMOR SYSTEMS.  
AD-691 739

\*SACCO, WILLIAM J.

\* \* \*  
A SYSTEMS EFFECT STUDY ON THE

EVALUATION OF LIGHTWEIGHT BODY  
ARMOR.  
AD-763 165

\*SALYER, I. O.

\* \* \*  
FOAM FLOTATION SYSTEMS FOR  
PERSONNEL WEARING BODY ARMOR.  
AD-731 000

\*SCARDINO, FRANK L.

\* \* \*  
A STUDY OF FELTS FOR PERSONAL  
ARMOR.  
AD-695 644

\*SCHAMADAN, JAMES L.

\* \* \*  
CRASHWORTHINESS OF AIRCREW  
PROTECTIVE ARMOR.  
AD-672 504

\* \* \*  
A STUDY OF FORCES CAUSED BY HEAD  
IMPACT ON AIRCREW PERSONNEL ARMOR  
UNDER SIMULATED CRASH CONDITIONS.  
AD-685 838

\*SCHEETZ, HAYDEN A.

\* \* \*  
EVALUATION OF RIFLE-FIRING BEHAVIOR  
OF TROOPS EQUIPPED WITH BODY ARMOR:  
A PILOT STUDY.  
AD-752 903

\* \* \*  
HUMAN FACTOR EVALUATION OF THE USMC  
M1955 ARMORED VEST AND THE PROPOSED  
TITANIUM NYLON IMPROVED  
CONVENTIONAL MUNITIONS PROTECTIVE  
ARMORED VEST (48 PLATE).  
AD-759 493

\*SCHWENDEMAN, J. L.

\* \* \*  
FOAM FLOTATION SYSTEMS FOR  
PERSONNEL WEARING BODY ARMOR.  
AD-731 000

\*SCRIBANO, F.

\* \* \*  
DESIGN, DEVELOPMENT AND FABRICATION  
OF A PERSONNEL ARMOR LOAD PROFILE

P-5  
UNCLASSIFIED

/ZAAI4

- ANALYZER.  
AD-711 876
- \*\*\*  
DESIGN AND DEVELOPMENT OF A FULL-  
SCALE ANATOMICAL LOAD DISTRIBUTION  
ANALYZER.  
AD-758 918
- \*SCRIBANO, F. C.  
\*\*\*  
CONSTRUCTION OF BALLISTIC MATERIAL  
SAMPLES FOR AIRCREW ARMOR SYSTEMS.  
AD-691 739
- \*SCRIBANO, FRANK C.  
\*\*\*  
ADVANCED AIRCREW ARMOR SUSPENSION  
SYSTEMS.  
AD-713 016
- \*SHAMPINE, JAMES C.  
\*\*\*  
THE DEVELOPMENT OF A NAVY, BUOYANT,  
ANTI-FRAGMENT, BULLETPROOF VEST:  
PROTECTION AGAINST LOW-VELOCITY  
FRAGMENTS, SECONDARY (SPALL)  
FRAGMENT DAMAGE, AND 30-CALIBER-  
BALL PROJECTILES.  
AD-752 792
- \*SHEAR, RALPH E.  
\*\*\*  
A SYSTEMS EFFECT STUDY ON THE  
EVALUATION OF LIGHTWEIGHT BODY  
ARMOR.  
AD-763 165
- \*SILVIA, JOHN  
\*\*\*  
THE DEVELOPMENT OF A NAVY, BUOYANT,  
ANTI-FRAGMENT, BULLETPROOF VEST:  
PROTECTION AGAINST LOW-VELOCITY  
FRAGMENTS, SECONDARY (SPALL)  
FRAGMENT DAMAGE, AND 30-CALIBER-  
BALL PROJECTILES.  
AD-752 792
- \*SPICELY, SAMUEL B.  
\*\*\*  
BODY ARMOR.  
AD-815 561
- \*STEWART, GEORGE M  
\*\*\*  
A COMPARATIVE BALLISTIC STUDY OF  
THE STANDARD U.S. ARMY VEST. M1952-  
A, AND OF THE CANADIAN ARMOR VEST,  
X53  
AD-039 470
- \*SUN, S. M.  
\*\*\*  
FOAM FLOTATION SYSTEMS FOR  
PERSONNEL WEARING BODY ARMOR.  
AD-731 000
- \*TANENHOLTZ, STANLEY D.  
\*\*\*  
A STUDY OF FORCES CAUSED BY HEAD  
IMPACT ON AIRCREW PERSONNEL ARMOR  
UNDER SIMULATED CRASH CONDITIONS.  
AD-685 838
- \*TURNBOW, JAMES W.  
\*\*\*  
CRASHWORTHINESS OF AIRCREW  
PROTECTIVE ARMOR.  
AD-672 504
- \*VANDERBIE, JAN H  
\*\*\*  
ENERGY COST OF WEARING ARMORED  
VESTS AND CARRYING PACK LOADS ON  
TREADMILL, LEVEL COURSE, AND  
MOUNTAIN SLOPES  
AD-021 004
- \*WHITE, PAUL C., JR  
\*\*\*  
THE EFFECTS OF TWO TYPES OF BODY  
ARMOR ON BODY TEMPERATURE.  
AD-624 738
- \*WINSMANN, FRED R  
\*\*\*  
ENERGY COST OF WEARING ARMORED

