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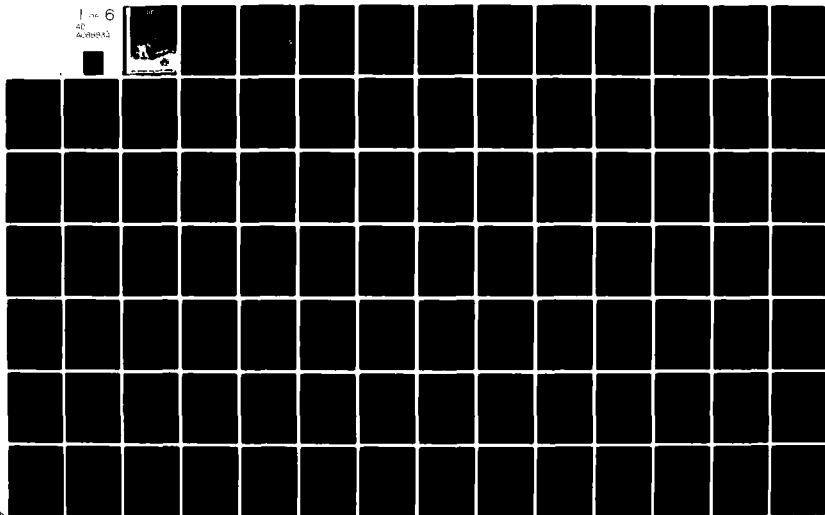
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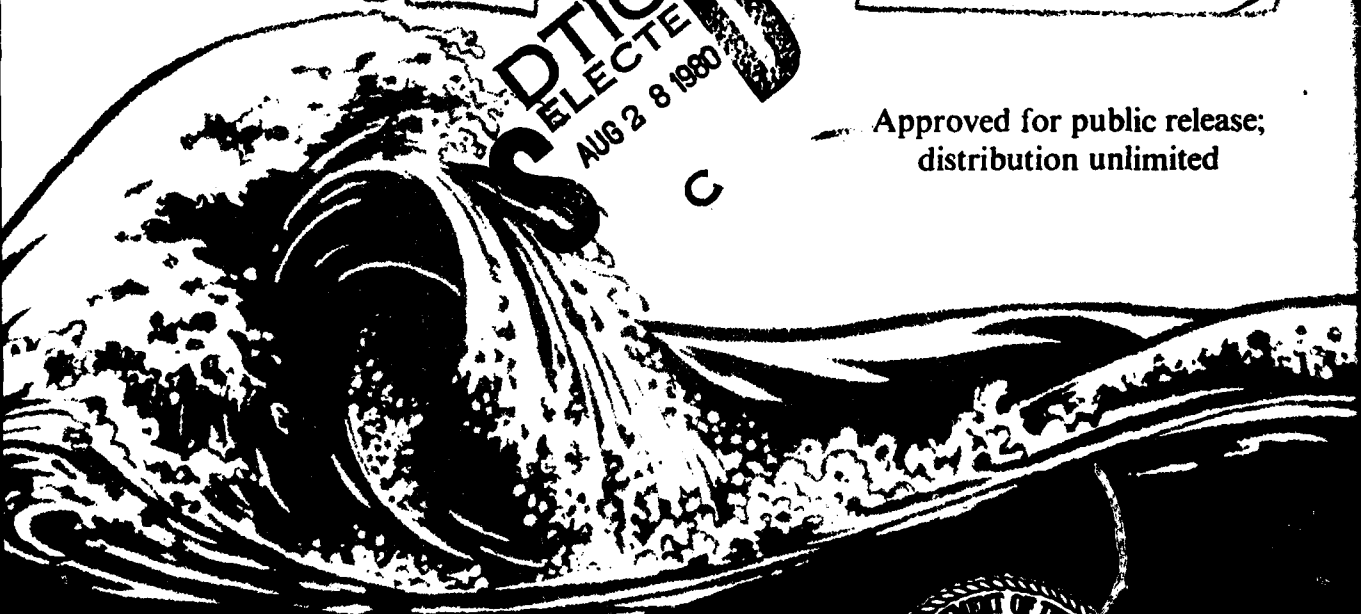
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STATISTICAL NONRECURSIVE SPATIAL-TEMPORAL FOCAL PLANE
PROCESSING FOR BACKGROUND CLUTTER SUPPRESSION AND
TARGET DETECTION

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Lieutenant Commander, Israeli Navy
B.S., Technion Israel Institute of Technology, 1969
M.S., Naval Postgraduate School, 1977

Advanced surveillance and weapon guidance systems using new mosaic sensor arrays and large scale integration (LSI) electronic data processors on the same focal plane require detection of weak targets deeply buried in background clutter noise by many tens of db's. This investigation reports on the focal plane processing techniques to accomplish these heretofore unachievable goals.

Five focal plane processing algorithms are developed consisting of nonrecursive statistical spatial-temporal filters for clutter suppression followed by thresholding for initialization of target detection. These filters are based on either the minimization of mean square error criterion (for MMSE filters) or the maximization of signal to noise ratio criterion (for matched filters). Two are nonadaptive spatial filters and two are nonadaptive spatial-temporal filters. The

Doctor of Philosophy
March 1979

Advisor: T. F. Tao
Electrical
Engineering
Department

fifth type is an adaptive spatial filter based on the minimization of mean square error criterion.

These filters have been investigated analytically and by computer simulation using computer generated images containing correlated clutter noises modeled by Markov processes and also real world infrared images. Using an infrared image in the red spike spectral band, a single frame statistical spatial filter can suppress the clutter by 27 db. A five frame sequential statistical spatial-temporal filter was found to have a clutter suppression of 87 db.

INTERFRAME IMAGE PROCESSING WITH
APPLICATION TO TARGET DETECTION AND TRACKING

José Leite Pereira Filho
Lieutenant Commander, Brazilian Navy
B.S., Pontificia Universidade Católica RJ, 1970
M.S., Naval Postgraduate School, 1977

The restoration of images and the enhancement and detection of targets in cluttered background are the subjects of this research. The statistical approach is used in order to exploit temporal as well as spatial image redundancies.

The images are modeled as a homogeneous random field. An autocorrelation function and a method of parameter identification are proposed. Experiments with several pictures are presented to validate the model.

An analysis of two-dimensional recursive filters is presented. A three-dimensional recursive filter is developed which exploits the spatial as well as the temporal image redundancies.

A class of hybrid filters is proposed which improves the performance of the recursive filters. Several experiments with pictures are presented to show the ability of the hybrid filters in picture restoration.

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Advisor: H. A. Titus
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Department

A detector is developed for purposes of target extraction from cluttered background images. The detection is independent of the target shape.

A simulation of the target detection and tracking problem is presented. The target is tracked from frame to frame by means of a conventional Kalman filter, which uses the image filter as the measurement device.

A DISCRETE VORTEX ANALYSIS OF FLOW ABOUT STATIONARY
AND TRANSVERSELY OSCILLATING CIRCULAR CYLINDER

Ray L. Shoaff, Jr.
Lieutenant, United States Navy
B.S., Florida Atlantic University, 1970

A comprehensive numerical model has been developed to investigate the characteristics of an impulsively-started, asymptotically-steady, uniform flow about a circular cylinder. The model is based on the rediscrretization of the shear layers, wake-boundary-layer interaction, and the dissipation of vorticity by turbulence.

The forces acting on the cylinder, rate of vorticity flux, Strouhal number, oscillations of the stagnation and separation points, longitudinal and transverse spacing of the vortices, and the base pressure have been calculated and shown to be in conformity with those obtained experimentally.

The model has been used to predict the characteristics of hydro-elastic oscillations of a cylinder in the range of synchronization. The numerical experiments shed considerable light on the interaction between the fluid motion in the wake and the dynamics of the body.

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Advisor: T. Sarpkaya
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Department

An extensive sensitivity analysis has been carried out to determine the stability of all the parameters and hence the stability of the numerical model itself.

STOCHASTIC SEPARATION OF RADAR SIGNALS

Shlomo Zach
Lieutenant, Israeli Navy
B.Sc., Technion, Israel Institute of Technology, 1970
M.S., Naval Postgraduate School, 1977

There has been a continuing problem of estimating a radar signal when the noise and the signal have the same power spectra. This is particularly troublesome when one tries to resolve two close targets with a tracking radar. The purpose of this research is to show theoretically that there are practical ways to solve the problem.

Two approaches are introduced here. The first is to add a process filter to the radar, and the second is to design a new measuring technique with processing such that the signals will be separable. These two main approaches have led to several new or extended theories which were developed in the course of this work:

- The Probability filter.
- A modified Kalman filter (MKF).
- A measurement modification technique for monopulse radar.

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Advisor: Sydney R. Parker
Electrical Engineering
Department

- A new approach to the design of a monopulse tracking radar.

Simulations were performed to check the two major theories (the M.K.F. and the probability filter). According to the simulations we can say that a tracking radar can be modified in order to solve the problem of separating unresolved targets.

INITIAL STEADY AERODYNAMIC MEASUREMENTS
OF A CIRCULATION CONTROL AIRFOIL IN AN
OSCILLATING FLOW WIND TUNNEL

Cesar G. Bogino
Lieutenant, Peruvian Navy
B.S.M.E., National University of Engineering, Peru, 1973
M.S.A.E., Naval Postgraduate School, 1974

Integration of a Circulation Control Airfoil (CCA) model into the experimental environment of the Naval Postgraduate School 2 x 2 foot Oscillating Flow Wind Tunnel was initiated. Serious deficiencies were encountered with the model, including structural inadequacies and improperly installed static pressure tubes. Upon correction of these difficulties, the model was adapted to span the tunnel horizontally at the test section center, and an external air supply system was modified and calibrated for the purpose of providing an independent air source for the model.

The CCA principle (an airfoil developing lift by means of a jet blowing over a rounded trailing edge from a narrow upper-surface tangential slot) was verified in the steady-flow situation for several model angles of attack and blowing

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December 1978

Advisor: L. V. Schmidt
Department of
Aeronautics

rates; an unsteady portion of the test program was considered but not resolved. A chronology of the test program is presented, including a brief description of the efforts by follow-on investigators.

ESTIMATION OF SONOBUOY POSITION
RELATIVE TO AN AIRCRAFT
USING EXTENDED KALMAN FILTERS

Nicholas Mason Brownsberger
Lieutenant, United States Navy
B.S., United States Naval Academy, 1972

In airborne anti-submarine warfare there is a need to more accurately determine the positions of sonobuoys on the surface of the water. This report develops two algorithms which employ extended Kalman filters to determine estimated position. The bearing from the aircraft to the sonobuoy is the primary measurement. Range information is not available. The first algorithm is a six-state filter which was reduced from the 13-state system developed by the Orincon Corporation. Its states include relative position, relative velocity, and inertial misalignments. The second algorithm includes two cascaded Kalman filters. The primary two-state filter estimates sonobuoy position. A secondary filter estimates drift from information obtained from the primary filter. Both algorithms successfully estimated sonobuoy position for simulated aircraft data. The effect of aircraft-to-sonobuoy range, the frequency of measurement, and changes in altitude are also analyzed.

Master of Science in
Aeronautical Engineering and
Aeronautical Engineer
September 1979

Advisor: D. J. Collins
Aeronautics
Department

AN ADAPTATION AND VALIDATION
OF A PRIMITIVE VARIABLE MATHEMATICAL
MODEL FOR PREDICTING THE FLOWS
IN TURBOJET TEST CELLS AND
SOLID FUEL RAMJETS

Charles Albert Stevenson
Lieutenant, United States Navy
B.S.E.E., University of Missouri, 1970

An adaptation of a primitive variable, finite-difference computer program was accomplished in order to predict the non-reacting flow fields in turbojet test cells and the reacting flow fields in solid fuel ramjets. The study compares the predictions of the primitive variable computer model with an earlier computer model and empirical data. It was found that the new model reasonably predicted the flow fields in both geometries. In addition, the primitive variable model allowed simulation of test cell flows up to full engine throttle conditions and solid fuel ramjet flows which included an aft mixing chamber.

Master of Science in
Aeronautical Engineering
and
Aeronautical Engineer
June 1979

Advisor: D. W. Netzer
Aeronautics
Department

FOCAL PLANE SIGNAL PROCESSING FOR CLUTTER SUPPRESSION
AND TARGET DETECTION IN INFRARED IMAGES

Kemal Celik
Lieutenant, Turkish Navy
B.S., Naval Postgraduate School, 1977
M.S.E.E., Naval Postgraduate School, 1978

An end-to-end focal plane processing procedure has been developed for detection of dim moving targets in very noisy infrared images. The targets are typically deeply buried in background clutter noise by many dB's. This processing procedure includes three major stages. The first stage is pre-threshold and includes a statistical or frame differencing temporal filter augmented by a statistical spatial filter if appropriate. The second stage is adaptive thresholding based on a histogram counting technique. The third, post thresholding stage consists of three steps: moving target acquisition, tentative track declaration and target tracking. This focal plane processing procedure has been tested by computer simulation using two sets of real world infrared images. Moving target tracks at a relative intensity of 0.0004 have been detected from background clutter at relative intensities from 2.24 to 6.40.

Electrical Engineer
June 1979

Advisor: T. F. Tao
Electrical
Engineering
Department

HIGH FREQUENCY RADIO INTERFERENCE

Eugene Joseph Cummins, Jr.
Lieutenant Commander, United States Navy
B.S.E.E., Missouri School of Mines and Metallurgy, 1968
M.S.E.E., Naval Postgraduate School, 1978

A number of types of man-made high frequency radio noise and interference are examined and described. Three-axis display presentations are correlated with known noise source mechanisms. Receiving system spurious emissions, particularly intermodulation products, are examined in some detail. The impact of the various types of interference on operational communications receiving systems is described qualitatively.

Electrical Engineer
March 1979

Advisor: Stephen Jauregui
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DEGRADATION IN RADIATING SOURCES DUE
TO CYLINDRICAL OBSTRUCTIONS

Marcelo V. Freire R.
Lieutenant, Ecuadorean Navy
B.S.E.E., Naval Postgraduate School, 1977
M.S.E.E., Naval Postgraduate School, 1978

A theoretical and experimental evaluation is presented of the degradation of antenna patterns produced by cylindrical masts in front of radar antennas. Possible ways to diminish this negative effect are discussed.

Electrical Engineer
Degree
March 1979

Advisor: D. B. Hoisington
Electrical
Engineering
Department

FOCAL PLAN PROCESSING TECHNIQUES TO SUPPRESS
INFRARED BACKGROUND CLUTTER, DETECTION AND TRACKING
OF VERY DIM TARGETS BURIED IN CLUTTER NOISE

A. Muhtar Koray
Lieutenant, Turkish Navy
B.S.E.E., Naval Postgraduate School, 1977
M.S.E.E. (with distinc.), Naval Postgraduate School, 1978

Signal processing techniques in two areas have been investigated for detecting and tracking very dim targets in either single frame or multiple frame infrared images consisting of mainly background clutter noise. The first area addresses the improvement of statistical temporal and/or spatial filters for clutter suppression to enhance both point and extended targets. The second area analyzes the application of steady-state Kalman filter principles to develop a tracking algorithm for detection of moving target tracks in a composite image of several successive frames.