UNCLASSIFIED

VOJ-ZHO

VESTS AND CARRYING PACK LOADS ON  
TREADMILL, LEVEL COURSE, AND  
MOUNTAIN SLOPES  
AD-021 004

\*WOJTOWICZ, A.

\* \* \*  
FOAM FLOTATION SYSTEMS FOR  
PERSONNEL WEARING BODY ARMOR.  
AD-731 000

\*YARGER, WILLIAM E.

\* \* \*  
BODY ARMOR IN A HOT HUMID  
ENVIRONMENT. PART I. STUDIES IN  
UNACCLIMATIZED MEN.  
AD-676 689

\* \* \*  
BODY ARMOR IN A HOT HUMID  
ENVIRONMENT. PART II. STUDIES IN  
HEAT ACCLIMATIZED MEN.  
AD-682 689

\*YOST, DEVERNE R.

\* \* \*  
AIRCREW PROTECTIVE ARMOR.  
AD-826 999

\*YOUNG, D.A

\* \* \*  
DEVELOPMENT OF PLASTIC MATERIAL FOR  
PERSONNEL ARMOR  
AD-052 243

\* \* \*  
DEVELOPMENT OF PLASTIC MATERIAL FOR  
PERSONNEL ARMOR  
AD-069 734

\*ZHOLONDKOVSKII, O.

\* \* \*  
KNIGHTS OF THE TWENTIETH CENTURY  
(RYTSALI DVADTSATEGO VEKA),  
AD-719 551

P-7  
UNCLASSIFIED /ZAA14

## UNCLASSIFIED

## CONTRACT INDEX

\*DA-19-129-AMC-641(N)  
 IIT RESEARCH INST CHICAGO ILL  
 (USA-NLABS-TR-69-61-CE)  
 AD-691 734

\*DAAG17-67-C-0138  
 AVIATION SAFETY ENGINEERING AND  
 RESEARCH PHOENIX ARIZ  
 (USA-NLABS-TR-68-57-CM)  
 AD-672 504  
 DYNAMIC SCIENCE PHOENIX ARIZ AVSER  
 FACILITY  
 (USA-NLABS-TR-69-49-CE)  
 AD-692 838