Electrical Engineer Degree
June 1979

Advisor: T. F. Tao
Electrical
Engineering
Department

ARITHMETIC CODES

Tarcisio J. C. Pereira
Commander, Brazilian Navy

This thesis constitutes a tutorial study on the theory of arithmetic codes. Both non-separate and separate codes are discussed. Cyclic AN codes are presented and their analogy with cyclic parity check error correcting codes is emphasized. Also, a brief discussion of the implementation problem is carried out.

Electrical Engineer
December 1978

Advisor: Mitchell L. Cotton
Department of
Electrical Engineering

ACOUSTO-OPTIC SPECTRUM ANALYSIS
AND NARROWBAND INTERFERENCE EXCISION
IN WIDEBAND SIGNAL ENVIRONMENTS

F. Weldon Regan, III
Lieutenant, United States Navy
B.S.E.E., University of Michigan, 1973

The thesis is a study of performance measures for acousto-optic spectrum analysis, and optical excision of narrowband interference. A Gaussian laser beam model is developed and programmed for propagation through thin lenses. Effects of beam truncation by Bragg cell apertures are examined. Bragg cell performance is analyzed with respect to diffraction efficiency, information capacity, and response agility. A performance comparison is made between charge-coupled device and photodiode technologies in photodetector array applications. Overall excisor performance is discussed in terms of interference removal effectiveness and process corruption of residual information bearing signals.

Electrical Engineer
September 1979

Advisor: J. P. Powers
Electrical
Engineering
Department

AN IN-DEPTH STUDY OF THE SENSITIVITY
OF WAVE DIGITAL FILTERS

Masoud Sanaie-Fard
Commander, Iranian Navy
BSEE, Electrical Engineering, Royal Naval
Engineering College Manadon,
Plymouth, England, 1967
MSEE, Electrical Engineering, United States
Naval Postgraduate School, 1978

A detailed analytical and experimental study of the sensitivity of Wave Digital Filters has been conducted. The results indicate the the wave digital filter tends to achieve the same low sensitivity characteristics as the analogue circuit from which it was derived. Other results indicate relatively higher sensitivity to terminating resistance values compared with internal element values, lower sensitivity for algorithms derived from simple rather than multiple elements, and higher sensitivity at the critical frequencies. Finally the rms error due to the quantization in the number of bits in the multiplier coefficients has been measured at approximately 3 db per bit for the many examples tested.

Electrical Engineer
June 1979

Advisor: Sydney R. Parker
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Electrical
Engineering

GEOMETRIC DESIGN TECHNIQUE FOR
TWO-DIMENSIONAL ANALOG AND DIGITAL FILTERS

Coskun Zumrutkaya
Lieutenant, Turkish Navy
B.S.E.E., Naval Postgraduate School, 1977
M.S.E.E., Naval Postgraduate School, 1979

A technique for the use of semi-infinite planes to approximate the log magnitude versus log frequency characteristics of two-dimensional filters is presented (Extended Bode approach). This technique is applied to quarter plane filters and works well for separable transfer functions. Other non-separable canonic (basic) transfer functions are also studied in terms of their planar approximation. The general technique is shown to be useful for the insight it provides as well as being a simple approach to design. The double bilinear z-transform is studied for use with the two-dimensional analog transfer functions to convert them to the digital domain.

Electrical Engineer
June 1979

Advisor: S. R. Parker
Electrical
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OSCILLATING FLOW ABOUT TUBE BUNDLES

Mehmet Ali Cinar
Lieutenant, Turkish Navy
B.S.M.E., Naval Postgraduate School, 1978

The lift, drag, and inertia coefficients have been determined experimentally for various tube bundles and for two cylinders at various relative positions subjected to harmonically oscillating flow. The force coefficients for the inline force have been analyzed through the use of Morrison's Equation and Fourier Analysis. The transverse force or the lift force has been expressed in terms of its maximum value.

The results have shown that the interference between the cylinders can give rise to complex flow patterns and to unexpectedly large force transfer coefficients. The results with two-cylinder experiments have shed considerable light on the wake interference in harmonic flows.

Master of Science in
Mechanical Engineering
and Mechanical Engineer
September 1979

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TRANSVERSE OSCILLATIONS OF SMOOTH AND
ROUGH CYLINDERS IN HARMONIC FLOW

Suleyman Ozkaynak
Lieutenant, Turkish Navy
B.S., Naval Postgraduate School, 1978

The dynamic response of elastically mounted cylinders in sinusoidally oscillating two-dimensional flow has been investigated both theoretically and experimentally.

The experiments were carried out in a large U-shaped water tunnel, with smooth and sand-roughened circular cylinders. The results have been expressed in terms of lift coefficients, relative amplitudes of oscillation, Keulegan-Carpenter number, Reynolds number, Strouhal number, and a mass parameter.

A theoretical analysis has been carried out by assuming the transverse force varies harmonically. Furthermore, the instantaneous values of the displacement have been predicted through the use of the Duhamel's integral.

The results have shown that elastically-mounted cylinders undergo synchronous oscillations at a reduced velocity of 5.7 when the vortex shedding frequency coincides with the natural

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frequency of the cylinder. Away from the region of synchronization the cylinder is subjected to forced response by vortices shedding at a frequency smaller or larger than the natural frequency of the cylinder.

SPATIAL-TEMPORAL FILTER
FOR
CLUTTER SUPPRESSION AND TARGET DETECTION OF
REAL-WORLD INFRARED IMAGES

David Carl Hilmers
Captain, United States Marine Corps
B.A., Cornell College, 1972
M.S.E.E., Naval Postgraduate School, 1978

A statistical processing method for clutter suppression and target detection of two-dimensional images is developed. The technique utilizes a spatial-temporal nonrecursive filter which requires no a priori knowledge of the statistics of the two-dimensional image. The theoretical concepts and design procedure of the filter are developed. Its performance is analyzed utilizing an infrared background clutter image. The processing gain and probability of detection of point targets are investigated by computer simulation as system parameters are varied.

Engineer's Degree
December 1978

Advisor: T. F. Tao
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Department

TECHNIQUES AND BENEFITS OF SHAPING
THE PULSES OF BINARY SEQUENCES WITH
APPLICATION TO SPREAD SPECTRUM RADIO COMMUNICATIONS

Panayiotis G. Mavraganis
Lieutenant, Hellenic Navy
B.S.E.E., Naval Postgraduate School, 1977
M.S.E.E., Naval Postgraduate School, 1978

This research is concerned with binary sequences. Such two-level voltage waveforms are used in some types of spread spectrum systems. Of interest in this work is the effect of shaping the normally rectangular pulses of the binary sequence. An objective is to find and tabulate particular sequences and specific shapes having desirable autocorrelation functions and power spectra.

A direct and versatile method of shaping binary sequences is presented. Photographs of sequences having triangular, raised sine and ramp shapes are included in this report. Photographs of the autocorrelation function and spectra of selected shaped sequences are presented.

The computer programs used to search for sequences of interest and used to calculate the autocorrelation function and spectra of particular shaped sequences are described.

Engineer's Degree
March 1979

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Shaped sequences having interesting spectra have very small side lobe levels; others have no discernible nulls in the spectra; some spectra have nulls which are not simply related to the sequence clock frequency (pulse rate).

APPLICATION OF POWERED HIGH LIFT SYSTEMS
TO STOL AIRCRAFT DESIGN

Frederick Donald Ameal
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1966

The development of VTOL technology over a thirty year period was reviewed. Various powered-lift concepts were explored and recent application analyzed. The ACSYNT computer program, developed by the NASA Ames Research Center, was used to predict the takeoff performance of a proposed jet STOL transport utilizing the Lockheed AIBF system. A correlation of the performance of the S-3A VIKING aircraft was performed.

Master of Science in
Aeronautical Engineering
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Advisor: M. F. Platzer
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Aeronautics

INVESTIGATION OF PIPE FLOW INSTABILITY
AND RESULTS FOR WAVE NUMBER ZERO

Michael James Arnold
Lieutenant, United States Navy
B.S., University of Idaho, 1969

Past research by Harrison and Johnston on the stability of pipe flow yielded only tenuous results owing to errors in set up of the problem and in formulation of the complex axis boundary conditions.

Recent advances in the formulation of these boundary conditions and application of generalized stability criteria allowed an accurate numerical solution to be made for angular wave number zero. The results show that flow for this case is characterized by certain instabilities that have not been previously identified in linearized studies of this type.

A nonuniform computational mesh was developed which provided dramatic reductions in computational time on a limited basis.

Two data reduction programs were also developed to process and display data generated by the main program.

Master of Science in
Aeronautical Engineering
December 1978

Advisor: T. H. Gawain
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MEASUREMENTS OF JET DISPERSIONS
SIMULATED IN AN AERONAUTICAL
WIND TUNNEL

Jack Vernon Brendmoen
Lieutenant, United States Navy
B.S.M.E., University of Nebraska, 1973

A neutrally stable atmospheric surface layer was suitably simulated in a low speed wind tunnel by tripping the boundary layer with a fence and letting the turbulent flow develop over a length of roughness elements. Jet exhaust dispersion characteristics, simulated by a burner/nozzle system, were investigated by measuring the horizontal and vertical temperature profiles at axial stations downwind from the nozzle exit. Dispersion sensitivity to different nozzle exit conditions, angles of incidence to the wind, and nozzle surface blockage were investigated. The results were compared to dispersion methods used in the Air Quality Assessment Model (AQAM). It was found that the experimental jet penetration length was much shorter than that assumed in AQAM, and that a plume rise existed, which is not included in the current AQAM model. Required inputs of the initial dispersion coefficient were determined as a function of wind direction.

Master of Science in
Aeronautical Engineering
September 1979

Advisor: D. W. Netzer
Aeronautics
Department

P-3 SURVIVABILITY AND CREW COST CONSIDERATIONS

Frederick Frank Cazenave, Jr.
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1967
M.S., University of West Florida, 1971

An examination is made of several aspects of the survivability of the P-3 Orion in its current mission environment. Those aspects include a mission-threat analysis, a study of the validity of standard kill level definitions with regard to the P-3, and the development of a cost model for including the crew in survivability trade-off studies. The study shows that the P-3 aircraft can now expect a hostile mission environment. Consequently, the application of survivability techniques to enhance its combat effectiveness and to provide the basis for the development of a follow-on aircraft capable of surviving the expected hostile environment of the 1980's is required. The area of crew costing has been generally neglected in the cost modeling for survivability trade-off studies, as shown by a survey of the survivability community. This neglect may have led to the exclusion of survivability enhancement features which would otherwise have been included. The development of a standardized method of defining crew value

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in terms of government investment and the cost penalties incurred due to the loss of a crew is believed to be necessary for the realistic identification of any system's worth.

XR-3 BOW SEAL PERFORMANCE AS A
FUNCTION OF SEAL GEOMETRY

John Arthur Fjelde
Lieutenant, United States Navy
B.A.E., University of Minnesota, 1969

and

Carl Eric Gaenslen
Lieutenant Commander, United States Navy
B.S.E.E., Marquette University, 1969

A series of tests was conducted to determine the effects of bow seal shape upon the performance of the XR-3 captured air bubble testcraft. The lift and drag forces experienced by the bow seal, plotted versus velocity, are presented and analyzed.

Master of Science in
Aeronautical Engineering
December 1978

Advisor: D. M. Layton
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Aeronautics

DEVELOPMENT OF A DEVICE FOR THE INCORPORATION OF MULTIPLE
SCANIVALVES INTO A COMPUTER-CONTROLLED DATA SYSTEM

Robert Neldon Geopfarth
Lieutenant, United States Navy
B.S., University of Kansas, 1972

A controller (designated HG-78K) was built to permit manual and computer-directed acquisition of pneumatic data from multiple Scanivalves. The controller incorporated a low cost digital electronic circuit which was designed as a peripheral device on the Hewlett-Packard Interface Bus (HP-IB) to enable computer interrogation of port addresses of multiple Scanivalves. Computer programs were written in BASIC and FORTRAN languages and operation of the system was verified using HP-9830A and HP-21MX computers.

Master of Science in
Aeronautical Engineering
March 1979

Advisor: R. P. Shreeve
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A CONCEPTUAL DESIGN OF A LIGHTER-THAN-AIR
TEST AND RESEARCH VEHICLE

Richard Patrick Glover
Lieutenant, United States Coast Guard
B.S., University of the State of New York, 1978

An analysis of conventional lighter-than-air vehicles was conducted to determine if a modular design approach was feasible. Once this was accomplished, a conceptual design using the modular approach is presented for a vehicle to serve as a platform for conducting lighter-than-air flight tests and research. In addition, a general discussion is included on the program management organization, flight tests, and instrumentation of such a vehicle.

Master of Science in
Aeronautical Engineering
June 1979

Advisor: D. M. Layton
Aeronautics
Department

THE DEVELOPMENT AND EVALUATION
OF AN EXPERIMENTAL APPARATUS
FOR THE INVESTIGATION OF FASTENER PULL-THROUGH
FAILURE IN GRAPHITE-EPOXY LAMINATES

Wayne Richard Hanley
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1966

This thesis examines the failure at a fastener hole in a composite fuel tank skin due to hydraulic ram, i.e., fluid pressure due to a penetrating projectile. An experimental apparatus was set up to investigate the triaxial loading conditions at the fastener hole so that an M-P-N failure surface could be developed for the graphite-epoxy laminate. An expression was derived to predict the bending moment at the fastener in terms of the pull force on the fastener and the axial force in the plate. Aluminum specimens were tested and the results were compared with the predicted results to validate the experimental procedure. The experimental results were found to be not repeatable, and hence a correlation with the predicted results was not appropriate. The non-repeatability could not be explained. Composite specimens were fabricated and prepared for testing. Experimental values for the ultimate pure pull force, P , ultimate pure bending moment, M , and ultimate pure axial force, N , were obtained.

Master of Science in
Aeronautical Engineering
March 1979

Advisor: R. E. Ball
Aeronautical Engineering Department

THE APPLICATION OF A LASER DOPPLER
VELOCIMETRY SYSTEM TO FLOW VELOCITY
MEASUREMENTS IN A TRANSONIC COMPRESSOR

Jeffrey Alan Harrison
Lieutenant, United States Navy
B.S., North Carolina State University, 1972

A laser doppler velocimeter (LDV) system was developed and utilized to measure the flow velocities in the axial and tangential directions behind the rotors of a single stage transonic compressor. The backscatter mode was used to acquire the scattered light signals from particles that were seeded into the airflow upstream of the compressor. The light signals were generated as the particles traversed a fringe pattern produced by the intersection of two laser beams.

The LDV system proved that it was possible to make velocity measurements in the transonic compressor. The results revealed a variation of the flow velocity in both the axial and tangential directions due to the formation of a wake caused by the passage of rotor blades. The velocity measurements were comparable to those acquired through pressure probe measurements.

Master of Science in
Aeronautical Engineering
December 1978

Advisor: D. J. Collins
Department of
Aeronautics

LIFT ANALYSIS ON THE BOW SEAL OF THE
SURFACE EFFECT SHIP TESTCRAFT XR-3

James R. Snider
Captain, United States Army
B.S., Engineering, USMA, 1970

Experimental test runs were conducted to determine lift forces acting on the bow seal of the captured air bubble testcraft, XR-3. These forces, plotted versus turn rate for varying center-of-gravity locations, are presented and analyzed.

Master of Science in
Aeronautical Engineering
September 1979

Advisor: D. M. Layton
Aeronautics
Department

A FEASIBILITY STUDY OF SINGLE-MODE FIBER OPTIC
EVANESCENT FIELD COUPLERS

John W. Stillwell
Lieutenant, United States Navy
B. S. Electrical Engineering, Purdue University, 1972

Optical waveguide and directional coupler theory is reviewed, including light propagation in single-mode optical fibers. A comprehensive study of the theoretical considerations relevant to the design of a single-mode fiber coupler is presented. The evanescent field and a perturbation based coupled mode formalism is employed. This study also includes discussions on currently available fibers, their construction, propagation characteristics, strength, attenuation, scattering, and handling techniques, as well as their susceptibility to environmental stresses. A method of fabricating fiber couplers is presented and the practical problem discussed. Results are presented of analysis of the measured tap ratio, directionality and insertion loss sensitivities of fiber couplers to the core-to-core separation, skew angle, and interaction lengths. The coupling efficiency of a single-mode optical fiber directional coupler was found to be sensitive to

Master of Science
Aeronautical Engineering

Advisor: E. C. Crittenden Jr.
Physics and
Chemistry
Department

the parameters predicted by theory. However, a significant scatter-driven coupling was observed which is attributed to cladding mode propagation present when using short sections of fiber.

AN INVESTIGATION OF RESIDUAL STRESS
CHARACTERIZATION OF 7075-T6 ALUMINUM
FOR APPLICATION IN FATIGUE ANALYSIS

Gary Leland Stuart
Lieutenant, United States Navy
B.S., University of Kansas, 1972

Residual stresses induced by a stress concentration have been shown to increase the fatigue life of materials. An experimental investigation was undertaken to establish a relationship which would allow for the prediction of local residual stresses at a notch from known geometrical stress concentration factors and applied loads. Notched flat plate specimens were tested utilizing photoelastic coatings for measurement of stress concentration factors and residual stresses. Handbook values for stress concentration factors were found to be accurate within seven percent for the geometrics tested. The residual stress characterization consisted of a plot of nominal stress versus residual stress. These plots predicted residual stresses to within ten percent of the measured values for typical flight load histories.

Master of Science in
Aeronautical Engineering
December 1978

Advisor: G. H. Lindsey
Department of
Aeronautics

XR-3 BOW SEAL DIFFERENTIAL
DRAG IN TURNS

David Anthony Edwards
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1968

A series of turning maneuvers was conducted with the instrumented XR-3 SES test craft to determine the domain of differential drag experienced by the bow seal. Data is presented showing the difference in total drag experienced by the inboard and the outboard portions of the bow seal during turns at various testcraft velocities. A brief introduction to SES terminology and a summary description of the testcraft, its instrumentation and data reduction facilities are included. Results show a fluctuation of the differential drag forces experienced as test craft velocity increases, especially at high rates of turn.

Master of Science
in Applied Science
December 1978

Advisor: Donald M. Layton
Department of
Mechanical
Engineering

ADVANCED INFRARED DETECTORS FOR FUTURE
MISSILE SEEKERS

Richard Alan Fantauzzo
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1967

New technology was utilized to design and fabricate a self-filtering infrared detector (SFD) optimized for a specific target signature. The SFD was prepared from vacuum deposited, composition-turned epitaxial films of the semiconductor alloy, $\text{PbS}_x\text{Se}_{1-x}$. A filter and detector layer were both grown on opposite sides of a BaF_2 substrate. The detector element was a p-n junction formed by depositing a Pb contact onto a p-type detector layer surrounded by a Au ohmic contact. The optical cuton and cutoff wavelengths were composition-tuned to 4.0 and 5.0 μm by adjusting x in both layers. The measured spectral response of the SFD device was in good agreement with theoretical calculations, whereas, the quantum efficiency was below. The device resistance was two

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Naval Surface
Weapons Center,
White Oak Laboratory

orders of magnitude below the predicted values due to surface leakage. This leakage also caused the peak responsivity and detectivity to be lower than the predicted values. Application of this technology shows great promise provided these problems can be resolved.

SENSITIVITY STUDIES OF SINGULAR
COMPENSATED CONTROL SYSTEMS

Paulo Antonio Ferreira
Commander, Brazilian Navy
B.S.Ch.E., Military Institute of Engineering, 1968

and

Luis Filipe Ferreira de Sousa
Lieutenant, Portuguese Navy
B.S.E.E., Naval Postgraduate School, 1978

The theory of singular lines on the Parameter Plane and of singular compensation of linear feedback control systems is reviewed and some of its properties are derived.

The root sensitivity method developed by Kokotovic and the performance measure method for sensitivity are applied to singular compensated systems and to conventional compensated systems. The sensitivity for the two types of compensation is compared.

The design and sensitivity analysis of singular compensated systems is illustrated by examples.

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Advisor: G. J. Thaler
Electrical
Engineering
Department

HIGH STRENGTH ALUMINUM MAGNESIUM ALLOYS:
THERMOMECHANICAL PROCESSING, MICROSTRUCTURE
AND TENSILE MECHANICAL PROPERTIES

Raymond Arthur Grandon
Lieutenant Commander, US Navy
B.S., University of Nebraska, 1966

Microstructures and mechanical properties of thermomechanical processed Aluminum-Magnesium alloys were investigated in this research. Magnesium content of the alloys ranged from 7 to 12 weight percent and an alloy containing 10 percent Mg and 0.5 percent Cu was also examined. Thermomechanical processing treatments involved solution treatment followed by warm isothermal rolling. Temperature for this warm rolling was typically 300°C, and this is below the solvus temperature for the alloy. Such processing results in a fine dispersion of the intermetallic compound Al_3Mg_2 (β) in a solid solution matrix. Typical mechanical properties are an ultimate tensile strength of 520 Mpa (75,000 psi), with 12 percent elongation to fracture. Such a material may be further cold worked to ultimate tensile strengths of 620 Mpa (90,000 psi), with

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Advisor: T. R. McNelley
Mechanical
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6 percent elongation to fracture. Dynamic recrystallization in such alloys was also studied; control of recrystallization is necessary to achieve uniform dispersion of the intermetallic in subsequent processing.

OPTIMAL CONTROL SURFACE DESIGN FOR
THE MK VIII SWIMMER DELIVERY VEHICLE

Thomas Kleehammer
Lieutenant, United States Navy
B.S., University of Michigan, 1970

The author uses principles of aerodynamics, hydromechanics, classical electrical engineering control theory, and computer simulation techniques in an attempt to develop an optimal bowplane and horizontal and vertical tail geometric design configuration for the U.S. Navy Special Warfare Unit's MK VIII Swimmer Delivery Vehicle. Design criteria was based on the installation of a secondary surface control system whose concepts have been feasibly proven for certain fixed wing aircraft by researchers at the University of Kansas. The thesis simulates vehicle underwater motions whose accuracy is limited by assumptions of linearity common to small perturbation theory, but nevertheless it acts as a viable theoretical and practical framework from which more sophisticated research and immediate applications can begin.

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Advisor: J. H. Duffin
Electrical
Engineering
Department

A STUDY OF THE EFFECTIVENESS OF RADAR JAMMING TECHNIQUES

Kusnendar
Major, Indonesian Navy

A Study of relative jamming effectiveness is presented for three different denial jamming methods against an AN/APS-31 airborne search radar. The radar in this case was not protected by ECCM.

The methods which were investigated are:

1. Frequency modulation by noise alone.
2. Frequency modulation by noise together with frequency modulation by a sine wave.
3. Direct noise amplification.

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Advisor: D. B. Hoisington
Department of
Electrical
Engineering

BALLISTIC PERFORMANCE, SHEAR BAND FORMATION
AND MECHANICAL BEHAVIOR OF THERMO-MECHANICALLY
PROCESSED ULTRA HIGH CARBON STEEL

Ronald Reid Martin
Lieutenant, United States Navy
B.S., Pennsylvania State University, 1971

James William Phillips
Lieutenant, United States Navy
B.S., Columbus College, 1970

This research is part of an ongoing program being conducted at the Naval Postgraduate School to investigate the application of extensively warm-worked ultra high carbon (UHC) steel as an armor. The effects on mechanical and ballistic properties of rolling temperature, reduction per pass during rolling and annealing after rolling are characterized. Post-perforation microstructural analysis demonstrated that warm-worked ultra high carbon steels have a lesser tendency to form adiabatic shear bands than several conventional steel armors. These bands are important in ballistic perforation and lead to reduced penetration resistance in conventional armors. Further, warmworked 52100 UHC steel was found to offer ballistic penetration resistance superior to the current armors tested and should receive serious consideration as a candidate armor.

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Advisor: T. R. McNelly
Department of
Mechanical
Engineering

A PROTOTYPE PRODUCTION RULE PROGRAM
FOR A DECISION SUPPORT SYSTEM

Thomas Buscemi, Jr.
Major, United States Marine Corps
B.S., United States Merchant Marine Academy, 1966
M.S., University of Southern California, 1971

and

John Michael Masica
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1969

A prototype production rule program, DECAIDS, for the support of decisions on computer resources was constructed using the Stanford University EMYCIN production rule system. The DECAIDS program demonstrates the use of a production rule system to support a relatively unstructured management problem. A discussion of knowledge based systems, predicate calculus and production rules is included. A tutorial section discusses the user information needed for development of a backward-chaining, goal-seeking knowledge base system.

Master of Science in
Computer Science
June 1979

Advisor: R. J. Roland
Computer Science
Department

MICROCOMPUTER DESIGN FOR
ELECTRONIC EMITTER IDENTIFICATION

Gary Lew Bush
Lieutenant, United States Navy
B.B.A., North Texas State University, 1974

New technological advances in weapons and electronics have increased the fighting capabilities of small ships. The increases are seen in better and lighter offensive weapons, along with increases in self-defensive weapons through the addition of electronic suites. The electronic warfare suites currently used on small ships are limited in size, weight, and response time because of the environment in which these ships are employed. It is the purpose of this paper to propose a system which will allow the currently very limited data bases to be expanded while at the same time not degrading the system. The feasibility of this approach is based upon using a microcomputer to aid in the identification of emitters off-line while leaving the current system to identify high threat emitters.

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Computer Science
September 1979

Advisor: F. Burkhead
Computer Science
Department

NPS-PASCAL
A PASCAL IMPLEMENTATION
FOR MICROPROCESSOR-BASED COMPUTER SYSTEMS

John L. Byrnes
Lieutenant, United States Navy
B.S., United States Naval Academy, 1973

NPS-PASCAL is a Naval Postgraduate School research project whose goal is the implementation of the PASCAL programming language on a microprocessor-based system. The NPS-PASCAL compiler consists of two software subsystems, the first analyzes the source program and produces a machine-independent intermediate form, while the second produces target machine code. The system is designed to satisfy the constraints of Standard Pascal, as defined by the British Standards Institute's International Standards Organization Working Craft of Standard Pascal.

The analysis subsystem, defined herein, accomplishes the lexical, syntactic, and semantic analysis of a PASCAL program. It has been implemented on an Intel 8080 microcomputer, running under the CP/M operating system.

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June 1979

Advisor: G. A. Kildall
Computer Science
Department

SYSTEMS ANALYSIS FOR THE INTERACTIVE SIMULATION
WITH GRAPHICAL DISPLAYS TO SUPPORT
SIMULATION OF TACTICAL ALTERNATIVE RESPONSES (STAR)

George Sansing Coker
Major, United States Marine Corps
B.S., Mississippi College, 1968

and

David Ralph Forinash
Captain, United States Army
B.S., United States Military Academy, 1970

A systems analysis of a computer system to support the STAR war gaming model is presented. The war game is described and the user's objectives are defined. Four conceptual methods for implementing the user's objectives are presented and a preferred solution is chosen. The characteristics of the preferred solution that are necessary to meet the user's objectives are described. Further software needed to implement the objectives is briefly discussed. The code for the current model is analyzed and a summary presented. Conclusions from this systems analysis are derived and future research areas are identified.

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Computer Science
March 1979

Advisor: S. H. Parry
Department of
Operations Research

IMPLEMENTATION OF A PICTURE DIGITIZER AND DISPLAY
FOR IMAGE PROCESSING OPERATIONS

Thomas M. Costello
Captain, United States Army
B.S., UMSA, 1970

and

Robert C. Vogler
Captain, United States Air Force
B.S., Butler University, 1973

The purpose of this study was to implement Spatial Data System's EyeCom Picture Digitizer and Display on Digital Equipment Corporation's PDP-11/50 minicomputer using the real-time operating system RSX-11M. The tasks involved included the following:

- operating the EyeCom on the RT-11 operating system to investigate its image processing capabilities;
- implementing of Drexel University's software conversion package for the RSX-11M operating system;
- preparing a EyeCom Operator's Manual for RSX-11M;
- developing a Pseudocolor option using the RAMTEK GX-100A Color Raster Scan Display.

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Advisor: G. A. Rahe
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With the completion of these tasks, the EyeCom can now do the following image processing operations: picture digitization, magnification, averaging, gray-scale reduction, contrast enhancement, spatial filtering, shifting, reversal, edge enhancement, picture noise reduction, and histogram distribution. The result of these operations can be displayed on the RAMTEX GX-100A Color Raster Scan Display.

NPS MICRO-COBOL
AN IMPLEMENTATION OF NAVY STANDARD HYPO-COBOL
FOR A MICROPROCESSOR-BASED COMPUTER SYSTEM

Jim Farlee, Jr.
Captain, United States Marine Corps
B.S., University of Nebraska, 1970

and

Michael L. Rice
Captain, United States Marine Corps
B.S., Utah State University, 1973

A compiler for a subset of the Automated Data Processing Equipment Selection Office (ADPESO) HYPO-COBOL has been implemented on a Microcomputer. The implementation provides nucleus level constructs and file options from the ANSI COBOL package along with the PERFORM UNTIL construct from a higher level to give increased structural control. The language was implemented through a compiler and run-time package executing under the CP/M operating system of an 8080 microcomputer-based system. Both the compiler and interpreter can be executed in 20K bytes of main memory. A program consisting of 8.5K bytes of intermediate code can be supported on this size machine. Modification of the compiler and interpreter programs can be

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accomplished to take advantage of larger machines. The programs that make up the compiler and interpreter package require 50K bytes of disk storage.

A TACTICAL SYSTEM EMULATOR
FOR
A DISTRIBUTED MICRO-COMPUTER ARCHITECTURE

Luis A. Guillen
Lieutenant (jg), Peruvian Navy
B.S., Peruvian Naval Academy, 1974

An emulator is constructed in order to study the behavior of a Tactical System in a distributed micro-computer architecture environment. This emulator represents Tactical Systems as a set of periodic and demand scheduled functional module processes that collaborate with each other.

A special purpose operating system was implemented for the distributed micro-computer architecture that supports the emulator. It includes processor management and system-wide input/output capabilities.

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Computer Science
June 1979

Advisor: Uno Kodres
Computer Science
Department

COMPUTER NETWORKS

Ronald Brent Kurth
Lieutenant, United States Navy
B.S., Chico State College, 1970

Computer networks are being used in many varied applications. Chapter I of this thesis will look at network topologies, components, and design goals. The remaining three chapters are dedicated to a case study of the Naval Postgraduate School's (NPS) computer system. Computer system performance measuring tools for terminal oriented systems are discussed and one is selected for the study. The NPS system is analyzed; shortcomings identified and possible solutions suggested. Finally, two network designs are proposed for a terminal oriented system that is suitable for satisfying the needs of the NPS.