\*DAAG17-68-C-0029  
 IIT RESEARCH INST CHICAGO ILL  
 (USA-NLABS-TR-70-51-CE)  
 F AD-713 016

\*DAAG17-68-C-0040  
 TEXTILE RESEARCH INST PRINCETON NJ  
 (USA-NLABS-TR-70-13-CL)  
 AD-694 644

\*DAAG17-69-C-0003  
 IIT RESEARCH INST CHICAGO ILL  
 (USA-NLABS-TR-70-65-CE)  
 F AD-711 874

\*DAAG17-69-C-0017  
 MONSANTO RESEARCH CORP DAYTON OHIO  
 (USA-NLABS-72-3-CE)  
 F AD-731 000

\*DAAG17-69-C-0079  
 MONSANTO RESEARCH CORP DURHAM NC  
 (USA-NLABS-TR-71-47-CE)  
 AD-730 775

\*DAAG17-70-C-0029  
 ALLIED CHEMICAL CORP PETERSBURG VA  
 (USA-NLABS-TR-73-26-CE)  
 F AD-765 423

\*DAAG17-70-C-0032  
 UNIROVAL INC WAYNE NJ  
 (USA-NLABS-TR-71-58-CE)  
 AD-725 916

\*DAAG17-70-C-0161  
 IIT RESEARCH INST CHICAGO ILL  
 F AD-758 918

\*DA128 0179RDP1472  
 ALROJET-GENERAL CORP AZUSA CALIF  
 AD-052 243  
 AD-069 734

\*DAJ37-71-C-0554  
 UNIVERSITY OF MANCHESTER INST OF  
 SCIENCE AND TECHNOLOGY (ENGLAND)  
 F AD-737 725

\*H140 138 68879  
 MELLON INST PITTSBURGH PA  
 AD-259 057  
 AD-266 054  
 AD-269 577  
 AD-276 256

C-1  
UNCLASSIFIED

/ZAG14

UNCLASSIFIED  
REPORT NUMBER INDEX

2-72 AD-752 79	MTP-10-4-009 AD-867 357
AGARD-CP-41 AD-691 092	RR257 AD-029 480
C/ED-50 AD-688 122	RR300 AD-039 470
C/PLSEL-84 AD-729 353	T 1041 AD-037 068
C/PLSEL-98 AD-756 367	T 1041 1 AD-035 448
C/PSEL-99 AD-758 918	TOP-10-3-022 AD-751 155
C/PSEL-T;-167 AD-707 918	TR-105 AD-752 792
EA-TR-4729 AD-763 165	USA-NLABS-72-3-CE AD-731 000
EPB-208 AD-021 004	USA-NLABS-TR-68-4-PR AD-658 034
EPR-14 AD-658 034	USA-NLABS-TR-68-57-CM AD-672 504
EPT-9 AD-696 481	USA-NLABS-TR-69-43-CE AD-688 122
FSTC-HT-23-1051-70 AD-719 551	USA-NLABS-TR-69-49-C AD-685 838
HEL-TM-8-73 AD-759 493	USA-NLABS-TR-69-61-CE AD-691 739
HEL-TM-9-73 AD-766 296	USA-NLABS-TR-69-79-PR AD-696 481
HEL-TN-14-72 AD-752 903	USA-NLABS-TR-70-13-CE AD-695 644
MTP-10-2-206 AD-872 651	USA-NLABS-TR-70-32-CE AD-707 918
MTP-10-2-506 AD-719 212	USA-NLABS-TR-70-51-CE AD-713 016

UNCLASSIFIED /ZAAI4

U.S.A.-WAI

UNCLASSIFIED

USA-NLABS-TR-70-05-CE  
AD-711 876

USA-NLABS-TR-71-30-CE  
AD-729 353

USA-NLABS-TR-71-47-CE  
AD-730 775

USA-NLABS-TR-71-48-CE  
AD-740 748

USA-NLABS-TR-73-9-CE  
AD-756 367

USA-NLABS-TR-73-13-PR  
AD-753 937

USA-NLABS-TR-73-28-CE  
AD-765 423

USAIB-3174  
AD-818 141

WAL-710/1014  
AD-029 020

R-2  
UNCLASSIFIED /ZAA14