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Computer Science
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Advisor: N. F. Schneidewind
Administrative
Sciences Department

MICROCOMPUTER BASED
INTERACTIVE DISPLAY SYSTEM

Francisco J. Mariategui C.
Lieutenant (jg), Peruvian Navy
B.S., Peruvian Naval Academy, 1974

and

Ivan Nelson Hall Jr.
B.S., Virginia Polytechnical Institute and
State University, 1971

This study was undertaken to design and implement a microcomputer based interactive display system suitable for use as a shipboard tactical-situation display. The stand-alone system included two plasma display scopes, one microcomputer, one CRT and one line printer. The scope of the effort included the interface of the display system via a RS-232 data/link to a PDP-11/50 minicomputer in order to emulate the shipboard tactical environment. Of major interest was the integration of the hardware components and the software developed in this study into a coherent alphanumerical and graphical display system.

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June 1979

Advisor: George Rahe
Computer Science
Department

A HEURISTIC ALGORITHM FOR THE GRAPH PARTITION PROBLEM

Kil-Hyun Nam
Major, The Republic of Korea Army
B.S., Korean Military Academy, 1969
B.S., Seoul National University, 1973

The objective of the graph partition problem is to partition a given weighted graph into subgraphs with at most k nodes in each subgraph such that the sum of the weights of the edges connecting subgraphs is minimized.

A heuristic algorithm is developed that has time complexity on the order of the square of the number of edges. A bound on the worst-case performance ratio of the heuristic solution and an optimal solution is developed. A discussion of previous algorithms for this problem with special emphasis on the heuristic of Kernighan and Lin is included.

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Computer Science
June 1979

Advisor: L. T. Kou
Department of
Computer Science

A STUDY OF ALTERNATIVES FOR COMPUTER
SYSTEMS ACQUISITION FOR THE HELLENIC NAVY

Vassilios A. Naoum
Commander, Hellenic Navy
Graduate of Hellenic Naval Academy, 1957

The achievements of the advancing computer technology, coupled with a dramatic reduction in hardware costs have been acknowledged by smaller Navies such as the Hellenic Navy.

This thesis makes a survey of the existing Naval Tactical Data Systems in countries of the North Atlantic Alliance, the efforts undertaken to improve these systems through hardware and software standardization, the methodology required for the development and support of such systems, and the costs implied.

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Computer Science
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Advisor: U. R. Kodres
Computer Science
Department

DISTRIBUTED, SECURE DESIGN FOR A
MULTI-MICROPROCESSOR OPERATING SYSTEM

James Steven O'Connell
Captain, USMC
B.S., University of Utah, 1971

and

Larry Don Richardson
Lieutenant, USN
B.S., University of Nebraska, 1973

This thesis applies the state-of-the-art techniques for methodical design of secure operating systems to a distributed, multi-microprocessor environment. Explicit process structure and utilization of virtual environments are the fundamental concepts that form a basis for the design presented. The primary design techniques utilized in the design are segmentation, distributed operating system, security kernel, multiprocessing, "cache" memory strategy and multiprogramming. The resulting design is for a family of distributed operating systems that can provide the power of yesterdays large computer in a microprocessor environment. Security, configuration independence, and a loop free structure are the

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Advisor: Lt. Col. R.R. Schell
Computer Science
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primary characteristics of the design. The design, although hardware independent, was formulated with the Zilog Z8000 or similar microprocessor in mind.

METHOD TO EVALUATE MICROCOMPUTERS FOR NON-TACTICAL
SHIPBOARD USE

Donald L. Smith
Lieutenant Commander, U.S. Navy
B.S. University of Washington, 1966

This thesis outlines a approach to determine what microcomputer hardware, acceptable for various administrative applications on small U.S. Navy ships, can be purchased "off the-shelf" from commercial sources. It provides a cost and functional analysis of various computer systems and provides information concerning software support for these systems. An analysis of various potential applications specifies administrative functions that are recommended for automation, and also specifies other administrative functions that are not recommended for automation, with reasons why they should not be automated.

Master of Science
Computer Science
September, 1979

Advisor: LCDR Frank Burkhead
Computer Science
Department

MICROCOMPUTER DEBUGGING SYSTEMS

Kathryn B. Strutynski
Employee, Naval Postgraduate School
B.S. Brigham Young University, 1953

The capabilities of an 8080 microcomputer cross-software simulator which operates in the timesharing environment of a large general purpose computer was compared with two debugging aids which operate in the real-time environment of a microcomputer. The cross-software simulator was expanded to provide the system functions of a widely-used microcomputer disk operating system.

Master of Science in
Computer Science
December, 1978

Advisor: Gary A. Kildall
Computer Science
Department

EVALUATION OF A SIGNAL PROCESSING
TEST BED

George T. Vrabel
Lieutenant, United States Navy
B.S., University of Nebraska, 1974

This thesis was undertaken to examine an acoustical signal processing test bed, similar to the one installed at the Naval Postgraduate School, to be used primarily for experimental applications. The major components include two PDP-11 series computers, at least one array processor, a mass storage unit as well as assorted input and display equipment. Of major interest were the computer selection, array processor selection and basic signal routing to facilitate real-time utilization.

Master of Science in
Computer Science
December 1978

Advisor: George A. Rahe
Computer Science
Department

A PLAN FOR THE TACTICAL EXPLOITATION OF
NATIONAL CAPABILITIES (TENCAP)

Edward R. Fennell
B.S., Tennessee Technological University, 1959

A plan is developed to demonstrate the feasibility of a particular concept to exploit National capabilities in support of the U.S. Navy's Over-the-Horizon Targeting (OTH-T) problem for anti-ship cruise missiles. Implementation of this plan would serve as a TENCAP (Tactical Exploitation of National Capabilities) initiative and provide objective data for use in analysis of the possible contribution of specific National systems to the solution of the OTH-T problem. It was concluded that fuller exploitation of the capabilities of these systems to support the OTH-T problem is constrained more by established procedures and prerogatives than by technology.

Master of Science in
Decision Control Systems
March 1979

Advisor: S. Jauregui
Department of
Electrical
Engineering

A THEORETICAL STUDY AND COMPUTER SEARCH
FOR BINARY SEQUENCES HAVING
SPECIFIC AUTOCORRELATION FUNCTIONS

Ioannis Anastasopoulos
Lieutenant, Hellenic Navy
B.S., Naval Postgraduate School, 1977

Binary sequences find increasing use in electrical engineering applications of ranging, time measurement and communications. A property of interest in these applications is the autocorrelation function of the binary sequence or pair of sequences. Of the 2^n possible sequences of length n , only a few have usable autocorrelation functions. There is, to date, no procedure known which will provide the sequence having a specific autocorrelation function, except for very particular cases.

In this report, known properties of complementary sequences are reviewed. Almost complementary sequences are defined and the procedure to obtain them is outlined. A formula is derived for the number of different autocorrelation functions of the 2^n possible sequences of length n bits. A computer search is implemented with the objective of discovering sequences with desirable autocorrelation functions.

Master of Science in
Electrical Engineering
December 1978

Advisor: Glen A. Myers
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DIGITAL SIMULATION AND ANALYSIS
OF THE DLG-6 BOILER AND
AUTOMATIC CONTROL SYSTEM

Mehmet Asici
Lieutenant, Turkish Navy
B.S., Naval Postgraduate School, 1977

The DLG-6 type boiler control system was separated into individual minor loops and then analyzed. Time response to step input and root locus plots of the fuel oil flow, air flow and feedwater flow control loops were investigated. Also the simulation of the entire control system was done for an input forcing function by using the Digital Simulation Language (DSL) technique.

Additionally the improvement and redesign of the control system was accomplished by trial and error methods. Lead and lag filters with different parameters values were inserted into the control loops as well as the adjustment of the various proportional and integral controller settings.

Master of Science in
Electrical Engineering
December 1978

Advisor: G. Thaler
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Engineering
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DEVELOPMENT OF A MICROPROCESSOR-BASED INSTRUMENT
FOR STATIC TESTING SMALL ROCKET ENGINES

Arthur Houghton Barber, III
Lieutenant, United States Navy
B.S., MIT, 1973

A microprocessor-based instrument was developed for static testing solid-fuel rocket engines having peak thrusts of 130 Newtons or less and total impulses of up to 100 Newton-seconds. It measured peak thrust, total impulse, burn time, pyrotechnic delay time, and maximum casing external temperature, all to relative accuracies of two percent of the smallest expected values. This corresponds to better than 0.1 percent of full-scale. The instrument was designed for minimum parts cost and for portable operation from two twelve-volt batteries. It may be easily modified to test engines with five to ten times greater thrusts and total impulses.

Master of Science in
Electrical Engineering
September 1979

Advisor: M. L. Cotton
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DEVELOPMENT AND TIME DOMAIN VALIDATION OF A LOW-ORDER,
CONSTANT SPEED, PITCH-HEAVE MODEL FOR THE XR-3
SURFACE EFFECT SHIP

Leslie William Barnes
Lieutenant, United States Navy
B.S.E.E., University of New Mexico, 1972

An improved and simplified model for the Heave-Pitch dynamics of the XR-3 CAB Surface Effect Ship is developed for constant speed operation. The nonlinear equations of motion are linearized about the steady-state operating point. Time-domain validation is accomplished by comparison with the 6 DOF model. A signal flow graph of the craft dynamics is developed and Mason's Gain Rule used to determine the characteristic S-Domain polynomials describing the craft's vertical plane dynamic behavior, with Bode Pilot analysis included. Conclusions are drawn and recommendations for further study are made.

Master of Science in
Electrical Engineering
March 1979

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ENHANCEMENT OF PROCESSING GAIN
BY SELECTION OF ACCEPTANCE PARAMETERS
APPLIED TO DETECTION OF SIGNALS BURIED IN NOISE

James Devens Barron
Lieutenant, United States Navy
B.S., United States Naval Academy, 1971

The nature and merits of Tegulometric Frequency Analysis (TFA) in determining the presence of weak signals in a noise background have been reported in previous works [1-6], TFA is based on the statistical properties of the signal plus noise. Frequency is determined by a zero crossing technique. Due to the complex nature of the beating phenomenon in narrowband filtered signal plus noise waveforms, it has not been possible to satisfactorily describe TFA in analytical terms. This thesis presents the results of an experimental investigation of the feasibility of a new technique for detection of a sinusoidal signal in noise by defining acceptance parameters for amplitude and constancy of frequency. The selection of these statistical parameters has been demonstrated to enhance the detection of a weak signal in noise and produce an effective "processing gain."

Master of Science in
Electrical Engineering
December 1978

Advisor: G. H. Marmont
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THE INTERFERENCE PERFORMANCE OF FM DEMODULATORS AND
THE REALIZATION OF A NEW DEMODULATOR WHICH
IS IMMUNE TO FM JAMMING

Ehud Ben-Dor
Lieutenant Colonel, Israel Army
B.S.E.E., Technion, Israel Institute of Technology, 1968

This report presents the interference performance of two FM demodulators, the pulse counting discriminator (PCD) and the phase locked loop (PLL). These circuits were designed, built and then tested in the laboratory in the presence of various types of interfering signals. Data are presented for both analog and digital voice used as modulating signals.

A variety of interfering signals was used. The data is presented as jamming-to-signal ratio (JSR) versus recovered voice quality. A conclusion is that the best signal for a jammer to use is a pulsed carrier frequency modulated by Gaussian noise where the pulse rate (equal on-off times) is 10 Hertz. The performance of the PLL for all types of interference is much better than that of the PCD.

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This report also presents the design and operation of a new FM demodulator which is able to detect FM signals in the presence of high JSR when the jamming signals are any type of FM signal. We call this demodulator the "two path FM demodem." This system is able to recover readable voice signals when the jamming power level exceeds the signal level by more than 20db.

ELECTRONIC WARFARE (COUNTER COUNTERMEASURE)

Pramuan Boonyapan
Lieutenant, Royal Thai Navy
B.S.E.E., Naval Postgraduate School, 1978

A review of the modern technology employed in Electronic counter countermeasure (ECCM) system is carried out. This thesis lists most of the Electronic countermeasure methods and discusses many of the counter countermeasures used to overcome them.

Some of the typical electronic counter countermeasure techniques are described in detail, particularly those that are efficient and have the greatest potential for success.

Master of Science in
Electrical Engineering
June 1979

Advisor: D. A. Stentz
Department of
Electrical
Engineering

THE STATISTICS OF MULTIPATH FADING FOR AN OVERWATER
PATH AT VHF APPLIED TO COMMUNICATIONS LINKS AT
NUWES KEYPORT, WASHINGTON

Jose Rolando Cano
Lieutenant, United States Navy
B.A., St. Mary's University, 1972

Signal strength variations due to changes in sea state, antenna heights, and path length for a VHF overwater communications link at NUWES, Keyport, Washington are calculated utilizing theoretical and experimental results. All known variables such as peculiar and diffuse scattering, fading due to changes in atmospheric conditions, changes in antenna patterns, shadowing, and depolarization are examined, their effects considered and graphs giving probability of detection curves plotted.

Master of Science in
Electrical Engineering
June 1979

Advisor: J. B. Knorr
Electrical
Engineering
Department

ANALOG AND DIGITAL HARDWARE DEVELOPMENT FOR A MICROCOMPUTER
CONTROLLED DATA ACQUISITION SYSTEM FOR ACOUSTICAL IMAGING

Reid Owen Carlock
Major, United States Marine Corps
B.S., United States Naval Academy, 1968

This thesis presents the design and testing of a micro-computer controlled data acquisition system for an acoustical imaging system. Analog sinusoidal signals are processed through a 256 channel analog multiplexer to high speed phase and amplitude detection channels. Analog to digital conversion is accomplished with a microcomputer peripheral module. Data storage then follows in a 64K byte peripheral memory. Interface with a cassette tape recording system is accomplished for data transferral.

Master of Science in
Electrical Engineering
June 1979

Advisor: J. P. Powers
Department of
Electrical
Engineering

A MICROCOMPUTER-BASED DIGITAL DATA ACQUISITION
CONTROLLER FOR A COMPUTER AIDED ACOUSTIC
IMAGING SYSTEM

Rodney Alvie Colton
Lieutenant, United States Navy
B.S.E.E., University of Nevada, 1969

This thesis describes the design and construction of a microcomputer based controller for an ultrasonic acoustic imaging system. The INTEL 8748 single chip microcomputer was utilized and the associated hardware and software for the system are described in detail. Carefully designed and tested operating instructions are provided along with an explanation for each instruction. The system is fully documented, thus allowing future personnel to change or update the system as required to take full advantage of the flexibility of a microcomputer based design.

Master of Science in
Electrical Engineering
June 1979

Advisor: R. Panholzer
Electrical
Engineering
Department

THE DESIGN AND IMPLEMENTATION OF AN INEXPENSIVE
MICROPROCESSOR DEVELOPMENT SYSTEM FOR THE Z-80
MICROPROCESSOR

Douglas Floyd Corteville
Lieutenant, United States Navy
B.S., Michigan State University, June 1972

The Radio Shack home computer system, TRS-80, configured with Level II Basic ROM's, 16K of RAM, its expansion interface, a single disk drive, and a line printer interface to the Teletype model 40 line printer is being used as a microprocessor development aid for the Z-80 microprocessor. Basic language programs are resident on the mini-disk and are used to load, to store, to dump, and to execute assembled assembly language programs.

Master of Science in
Electrical Engineering
June 1979

Advisor: R. Panholzer
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Engineering
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SPECTRUM RECEIVER AND SIGNAL SELECTION UNIT
DESIGNS FOR THE NAVAL POSTGRADUATE SCHOOL
SATCOM SIGNAL ANALYZER

William E. Davidson
Lieutenant, United States Navy
B.S., Eastern Oregon State College, 1970

The design and construction of a Signal Selection Unit and four Spectrum Receivers for use in the Naval Postgraduate School's SATCOM Signal Analyzer are presented. The purpose of the SATCOM Signal Analyzer is to provide high-speed spectrum analysis and characterization of the outputs of UHF communication satellite transponders in orbit. It is constructed around a PDP-11/34 minicomputer which provides the necessary control for most of the equipment of the system. Extremely accurate frequency measurement is provided by the frequency receivers and signals for multi-channel spectrum analyses are provided by the Spectrum Receivers. The Signal Selection Unit routes signals to the Spectrum, AM/FM, and Frequency Receivers. This report documents the design and development of the Spectrum Receivers and the Signal Selection Unit.

Master of Science in
Electrical Engineering
June 1979

Advisor: J. E. Ohlson
Electrical
Engineering
Department

HIGH FREQUENCY COVERT COMMUNICATIONS,
A STRATEGY

William Robert DeMain
Lieutenant, United States Navy
B.S.E.E., Purdue University, 1972

A covert communication system is a continuing necessity for command and control of naval forces. This report is a study in the use of conventional High Frequency radio equipment to achieve secure covert communications. Predictive analysis of ionospheric propagation, power control, and bandwidth spreading with signal processing techniques are applied to long haul HF channels. A strategy is developed which minimizes the probability of intercept of transmitted signals yet provides adequate power at receiver sites in the HF frequency spectrum of 3-30 MHz.

Master of Science
in Electrical Engineering
September 1979

Advisor: J. B. Knorr
Electrical
Engineering
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DESCRIPTION AND IMPLEMENTATION OF
NUMBER THEORETIC TRANSFORMS

Antonio Catarino Rodrigues de Sousa
Lieutenant, Portuguese Navy
B.S.E.E., Naval Postgraduate School, 1977

This thesis summarizes the theory of number theoretic transforms (NTT's), and presents original examples to illustrate the theory. Concepts have been studied and compared in order to present them in a cohesive and unified manner.

Software and hardware implementation of Fermat number transforms are discussed and compared with the Fourier Transform showing a substantial improvement in efficiency and accuracy. The main drawback of Fermat Number Transforms is a rigid relationship between the allowed sequence length and work length. Methods and other NTT's, for overcoming this problem are discussed. The theory has also been extended to two dimensions.

Master of Science in
Electrical Engineering
December 1978

Advisor: S. R. Parker
Electrical
Engineering
Department

REAL TIME KALMAN FILTERING FOR
TORPEDO RANGE TRACKING

Dennis Michael Dwyer
Lieutenant, United States Navy
B.S., United States Naval Academy, 1973

Two Extended Kalman filter routines, one using a one-step estimation/prediction and the other a sequential approach, were developed and compared to provide real time estimates of target positions on the three dimensional underwater tracking range at Naval Underwater Weapons Engineering Station, Keyport, Washington. Inputs to the routines were acoustic pulse transit times from the target to receiving array elements which are non-linear functions of the position coordinates. These inputs were linearized and the filter gains calculated on-line. Simulated runs were conducted for tracks in the area of one hydrophone array and for tracks that transited through multiple arrays. It was found that the sequential estimate routine exhibited better performance in recovering from transients caused by random measurement noise or target movement.

Master of Science in
Electrical Engineering
December 1978

Advisor: H. A. Titus
Electrical
Engineering
Department

ELECTRONIC IMPLEMENTATION OF SPATIAL FILTER USING
MICROCOMPUTER CONTROLLED CID CAMERA AND
CTD TAPPED DELAY LINE

Kenneth P. Easterday, Jr.
Lieutenant, United States Navy
B.S.E.E., University of New Mexico, 1971

An electronic hardware spatial filter system for image processing is partially constructed employing a visible charge injection device camera, an LSI-11 microcomputer, a charge transfer device tapped delay line and other specially designed IC control circuits. The spatial filter is to be used for enhancement and detection of targets in an image processing system. The charge injection device camera functions as the image sensor and as the memory for the images. Its random addressing and non-destructive readout features are used for implementing the spatial filter. The microcomputer functions as a digital controller for the system and also as a digital image processor. The tapped delay line device is employed as a 3x3 nonrecursive spatial filter. A procedure for dynamically setting the filter coefficient weights of the tapped delay line filter is developed and evaluated.

Master of Science in
Electrical Engineering
March 1979

Advisor: T. F. Tao
Electrical
Engineering
Department

LONG-TERM STABILITY AND DRIFT MEASUREMENTS OF
GAPFILLER'S ONBOARD OSCILLATOR

James Milton Forgy
Lieutenant, United States Navy
B.S., University of Missouri, 1973

The analysis and measurements in determining the drift and long-term frequency stability of the Pacific GAPFILLER satellite onboard oscillator, using the Naval Postgraduate School Satellite Communication Signal Analyzer, is presented and documented. The drift rate is approximately 2.7×10^{-12} /day from data taken over eleven months.

Master of Science in
Electrical Engineering
March 1979

Advisor: J. E. Ohlson
Electrical
Engineering
Department

COMPUTER MODELING OF VOICE SIGNALS WITH
ADJUSTABLE PITCH AND FORMANT FREQUENCIES

Geoffrey T. Hall
Captain, United States Marine Corps
B.S., Purdue University, 1971

Digital encoding of speech to allow more efficient transmission at low data rates involves the decomposition of the speech waveform into various parameters which are related to the physical structure of the speech production process. In this thesis, linear predictive coding is used to produce a set of coefficients for the characteristic polynomial of successive 25 msec. segments of the voice track, in the z-domain. The location of the poles in the z-plane and the excitation pitch period are then shifted and the signal reformulated to cause changes of the overall frequency characteristics of the speech waveform, while maintaining the perceived sounds and information content. The resulting audio tapes confirm the theory and conjectures of the thesis.

Master of Science in
Electrical Engineering
December 1978

Advisor: S. R. Parker
Department of
Electrical
Engineering

DESIGN OF A MICROPROCESSOR-BASED
PCM DATA PROCESSING UNIT

Douglas Charles Herndon
B.S., University of Maryland, 1975

A microprocessor-based data processing unit for a pulse code modulation data communications system was designed and implemented.

Master of Science in
Electrical Engineering
June 1979

Advisor: Rudolf Panholzer
Electrical
Engineering
Department

NARROWBAND VOICE SYSTEM

Raymond Roy Hitchcock
Captain, United States Army
B.S., Virginia Military Institute, 1969

The problem of how to accommodate more simultaneous users in a given bandwidth communications channel was examined. It was determined that voice signals could be reduced in bandwidth by 50 percent. Two speech formats, F1 and F3, were filtered from the speech signal and frequency translation performed to form a compact audio signal. At the receiver, this process is reversed and the formants returned to their normal spectral positions. Intelligibility scores of 94 percent were obtained in a listening test conducted using the two formants F1 (250-650Hz) and F3 (1950-2450Hz).

Master of Science in
Electrical Engineering
June 1979

Advisor: Gerald D. Ewing
Electrical
Engineering
Department

A NEW PARAMETER OPTIMIZATION METHOD
APPLIED TO AUTOPILOT DESIGN

Ozcan Kesici
Lieutenant, Turkish Navy
B.S., Naval Postgraduate School, 1977

An investigation directed at finding an optimum compensator for use in the C-8A aircraft autopilot is described. The design approach uses a compensator structure with a number of real poles and zeros sufficient to steady-state decouple a multivariable system. The compensator pole-zero locations are chosen to give a system response as close as possible to a desired response within the limits imposed by flap angle and elevator angle constraints.

The desired response used in the design evaluation process can be based on any one or a combination of the system outputs. An integral squared-error function minimization algorithm is used to optimize the pole-zero locations. The compensators resulting from the optimization procedure are shown to be realizable by application of two-port lattice network design method.

Master of Science in
Electrical Engineering
December 1978

Advisor: G. J. Thaler
Department of
Electrical
Engineering

DESIGN AND PERFORMANCE OF A FREQUENCY HOPPING
COMMUNICATIONS SYSTEM USING DELTA MODULATION

Habib Kucukoglu
Lieutenant, Turkish Navy
B.S.E.E., Naval Postgraduate School, 1977

A way to increase jamming immunity and to decrease the intercept probability of a communication system is to use spread spectrum (SS) techniques.

In this report a frequency hopping SS system (transmitter and receiver) is presented. This system is designed, built, and tested to send and receive digitized voice by utilizing a single chip delta modulator/demodulator.

The report describes the circuitry employed, lists the important parameters of the system and includes photographs of various waveforms. The recovered audio is a good quality using digital data rates as low as 25 kilobits per second. A hopping rate of 100 hops per second is used in the design.

Master of Science in
Electrical Engineering
December 1978

Advisor: G. Myers
Electrical
Engineering
Department

OPERATION AND PERFORMANCE OF A SIGNAL CHANNEL
PCM CODEC VOICE TRANSMISSION SYSTEM

Michael D. Kyriazanos
Lieutenant, Hellenic Navy
B.S.E.E., Naval Postgraduate School, 1977

A new monolithic LSI product has recently been developed for the telecommunications market. The device is a coding-decoding circuit called a codec that converts analog signals into digital bit streams and back to analog form. Its primary application is in telephone channel banks, where its low cost makes per channel coding and decoding of voice signals economically feasible.

In this work such a codec set is used in conjunction with two hybrid filters as the main components of a single channel voice transmission system. The operation and the performance of this system are presented.

Master of Science in
Electrical Engineering
December 1978

Advisor: Glen A. Myers
Electrical
Engineering
Department

DESIGN STUDY OF A LOW PROFILE, HIGH
FREQUENCY ANTENNA SYSTEM

Robert Emmett Maskell
Lieutenant, United States Navy
B.S.O.E., United States Naval Academy, June 1973

This paper presents a design study of one method of reducing the physical size of high frequency radio antennas. The particular method utilized is that of the normal mode helical antenna. The results of tests conducted during December 1978 and January/February 1979 are listed and discussed and recommended design improvements are provided.

Master of Science in
Electrical Engineering
March 1979

Advisor: O. M. Baycura
Electrical
Engineering
Department

FIBER OPTIC DESIGN APPLICATION FOR A
SHALLOW WATER TORPEDO TRACKING RANGE

John Robert McHenry
Captain, United States Army
B.S., United States Military Academy, 1971

This thesis is a study of the possible application of fiber optic communications in a shallow water torpedo tracking range at the Naval Torpedo Station in Keyport, Washington. After a brief description of the current system, a study of advantages and disadvantages in using fiber optic techniques for underwater tracking ranges was completed. A complete design was then performed for a typical communications link in the tracking range system. A description of both the electronics used to simulate the transmitted signal and the fiber optic test link is provided.

Master of Science in
Electrical Engineering
March 1979

Advisor: J. P. Powers
Electrical
Engineering
Department

THE PRONY PROCESS AS A METHOD OF
SOURCE SIMPLIFICATION FOR USE
IN ANTENNA MODELING PROBLEMS

John Earl Meyers
Lieutenant, United States Navy
B.S., United States Naval Academy, 1972

The Prony process of data compression and source characterization was investigated to determine its feasibility as a means of accurately reducing the numerical model of a complex radiating source. The Geometric Theory of Diffraction (GTD) program, although an excellent method of calculating radiation patterns in the presence of complex structures, is presently limited by computational time requirements for other than simple electromagnetic sources.

The Prony processing of a relatively complex electromagnetic source, a high gain monopole antenna, previously investigated for use with the U.S. Army's Range Measurement System, was studied for the acceptability of this method as a possible means of generating more efficient source input for GTD antenna simulations. The accuracy of this approach was determined by comparison with the solutions obtained using the Numerical Electromagnetic Code (NEC), antenna modeling program.

Master of Science in
Electrical Engineering
December 1978

Advisor: M. L. Wilcox
Department of
Electrical
Engineering

AN APPLICATION OF ADVANCED DIGITAL METHODS FOR THE
DETECTION OF HIGH FREQUENCY RADIOTELETYPE COMMUNICATIONS

Alfred W. Mitchell
Lieutenant, United States Navy
B.A., University of Oklahoma, 1972

A machine language computer program called FMDET, using a system of zero-crossing averaging and sharp digital filtering and frequency translation, is used to convert an incoming frequency shift keyed signal directly to a decoded pulse train. This has potential application as either a real time system improvement or a software device for existing Navy RATT systems.

Master of Science in
Electrical Engineering
December 1978

Advisor: G. Marmont
Department of
Electrical
Engineering

COMPENSATOR OPTIMIZATION IN MULTIPLE
INPUT MULTIPLE OUTPUT CONTROL SYSTEMS

John Tinney Mowrey
Major, United States Marine Corps
B.S.E.E., University of Florida, 1963

The BOXPLX of a user specified cost function is evaluated as a control system design method. The emphasis is on compensator design for multiple-input multiple-output plants, but the technique should be applicable to any control system with adjustable parameters.

The engineer must define the plant dynamics, inputs and outputs, the desired output responses for the specified inputs, weighting factors for the performance measure, the type of compensation to be used, the free parameters, and initial values and constraints on the free parameters.

The program gives a direct search of the optimum values, within the specified constraints, for the free parameters. Evaluation of the results is given in graphical plots of the output time responses including the desired output response as well as the compensated response.

Master of Science in
Electrical Engineering
March 1979

Advisor: H. A. Titus
Department of
Electrical
Engineering

The Transfer Matrix Method is used to provide an analytical check on the accuracy of the method and the procedure is illustrated with a two-input two-output system example.

DESIGN OF THE DIGITAL CONTROL AND TEST UNIT
SUBSYSTEMS FOR A SATELLITE SIGNAL ANALYZER

Clyde Musgrave
Lieutenant, United States Navy
B.S.E.E., University of Nebraska, 1972

The Satellite Signal Analyzer (S.S.A.) being designed and constructed by students in the Satellite Communications Laboratory of the Naval Postgraduate School will provide Real Time Spectrum Analysis of Communication Satellite UHF Signals. This thesis documents the digital control and test unit subsystems of this S.S.A. The digital control subsystem was designed and built to interface the PDP 11/34 MINICOMPUTER to all digitally controlled devices within the system. The control bus (CIB) provides 32 BITS of digital control on a single board. The TEST UNIT subsystem was designed and built to provide the capability to monitor various signals within the S.S.A. as well as conduct self-checks. The TEST UNIT is capable of measuring the Noise Figure/Temperature of the system receivers, monitoring the level and frequency of system signals, injecting signals into the receivers and transmitting signals to satellites.

Master of Science in
Electrical Engineering
June 1979

Advisor: J. E. Ohlson
Electrical
Engineering
Department

DESIGN AND PERFORMANCE OF A SPREAD SPECTRUM
DATA COMMUNICATIONS SYSTEM USING DELTA
MODULATION WITH A DITHERED CLOCK

Evangelos Vassilios Pappas
Lieutenant Commander, Hellenic Navy
B.S., Naval Postgraduate School, 1977
and

James Harvey Hoffman
Lieutenant, United States Navy
B.S., North Carolina State University, 1970

Digital modulation schemes and spread spectrum techniques are of major importance in modern communications. This thesis investigates a delta modulation/demodulation scheme and direct sequence spreading of the digital data. The clock rate is dithered to enhance the low probability of intercept advantage of spread spectrum.

The circuitry incorporates small and medium scale integrated circuits. Experimental results are presented in some detail. Good quality voice and music were recovered using a fixed bit rate as low as 10 kbits/sec and a clock dither range of 40 percent.

Master of Science in
Electrical Engineering
December 1978

Advisor: G. A. Myers
Electrical
Engineering
Department

FREQUENCY RECEIVERS IN THE SATELLITE
COMMUNICATIONS SIGNAL ANALYZER

Matthew J. Rogers
Lieutenant, United States Navy
B.S., United States Naval Academy, 1973

Design and operation is presented of the Frequency Receivers to be incorporated into the Satellite Communications Signal Analyzer (SSA) under development by the Naval Postgraduate School, with the sponsorship of the Naval Electronic System Command. The receivers have a linear dynamic range of 130 decibels, permit frequency measurement accuracy to ± 0.01 Hz, and process received RF for display in signal vector format.

Master of Science in
Electrical Engineering
September 1979

Advisor: J. E. Ohlson
Electrical
Engineering
Department

REMOTE ACQUISITION OF ATMOSPHERICALLY-PROPAGATED
RADIO-FREQUENCY COMMUNICATION CHANNEL PERFORMANCE
DATA BY WAY OF DIALUP TELEPHONE NETWORKS

Philip Ruputz
Lieutenant, United States Navy
B.S., University of New Mexico, 1972

Atmospherically-propagated radio frequency communication networks often require the use of remote, unattended, marginally accessible repeater locations. To gather performance data on the characteristics of the channel at the remote location requires either manning the repeater facility or installing a device which will automatically gather the desired data and either store it for future retrieval or transmit it in real time by way of some medium to a suitable location for analysis.

This thesis describes a system which is capable of gathering channel performance data, including hourly and daily tabulation of signal average and median power, number and depth of fades, and power distribution. It will automatically store up to four months of data and, upon demand, transfer either real-time readings or stored data over a telephone network to any convenient data analysis location.

Master of Science in
Electrical Engineering
June 1979

Advisor: J. B. Knorr
Electrical
Engineering
Department

THE CONSTRUCTION AND TESTING OF A VERTICALLY
POLARIZED, HIGH GAIN, LOW PROFILE ANTENNA
FOR OPERATION AT 918 MHz

Vasilios George Saklias
Lieutenant, Hellenic Navy
B.S.E.E., Naval Postgraduate School, 1977

The process of constructing and testing a high gain, low profile, vertically polarized antenna for possible use in the US Army RMS/SCORE system at Fort Hunter Liggett, California is presented. The antenna was constructed to operate at a frequency of 918 MHz with a bandwidth of 10 MHz using a cylindrical radiating element extending above a ground plan. A back plate behind the radiating element and a top plate above the radiating element were used as reflectors. The radiator dimensions and the distances between radiator and reflectors were adjusted to optimize azimuthal and elevation radiation patterns and to optimize the SWR. The resultant high gain directional antenna is compatible with the existing equipment and is easy and inexpensive to construct. The effects of variations in dimensions of the optimized antenna are also presented.

Master of Science in
Electrical Engineering
December 1978

Advisor: O. M. Baycurra
Electrical
Engineering
Department

MICROPROCESSOR-BASED DIGITAL CONTROLLER SYSTEM

Ronald B. Simcoe
Lieutenant, United States Navy
B.S., North Carolina State University, 1973

A "Pseudo" general purpose microcomputer system is designed and developed for use in digital control algorithm implementation, testing and analysis. The nature of the system and its operating instructions is such that the user needs minimal background knowledge to implement it successfully. An understanding of 8080 machine language is assumed.

Master of Science in
Electrical Engineering
September 1979

Advisor: H. L. Titus
Electrical
Engineering
Department

HIGH EFFICIENCY SWITCHING MODE RF POWER AMPLIFIERS

Pirachitra Surakkhaka
Lieutenant, Royal Thai Navy

This thesis explains the high efficiency switching mode amplifier which has many advantages over the other current source power amplifiers. The discussion emphasizes the Class E switching mode amplifier, its basic operation and characteristics, design procedures, and performance along with laboratory test results. It is concluded that high efficiency radio frequency solid state power amplifiers are easily designed and give high performance at low cost.

Master of Science in
Electrical Engineering
December 1978

Advisor: G. D. Ewing
Electrical
Engineering
Department

FORMULATION OF STATE EQUATIONS

Vorapoj Vanindananda
Lieutenant (Junior Grade), Royal Thai Navy
B.S., Thai Naval Academy, 1970

The standard method, basic flowgraph techniques and the modified flowgraph technique are presented with illustrations for the formulation of network state equations. The modified flowgraph technique is extended to cover networks with mutual couplings. Examples are given for illustration and comparisons are made.

Master of Science in
Electrical Engineering
June 1979

Advisor: Shu-Gar Chan
Electrical
Engineering
Department

ANALOG-TO-DIGITAL SIGNAL PROCESSING IN A PROTOTYPE
SATCOM SIGNAL ANALYZER

William B. Zell, Jr.
Lieutenant, United States Navy
B.S., University of Pennsylvania, 1969

A prototype SATCOM Signal Analyzer (SSA) has been designed which performs spectral analysis on transponder signals from the Navy's UHF communications satellites. As an integral part of the SSA, the Analog to Digital Control and Conversion subsystem converts four channels of baseband analog signals into equivalent digital representations while operating at variable sampling rates and offering either twelve or eight bits of resolution to an array processor for Fast Fourier Transform processing. This report documents the design and construction of the Analog to Digital Control and Conversion subsystem.

Master of Science in
Electrical Engineering
March 1979

Advisor: J. E. Ohlson
Electrical
Engineering
Department

THEORETICAL STUDY OF FINITE AMPLITUDE
STANDING WAVES IN RECTANGULAR CAVITIES WITH
PERTURBED BOUNDARIES

Mehmet Aydin
Lieutenant, Turkish Navy
B.S., Naval Postgraduate School, 1978

The effects of various geometrical boundary perturbations on finite-amplitude acoustical standing waves in a rectangular, rigid-walled cavity were investigated using non-linear theory. The standing waves that exist in an ideal cavity must be corrected when the boundaries are irregular. Three specific examples (stepped, linear and wedged perturbations) were worked out to demonstrate the corrections (in first order) near degeneracies for small perturbations. Those specific examples were compared to the experiments. The present theoretical model qualitatively predicts the effects of the perturbations on the behavior of the nonlinearly generated second harmonic. However, there are unexplained quantitative discrepancies between experiment and theory for a couple of cases.

Master of Science in
Engineering Acoustics
December 1978

Advisor: A. B. Coppens
Department of
Physics and
Chemistry

NEAR GRAZING SCATTERING
BY SLIGHTLY ROUGH SURFACES

James Matthew Bailie
Lieutenant Commander, United States Navy
B.S., Frederick College, 1966

It has been predicted that point source radiation which is at near-grazing incidence to a slightly rough surface generates a boundary wave in the fluid as well as the better known volume wave (I. Tolstoy, J. Acoust. Soc. Am., 63, S60 (1978)). Anechoic chamber experiments, using a surface constructed of rigid hemispheres on a rigid plate, have been performed to compare with theory. The experiments confirm that the relative boundary wave amplitude to volume wave amplitude increases as the $3/2$ power of the sound frequency when the source and receiver are on the boundary. However the predicted $r^{1/2}$ growth with range reaches a limit at $kr \approx 100$. For the receiver above the rough surface the experimental values of the scattered sound show some agreement with theoretical predictions.

Master of Science in
Engineering Acoustics
December 1978

Advisor: H. Medwin
Physics and
Chemistry
Department

IMPULSE WAVE DIFFRACTION
BY RIGID WEDGES AND PLATES

Joseph Henry Bremhorst
Lieutenant Commander, United States Navy
B.S., St. Ambrose College, 1968

The problem of diffraction of acoustics signals by rigid barriers is studied empirically. Backward and forward diffraction from a 90 degree wedge and a thin plate are analyzed. Attempts to measure the diffracted energy in the illuminated region over the apex of the barrier, where direct and reflected signals coexist with diffracted, are discussed. Factors influencing the choice of the barriers' physical dimensions and composition are listed, as are the problems surrounding the selection of an "ideal" sound source and receiver. Finally, the data are compared to the theory by Biot and Tolstoy (Journal of the Acoustical Society of America, v. 29, 1957) and found to be in good agreement with predictions.

Master of Science in
Engineering Acoustics
December 1978

Advisor: H. Medwin
Physics and
Chemistry
Department

PRESSURE ON THE INTERFACE BETWEEN A CONVERGING
FLUID WEDGE AND A FAST FLUID BOTTOM

Masami Kawamura
Lieutenant, Japan Maritime Self Defense Force
B.S., Naval Postgraduate School, 1978

and

Ioannis Ioannou
Lieutenant Commander, Hellenic Navy
B.S., Naval Postgraduate School, 1978

The pressure amplitude and phase distribution along the interface between a tapered fluid layer and an underlying fast fluid bottom were investigated both theoretically and experimentally.

Two different theoretical models were compared experimentally: a simple model based on a combination of normal modes and ray theory and an exact solution based on the method of images. The experiment was conducted at 100 kHz with a wedge of silicon oil separated from a large tank of fresh water by a thin mylar diaphragm. The simple model failed to predict adequately the pressure amplitude and phase along the interface. The method of images gave accurate predictions.

Master of Science in
Engineering Acoustics
December 1978

Advisors: J. V. Sanders
A. B. Coppens
Department of
Physics and
Chemistry

COMPARISON OF THEORETICAL AND EXPERIMENTAL
SOUND RADIATION PATTERNS FROM A WATER
LOADED FLEXURAL DISK TRANSDUCER

Tekin O. Kiyar
Lieutenant, Turkish Navy
B.S.E.E., Naval Postgraduate School, 1978

Measurements of the sound radiation patterns in water from the flexural vibrations of a clamped-edge steel disk have been made and are compared with the results of theoretical calculations made by Alper and Magrab (Journal of Acoustical Society of America, Vol. 48, Number 3, pp. 681-691, 1970) for the two lowest order circularly symmetric modes of disk vibration.

Although some differences were expected and were found due to the experimental condition which only approximated the assumptions made in the theory, it was found that the major features of the measured patterns agreed reasonably well with the theoretical pattern.

The results have applicability to the design of sound source which could be used in underwater tracking of vehicles on test range.

Master of Science in
Engineering Acoustics
December 1978

Advisor: O. B. Wilson, Jr.
Physics and
Chemistry
Department

EXPERIMENTAL STUDY OF FINITE-AMPLITUDE
STANDING WAVES IN RECTANGULAR CAVITIES WITH
PERTURBED BOUNDARIES

Ender Kuntsal
Lieutenant, Turkish Navy
B.S.E.E., Naval Postgraduate School, 1978

Finite amplitude standing waves in air at ambient temperature contained within a tuneable, rigid-walled, rectangular cavity were experimentally investigated. The effects of various geometrical perturbations on the harmonic content of the observed pressure waveform in the presence of degeneracies were compared to theory. Theory and experiment agreed qualitatively in that shape of the resulting curves have the correct form, but significant differences in the level of the second harmonic were frequently observed.

Master of Science in
Engineering Acoustics
December 1978

Advisor: J. Sanders
Physics and Chemistry
Department

ACOUSTIC IMAGING PROCESSOR

Timothy Eugene McCombs
B.S.E.E., West Virginia University, 1973

Experimental apparatus and techniques are developed for processing and display of acoustic images. The imaging involved is of torpedoes buried to a few meters depth in soft unconsolidated sediment of the ocean floor. A partial implementation of imaging techniques is simulated by using a linear array of microphones in air to produce signals for a digital beamformer. Input signals are corrected for wavefront curvature, thresholded, and time delayed using shift registers. A display is developed using signals tapped at appropriate points in the shift registers, and combined appropriately using logic gates. The display is a cathode ray tube display with angle of incidence on the horizontal axis and range on the vertical axis.

Master of Science in
Engineering Acoustics
June 1979

Advisor: G. L. Sackman
Electrical
Engineering
Department

PHYSICAL MODELING OF SOUND SHADOWING BY SEAMOUNTS

Robert Parish Spaulding Jr.
Lieutenant, United States Navy
B.S., University of Rhode Island, 1970
M.S., George Washington University, 1977

Propagation loss due to shadowing by seamounts is studied utilizing physical models in air. Dickens Seamount in the Gulf of Alaska is approximated by three models: a plane wedge, a contoured wedge, and a scaled three dimensional model. The forward diffraction over each is analyzed for a five octave frequency range. A new concept, the far-field "diffraction scattering strength" is defined and used to predict frequency-dependent diffraction loss at sea. The total propagation loss is calculated by adding laboratory model values of upslope forward scatter and crest diffraction losses to computer-predicted ray refraction losses up to and away from the seamount. This predicted loss is then compared to long-range ocean propagation loss measurements for the case in which rays are completely blocked by the Seamount. Close agreement is found.

Master of Science in
Engineering Acoustics
September 1978

Advisor: H. Medwin
Physics and
Chemistry
Department

INELASTIC ELECTRON SCATTERING FROM ${}^7\text{Li}$ IN THE
VICINITY OF THE α - TRITON THRESHOLD

Robert Francis Ryan
Captain, United States Army
B.S., United States Military Academy, 1970

Inelastic electron scattering experiments were carried out on ${}^7\text{Li}$ within a range of momentum transfer squared of $.2 < q^2 < .65 (\text{F}^{-2})$. Inelastic cross sections and form factors were determined for the 4.55 MeV inelastic peak and the inelastic continuum caused by the disintegration of ${}^7\text{Li}$ into an alpha particle and tritium above the threshold of 2.45 MeV.

Master of Science in
Engineering Science
March 1979

Advisor: Fred R. Buskirk
Physics and
Chemistry
Department

A STUDY OF THE CLOSED-LOOP SPOTTING SYSTEM AND DESIGN
EVOLUTION OF THE PHALANX CLOSE-IN WEAPON SYSTEM (CIWS)

Joseph Jean Claude Yvon Tremblay
Captain, Canadian Forces
B.E.E., Polytechnique of Montreal, Quebec, 1973

The necessity of having a shipboard "last ditch" defensive system against cruise missile and other threats brought about the development of the Phalanx Close-In Weapon System (CIWS).

This thesis describes the features of the Phalanx and its subsystems and explains their operational functions. A detailed analysis is given of the closed-loop spotting system in terms of control system theory. The mathematical equations which govern the operation of the closed-loop spotting system are presented.

Technical trade-offs made during the evolution of the Phalanx are examined. Future improvements which could increase Phalanx's performance are also discussed.

Master of Science in
Engineering Science

Advisor: M. B. Kline
Administrative
Sciences
Department

FACTORS IN NEGOTIATING OVERSEAS

Daniel William Allen, Jr.
Lieutenant Commander, Supply Corps, U.S. Navy
B.A., Cornell University, 1966

The Department of Defense has been expanding the volume of foreign purchases in compliance with directives intended to achieve our national goals regarding NATO Rationalization, Standardization, and Interoperability (RSI). Implementation of this "two-way street" policy entails extensive negotiations at the governmental level in formulating the Memoranda of Understanding associated with a given transaction. Also, there have been increases in the volume of direct purchase transactions requiring negotiation between the U.S. Government and foreign private firms. The purpose of this study is to identify those factors which may affect the negotiation process with foreign firms and foreign government officials. Cultural differences which might influence negotiations are also reviewed. Most findings and conclusions are based upon

Master of Science in
Management
September 1979

Advisor: David Burt
Administrative
Science Department

personal interviews with U.S. negotiators from both the public and private sectors who have had extensive experience in negotiating overseas. The study concludes with some recommendations to help the U.S. Department of Defense contract negotiators prepare for negotiations overseas.

A STUDY OF THE APPLICATION OF THE
LOGNORMAL DISTRIBUTION TO
CORRECTIVE MAINTENANCE REPAIR TIME

Ronny Almog
Lieutenant Commander, Israel Navy
B.S., Technion-Israel Institute of Technology, 1970

The usual mathematical formulation for availability assumes an exponential distribution for failure and repair times. While such an assumption is sometimes correct for reliability, it is not valid for maintainability. This study was conducted primarily in order to verify that the lognormal distribution is a suitable descriptor for corrective maintenance repair times, and to estimate the error caused in assuming an exponential distribution for availability and maintainability calculations when in fact the distribution is lognormal. Approximately 20 sets of existing maintainability demonstration repair time data, of essentially electronic systems, were analyzed using the methods of probability plotting and statistical testing for distributional assumption. The results show that the log-normal distribution assumption cannot be rejected in most of the cases, while the exponential distribution is rejected. However, the error caused when assuming an exponential distribution for MTTR is found to be negligible.

Master of Science in
Management
June 1979

Advisor: Melvin B. Kline
Department of
Administrative
Sciences

AN EVALUATION OF THE EFFECTIVENESS OF
THE NAVY'S HUMAN RESOURCE MANAGEMENT SURVEY
AS A NAVY ENLISTED RETENTION MANAGEMENT TOOL

Joseph R. Almony
Lieutenant
E.A., Columbia University

Jerrald D. Reece
Lieutenant
B.S., George Washington University

Unit "retention profiles" were developed using Navy Human Resource Management Survey responses for both high and low retention units. Although the "profiles" were found to be identical for both high and low retention units, comparative analysis of survey responses was found of value in assisting unit Commanding Officers in developing retention management strategies.

The data utilized consisted of 28,913 respondents of the Navy Human Resource Management Survey during the second quarter of fiscal year 1978. The individual's stated career intent was regressed on the survey dimensions, indices, and questions to further understand the dynamics of the retention decision. Unit "retention profiles" were developed as a result of stepwise discriminant analysis on the survey questions for both high and low retention units.

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A detailed bibliography of employee job turnover is included as an aid to future researchers.

FEASIBILITY STUDY OF A
COMPUTERIZED MANAGEMENT INFORMATION SYSTEM
FOR THE NOAA CORPS PERSONNEL SYSTEM

Alan D. Anderson
Lieutenant, NOAA Corps
B.S.M.E., South Dakota School of Mines & Technology, 1971

The National Oceanic and Atmospheric Administration (NOAA) Commissioned Personnel Division was in the situation of being subject to increasing demands for information and services and having a fixed number of office personnel to fulfill those demands. A study was performed to investigate the feasibility of converting some aspects of the manual data handling procedures to computerized handling. Objectives were defined as: reducing data retrieval and information preparation time; increasing currency of data; aiding in monitoring suspense dates; eliminating some hard copy records; and improving information dissemination. A generalized computer system using a data base management system software package was designed. Alternatives for obtaining the requisite capabilities were evaluated and an implementation procedure was outlined. It was concluded that the automation of the system was feasible and would most likely result in increased effectiveness.

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ACQUISITION OF AUTOMATIC DATA PROCESSING
IN THE NAVY

Arthur Clarke Argue III
Lieutenant, Supply Corps, United States Navy
B.S., United States Naval Academy, 1972

In recent years government agencies have become increasingly reliant on the use of automatic data processing equipment for accomplishing their daily tasks. Without this equipment most agencies, including the Navy, would not be able to function. As spending on automatic data processing equipment escalated at rapid rates, various rules and regulations were published by agencies in an attempt to ensure the effective management of this equipment. These rules often conflict with each other and often hinder activities trying to accomplish their missions.

This thesis will examine these rules and their effect on the Navy's automatic data processing equipment acquisition system. An attempt will be made to determine changes which the Navy can make to improve the system and make it more responsive to the users' needs. The study will focus on both the approval and the contracting portions of the acquisition cycle.

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LESSONS LEARNED FROM THE PATROL HYDROFOIL
MISSILE (PHM) PROGRAM

Edgar Scott Ball, Jr.
Lieutenant, United States Navy
B.S., Wooster College, 1968

The PHM project began as a major NATO acquisition program consisting of 60 or more ship for international purchase. Today the program consists of just six ships for the United States alone. This thesis reviews the history of the program, the design considerations and the current problems experienced by the program manager. An analysis of the rationale behind the decisions which led to the reduction in scope of the program suggests that factors inherent to the current systems acquisition process caused the cut back in the program and that these were independent of the program manager's efforts. The results of the analysis suggest that these factors have the potential to affect the outcome of any acquisition program, no matter how well the hardware performs.

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AN ANALYSIS OF THE CURRENT AND FUTURE TOWING
AND SALVAGE CAPABILITIES OF THE U.S. NAVY

Harlan Roland Bankert
Lieutenant Commander, United States Navy
B.S., University of Baltimore, 1967

This study examines the capabilities existing in the towing and salvage force in 1979. This is followed by a discussion of the role that the Military Sealift Command plays in towing and salvage fleet support. An estimation is made as to the number of ships that are needed to satisfy peacetime and wartime requirements for towing and salvage services. Next, alternative methods for improving or augmenting peacetime and wartime capabilities are examined. In the final chapter, conclusions are drawn regarding the posture of the towing and salvage force and possible alternatives are offered to improve this posture.

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ACQUISITION OF FOREIGN PRODUCED PRODUCTS:
A GOVERNMENT AND INDUSTRY PERSPECTIVE

John Roy Bergquist
Lieutenant Commander, Supply Corps, U.S. Navy
B.A., University of Minnesota, 1963

Department of Defense project managers are increasing the scope of their operations to include consideration of foreign defense articles in acquisition strategies. This action has been motivated primarily by NATO Rationalization, Standardization and Interoperability (RSI) requirements. This thesis addresses the problems, real and perceived, in implementing "two-way street" transactions with allied nations. Members of U.S. Navy project offices were interviewed to determine the impact of NATO RSI policy on their operations. The questions asked revealed problems encountered and highlighted the pro/con biases of foreign acquisition. Private industry has been active in foreign purchasing for many years. A survey was utilized to identify private industry's experiences with foreign business practices, company biases and economic considerations. The thesis concludes with a comparison of private and DOD experiences and offers some recommendations to project managers involved with expansion into the foreign marketplace.

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TOWARD AN ECONOMIC DISTRIBUTION MODEL
A MANAGEMENT CONTROL ANALOGUE

Willie Ray Bishoff Jr.
Major, United States Marine Corps
B.S., University of Houston, 1971

Logistics functions within the military can be viewed as similar in operation to finished goods distribution within major manufacturing concerns. Based upon research conducted within the distribution departments of selected major manufacturing concerns, this thesis contains a predictive model created from an observed relationship between finished goods distribution and military logistics. Utilizing a descriptive format, this model is established through four major areas of comparison. First, financial aspects and cost-benefit analysis toward an economic utilization of all resources pervades the analogue. Second, material movement designs or processes are presented toward answering the question of how a manager can go into an organization with a critical eye at how better to perform his function. Third, the often under-emphasized area of human resources utilization also contributes significantly to the model's evolution. Fourth, concluding the analogue, is a discussion of the interface of data processing, MIS, and evaluation aspects of the process.

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DISCOUNTING THEORY AND ITS
APPLICATION IN THE PUBLIC SECTOR

Ralph Anthony Bonna
Lieutenant Commander, Supply Corps, United States Navy
B.S., University of Maine, 1968

The purpose of this paper is to review the current policy established by the Office of Management and Budget (OMB) concerning the use of discounting in evaluating time-distributed costs and benefits of proposed public investments. Although a widely accepted concept in the private sector, the use of discounting in the public sector has been less clearly defined and a subject of considerable debate. The mechanics of discounting and the importance of the discount rate in investment decisions are discussed. A brief history of discounting in the public sector is presented including highlights of the Congressional Hearings in 1968 from which the current policy resulted. Several issues relating to the OMB policy such as the question of social versus economic goals, the effect of budget constraints, and the potential misapplication or misuse of the discounting methodology are addressed. Particular attention is given to the problem of inflation and its impact on the established rate.

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THE INFLUENCE OF MINORITIES ON THE SOVIET MILITARY

Roger A. Bossart
Captain, United States Air Force
B.B.A., University of Miami, 1968

There are changes occurring in the demographic composition of the Soviet population, particularly in the Soviet armed services which could generate significant internal stress and hamper effective and efficient military command and control. The resultant potential consequences could be decreased morale, lack of troop cohesiveness and decreased combat readiness with an overall effect being a decline of the Soviet Union as a world military power.

This thesis will examine language differentials between the non-Russian recruit and his Russian counterpart. Building on this foundation idea, however, will be the second, more complete subject of cultural oppression and ethnic discrimination as it is manifested today in the USSR.

The value of this study is to suggest possible Soviet reaction to demographic shifts, effects of growing nationalistic tendencies in the outlying republics, and consequences of dissident action as they might all influence Soviet combat readiness.

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A DECISION MODEL AND DATA COLLECTION GUIDE
FOR PLANNING CHANGE IN MATERIAL DISTRIBUTION SYSTEMS

George Richard Boyt
Lieutenant Commander, Supply Corps, United States Navy
B.A., University of Wyoming, 1965

Technological advancements in materials handling systems and computer applications offer appealing solutions to the military material distribution system managers who are being forced to seek productivity improvements because of spiraling operating costs. However, these managers have little planning guidance and reference material to help them decide what to do. The purpose of this thesis is therefore to provide such help. A decision model is developed and suggestions are made for collecting data for use in the model. In addition, a summary of experiences of industry and military activities attempting to automate the materials handling functions is presented.

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EQUIPMENT REPLACEMENT PROBLEMS AT NAVY
INDUSTRIALLY FUNDED (NIF) RESEARCH, DEVELOPMENT,
TEST AND EVALUATION (RDT&E) ACTIVITIES

Donald Reid Bridges
B.A., George Washington University, 1962

For many years the Navy industrially funded (NIF) Research, Development, Test and Evaluation (RDT&E) activities have been forced to utilize appropriate funds as the primary resource for replacement of general purpose equipment. In recent years, the budget review process has been such that these funds have been drastically reduced, creating a management problem for the activities.

The equipment is becoming obsolete, and difficult as well as expensive to repair. There is a need to upgrade quality and capability, which in turn would result in lower costs to the customers of the NIF RDT&E activities.

Recent trends indicate a growing acceptance, even pressure, to expand the authority of managers by allowing the capitalization of equipment. Statements by the General

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Accounting Office, the Defense Audit Agency and the OSD Assistant General Counsel indicate that capitalization of equipment is indeed a valuable management tool.

The writer recommends that the Navy obtain authority to capitalize general purpose equipment at the NIF RDT&E activities, as a tool necessary for the accomplishment of their respective missions.

AN ANALYSIS OF THE
EFFECTIVENESS EVALUATION MEASUREMENTS
FOR COAST GUARD
GENERAL LAW ENFORCEMENT HELICOPTERS

James Alan Brokenik
Lieutenant, United States Coast Guard
B.S., United States Coast Guard Academy, 1971

Concern over the growing drug problem has led to increased enforcement efforts by all responsible federal agencies. This thesis examines the current management control evaluation system used in conjunction with the Coast Guard General Law Enforcement Program. These evaluation techniques and the associated reports and historical data base are related to the current enforcement goals and objectives. From this analysis a better understanding of this system is gained, alternatives are developed, and recommendations for improved program and resource performance evaluations are presented.

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ANALYSIS OF THE
GUIDED MISSILE FRIGATE (FFG-7 CLASS)
SHIP ACQUISITION PROJECT

James Douglass Brotherton
Lieutenant Commander, United States Navy
B.S.M.E., University of Texas, 1968

The evaluation of success in any naval ship acquisition program requires the identification and accomplishment of three general prerequisites. The first is that a legitimate defense need exist for a naval ship. The second is that prioritized cost, schedule and performance goals exist and be met for the ship's life cycle. The last is that the program acquire a ship. The FFG-7 class ship acquisition program is evaluated based on these prerequisites within the current DoD acquisition policy and found to be lacking in the successful accomplishment of the prioritized goals, particularly regarding cost and schedule. Result of this evaluation is an observation on how a ship acquisition program can successfully accelerate pre-established DSARC milestones as well as document the debilitating effects of rampant inflation on an otherwise well planned and managed acquisition program.

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A MULTIDIMENSIONAL ANALYSIS OF DOA'S BUDGETARY PROCESS
USING ZERO BASE BUDGETING AND THE TRAINING MANAGEMENT
CONTROL SYSTEM

Royal A. Brown III
Captain, United States Army
B.B.A., Stetson University, 1979

Peter C. Correa
Captain, United States Army
B.S., United States Military Academy, 1973

This thesis report is a multidimensional analysis of the Federal budgeting process as it pertains to the United States Army financial manager. Summarized information is presented concerning the evolution and current state of the Federal Budget System. The Planning, Programming, and Budgeting System is described both with respect to its origin and present application. The concept, process, and Federal implementation of Zero Base Budgeting is discussed. The Training Management Control System as a new budgeting tool to justify Operation and Maintenance, Army Program 2 mission funds is introduced. A methodology applying the interface of the Training Management Control System and Zero Base Budgeting is developed for utilization in the budgeting process. The cruciality of program evaluation and budgetary performance

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feedbacks are discussed. Recommendations are included describing ways improvements can be made in: the Training Management Control System, the budgeting process for training dollars and the development of effectiveness measures.

PRICING FOR U.S. ARMY TECHNICAL ASSISTANCE
FIELD TEAMS (TAFT)

Terry E. Brown
Captain, United States Army
B.S., Columbus College, 1974

The Technical Assistance Field Team (TAFT) concept is a relatively new method of providing military services to foreign countries under the Foreign Military Sales (FMS) program. Because of this newness, the policies and procedures governing the deployment of an U.S. Army TAFT are still being formulated and revised. One such area is pricing. This document provides a brief overview of FMS, including the purposes, authority, and responsibilities for its administration. The authorized usage and pricing involved in the deployment of an U.S. Army TAFT are discussed. This study attempts to consolidate and/or provide methods that may be used to price TAFT deployments. Because of the lack of sufficient data in several areas, the pricing methods discussed are conservatively biased. Recommendations are presented to refine further the price estimation methods discussed.

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A NON-PARAMETRIC ANALYSIS OF THE HRM DATA

William L. Carter
Lieutenant, United States Navy
A.A., University of Florida, 1969,
B.S., Livingston University, 1971

Lawrence L. Yeatman
Lieutenant, United States Navy
B.A., University of Texas, 1971

This thesis provides a statistical analysis of historical HRM data in an attempt to determine if significant positive trends exist. Non-parametric statistical techniques using rank-ordering concepts were used for the analysis.

Analysis failed to show the trends predicted by the literature on survey-guided development. No significant overall trends were detected by any of the statistical tests used. A conclusion that no significant changes have occurred in Navy attitudes as the result of efforts by the HRMSS was considered suspect. The authors discussed the possible explanations for the discrepancy between the conceptual prediction and the observed results.

In conclusion, the analysis was not able to reject the null hypothesis. Possible areas of future research are presented for consideration by interested parties.

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RETIREMENT ACCOUNTING AND THE UNFUNDED LIABILITY

Albert T. Church, III
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B.S., United States Naval Academy, 1969

This thesis examines military retirement costs and the much-publicized unfunded liability that has accrued. Accounting and funding of pension costs in the private sector are analyzed by discussing accepted actuarial valuations and cost methods, Accounting Principles Board (APB) Opinion No. 8, and the Employee Retirement Income Security Act (ERISA) of 1974. Private sector procedures are then compared to retirement plans and procedures in the public sector. Finally, the nature and trend of military retirement costs is presented, followed by arguments as to the relevance of the unfunded liability. The thesis concludes with the observation that the growing governmental liabilities for retirement and social programs need formal recognition. The controversy surrounding military retirement costs, a small and relatively stabilized portion of this liability, is considered to be over-emphasized.

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IMPLICATIONS FOR THE MILITARY HEALTH CARE
SYSTEM IN UTILIZING NON-PHYSICIAN PROVIDERS:
PART II -- THE UTILIZATION AND STAFFING IMPLICATIONS

Bobby Gene Clark
Lieutenant, Medical Service Corps, United States Navy
B.S., The George Washington University, 1977

This thesis is a continuation of a subject initiated by Lieutenant Brian R. Colfack, Medical Service Corps, U.S. Navy, who approached the utilization of Non Physician Providers (NPP) from the perspective of cost implications (Ref. 1). Colfack also discussed the history of the NPP movement and the present mix of providers in the military sector. That thesis and the present work were undertaken as a part of the Naval Postgraduate School research project entitled "Navy Health Care Systems Professional and Paraprofessional Personnel Mix Study" sponsored by the Office of the Assistant Secretary of the Navy for Manpower.

The thesis begins with an examination of the civilian and military physician's assistant (PA) and nurse practitioner (NP) utilization patterns. Then, to the extent that information was available, staffing models for the non-physician health care provider from the civilian and military sectors

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are discussed. Implications for military utilization of NPPs follow. Staffing implications are then discussed in light of the models examined. Finally, a summary and conclusions chapter attempt to generalize the findings of the literature and draw upon the findings presented by Colfack.

A LEASE VERSUS BUY DECISION
METHODOLOGY FOR THE ARMY:
A PROPOSAL

Herbert Charles Clifton
Captain, United States Army
B.S., United States Military Academy, 1971

The Army currently does not have a prescribed uniform methodology to determine the lease versus buy financing of items procured from private industry. Also, when lease versus buy decisions have to be made, the decision is often a separate one after the system has been chosen by a cost-benefit analysis.

Discount rate, salvage value, tax rates, depreciation, and risk are all elements that directly affect the lease versus buy determination in both industry and government transactions. However, total agreement as to the application of these elements to the final decision is lacking within the Army.

Based on the literature available, a lease versus buy methodology is determined. Also, it is shown how this method should be part of a one step cost-benefit analysis instead of a two step method to be used by the Army when leasing is a viable financing alternative.

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A Q-GERT MODEL AND ANALYSIS OF THE
COMMUNICATIONS IN A MECHANIZED BRIGADE
COVERING FORCE

Henry Charles Cobb, Jr.
Captain, United States Army
B.S., University of Montana, 1970

The purpose of this thesis is to determine if the Queuing Graphical Evaluation Review Technique (Q-GERT) can accurately model tactical military communications in a manner which can be used and understood by managers who have little computer expertise. Q-GERT is FORTRAN-based analysis package which models networks consisting of events (nodes) and activities (arcs).

The communications of a mechanized brigade covering force is easily modeled using Q-GERT symbolism and user written FORTRAN inserts; however, a manager must be proficient in FORTRAN and have access to the 1000 node/1000 arc Q-GERT package to accurately implement this model.

The conclusion of this thesis is that Q-GERT is a flexible modeling technique which should prove to be a valuable managerial tool for the military manager when the larger Q-GERT package is used.

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IMPLICATIONS FOR THE MILITARY HEALTH CARE
SYSTEM IN UTILIZING NON-PHYSICIAN PROVIDERS:
PART I -- THE COST IMPLICATIONS

Brian Richard Colfack
Lieutenant, United States Navy
B.S., The George Washington University, 1977

Since the development of the physician's assistant and nurse practitioner concepts within the civilian health care system during the mid-1960's, each of the military medical departments comprising the Military Health Care System has added a force of these non-physician providers to their inventory of health care personnel.

This study attempts to present a historical perspective of the factors leading to the development of these concepts, within both the civilian and military health care sectors. Once this background is developed, a description of the current personnel resources of the Military Health Care System is presented. Given this information, the study then places its major emphasis on the cost implications for the Military Health Care System in utilizing these non-physician providers.

The study identifies four major cost elements: salary, overhead, training, and supervision. These and other factors are reviewed and analyzed as to their implications for the Military Health Care System.

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AN ANALYSIS OF THE EFFECTS
OF CONTAINERIZATION
ON MILITARY SEALIFT CAPABILITY

David Michael Cook
Lieutenant, Supply Corps, United States Navy
B.A., San Diego State University, 1970

This thesis analyzes the impact of containerization on military sealift capability. After tracing the history of containerization within the sealift environment, the types of current sealift intermodal vessels and the advantages and disadvantages of this transportation method are reviewed. The Defense Transportation System and, in particular, the Military Sealift command -- the operating agency responsible for managing the military's sealift capability -- are then reviewed. Next, the usefulness and problems of containerization in sealift logistical planning are identified, and the potential of this unique sealift transportation method on military sealift capability is analyzed. In the final chapter, specific recommendations are made in order to fully capitalize on and effectively utilize containerization to enhance military sealift capability.

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AN INTERNAL AUDIT MODEL FOR THE U.S. COAST GUARD

Roy Gene Cook
Lieutenant Commander, U.S. Coast Guard
B.S., University of Tennessee, 1967

Internal Audit is an element of internal control within an organization that provides management with information to aid in the achievement of organization goals. The ways in which internal audits help in meeting organization goals is examined, and a method by which the Coast Guard can apply these concepts is presented using the program structure initiated in 1965 for Planning, Programming and Budgeting in the Coast Guard as a basis for an internal audit system. The General Accounting Office has provided specific guidance in this area. Organizationally, it is proposed that internal audit should be in the 'operating administration' level rather than the Executive Department level in order to have maximum impact. In conclusion, an organizational model for the implementation of an internal audit function in the Coast Guard is presented.

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NAVAL AVIATOR RETENTION:
PREDICTING RETENTION AND
IDENTIFYING RELATED VARIABLES

Virgil Griffith Cook, Junior
Lieutenant Commander, United States Navy
B.S., University of Southern Mississippi, 1969

The research described in this thesis was directed toward determining the feasibility of using the Navy's HRM Survey to accurately predict aviator retention six to eighteen months in the future. Another objective was to determine if variables which discriminated Careerists from Resignees would provide sufficient understanding of retention behavior to enable Navy management to develop effective action plans aimed at solving aviator retention problems. Discriminant-function equations, in cross-validation, correctly classified 90% of the naval aviator sample into two groups -- Careerists and Resignees. Additionally, discriminant-function analysis generated discriminating variables which provide insight into career retention behavior. Attitude measures, command climate and general satisfaction, were found to be highly correlated with personnel retention.

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MAINTENANCE SURCHARGE FOR RANGE USE AT
THE PACIFIC MISSILE TEST CENTER

James T. Corbett
Lieutenant, United States Navy
B.S., Merrimack College, 1970

The Pacific Missile Test Center, PMTC, is utilized by various DOD components to test and evaluate weapons systems. Range facilities include tracking and surveillance radar, telemetry, communication, recording and command/control/ destruct instrumentation systems. PMTC is a component of DOD's Major Range and Test Facility Base and is subject to operating under a Uniform Funding Policy.

This thesis investigates the proposal made by PMTC's Engineering and Design Department that a surcharge system be developed to levy instrumentation maintenance costs on range users. The DOD organization for RDT&E and Weapons Systems Acquisition is discussed in brief. This is followed by a detailed examination of the Uniform Funding Policy and Industrial Maintenance Principles. The PMTC Financial Management System is presented and surcharge implementation problems are identified. A conclusion is made to effectuate a surcharge; and allocation and implementation procedures are introduced.

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A REVIEW OF THE METHODS OF ACCOUNTING AND
CONTROL OF THE RECREATION FUNDS AT THE
NAVAL POSTGRADUATE SCHOOL

James Cutler Dawson, Jr.
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1970

This thesis addresses the method of accounting and control of recreation funds at the Naval Postgraduate School, Monterey, California. The techniques employed by the Special Services Officer in monitoring these funds are discussed, and a review of the budget formulation and execution is conducted in an attempt to evaluate the adequacy of present controls. The thesis concludes with the observations that the present financial controls of the recreation funds at the Naval Postgraduate School are adequate and that the budget process is efficient and effective.

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JOB ENRICHMENT IN ANTISUBMARINE WARFARE

Robert Emmett DeLateur
Lieutenant, United States Navy
B.A., Central Washington State College, 1972

Since the all volunteer force came into being, retention of military personnel beyond their first enlistment has become an increasingly important problem, especially for the U.S. Navy. Yearly retention conferences have been held for the purpose of developing plans to reduce turnover. The results of the latest conference brought the focus of attention to better leadership and management training of U.S. Navy personnel.

Among the techniques that deal with the problems of absenteeism and turnover is job enrichment. The main thrust of job enrichment is to increase retention by increasing work satisfaction. Job enrichment as a management technique focuses on the basics of employee motivation and work behaviors. It aids the managers in identifying the components which comprise a job, and enables them to determine satisfying components that can be enhanced and dissatisfying components that can be diminished or eliminated.

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AN EMPIRICAL ANALYSIS OF
THREE STOCHASTIC INVENTORY
MODELS IN A NAVAL HOSPITAL

Floyd James Dunaway
Lieutenant, United States Navy
B.S., George Washington University, 1977

An empirical study of pharmacy item demand from the Supply Department in a Naval Hospital was conducted to test three stochastic inventory models to see if investment in inventory could be reduced. The three models, A3RSR Method (Tukey), Exponential Smoothing Method, and Regression Forecasting, were run with eighteen months of demand figures to develop the forecasts and compare the models. The results were evaluated on the basis of numerical differences and dollar values of the forecasts vs. the actual demands.

Exponential Smoothing proved to be slightly better, but no greater differences were noted between the performances of the three models. One possible explanation was found to be excessive variance in the demand generated by the Pharmacy, due to inputs other than actual customer demands. Recommendations were made for the institution of a basic system to aid the Pharmacy in determining their actual demand.

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AN ANALYSIS OF THE MANAGEMENT OF
NAVAL AIR SYSTEMS COMMAND
TEST AND EVALUATION FIELD ACTIVITIES

Lawrence William Emery
Naval Air Test Center, Patuxent River, Maryland
B.S.E.E., Northeastern University, 1965

Requirements for test and evaluation in the weapons system acquisition process have become increasingly formalized and management of the test and evaluation activities has become more centralized, particularly with the formation of the Major Range and Test Facility Base and establishment of the Uniform Funding Policy. Management of the Navy portion of the Major Range and Test Facility Base has been delegated to the Naval Air Systems Command Test and Evaluation Group; however, most of the use of these facilities comes from the Systems and Engineering Group. Some of the problems resulting from this divided responsibility are discussed here and recommendations for improvements are presented.

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COST-BENEFIT ANALYSIS OF
TRAINING A NAVAL RESERVE SEABEE

Radney Lee Fisher
Lieutenant Commander, United States Navy Reserve
B.B.A., University of Texas, 1965

The defense of the United States today is based on the Total Force concept--including a combination of active duty and reserve forces in being, which provide for the security structure essential during national crises. However, the Naval Reserve forces have been continually attacked and reduced in size over the past ten years. Is this continual reduction totally justified? An analysis of the costs to maintain a Reserve Seabee relative to an active duty counterpart suggests that it costs seven times more to pay, train and support the latter. While trained to meet specialization and conditional requirements, the Reserve Seabee benefits both civic and other military organizations with contributed labor, completing many construction projects during the year. The positive benefits at lower cost make the Reserve Seabee an asset to our country's Total Force.

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RETENTION OF FIRST AND SECOND CLASS PETTY OFFICERS
IN THE U.S. COAST GUARD

Franklin Timothy Fowler
Lieutenant, United States Coast Guard
B.S., Carson-Newman College, 1970

and

David James Ramsey, Jr.
Lieutenant, United States Coast Guard
B.S., United States Coast Guard Academy, 1971

This research project attempts to isolate the causes of the high rate of turnover amongst first and second class petty officers in the Coast Guard. Coast Guardsmen stationed in San Francisco and in the south Texas area, from a large variety of units and occupational specialties, provide input to this research effort. Questionnaires and interviews are used as the survey technique to obtain information from first and second class petty officers. Two-hundred and sixty-four petty officers responded to the questionnaire and thirty-three from San Francisco were interviewed by the authors. The average age of a respondent is twenty-six and most are in their second or subsequent enlistment in the Coast Guard. More than half

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indicated they are definitely leaving or considering leaving the Coast Guard at the end of their present enlistments.

As expressed by these petty officers, the major causes of voluntary separation from the service are declining benefits and inadequate pay. Additional causes are poor leadership, the poor quality of subordinates, and an inability to specialize in one aspect of their rates.

THE DEVELOPMENT OF A PATIENT CLASSIFICATION
SYSTEM FOR MEDICAL/SURGICAL PATIENTS
IN AN ACUTE CARE SETTING

Mary Anne Gardner
Lieutenant, Nurse Corps, United States Navy
B.S.N., College of Mount St. Joseph on-the-Ohio, 1970

This study was undertaken in an attempt to identify a flexible patient classification system that could be used with confidence as a tool to assist in the determination of nursing care workload. A patient classification system in use at one Naval Regional Medical Center was revised and tested at another naval facility. Indicators of patient dependence on nursing care were identified and four methods were used to determine indicator weights and patient classification. The results of each method were evaluated in comparison with consensus nursing judgment and determined to be essentially equivalent.

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AN APPLICATION OF ORGANIZATIONAL
AND MANAGERIAL PRINCIPLES AS
AN IMPROVEMENT TO THE CURRENT
ARMY TRAINING AND EVALUATION PROGRAM
FOR THE MECHANIZED INFANTRY

Dewey Peter George
Captain, United States Army
B.S., Virginia Military Institute, 1970

and

Richard Leo Gerding
Captain (P), United States Army
B.S., Benedictine College, 1975

The United States Army in the past five years has begun a revolutionary change in its concept of training. The Army Training and Evaluation Program (ARTEP) is the realization of this change. The implementation of the ARTEP has not achieved optimal results. Training management decisions at division, brigade, and battalion levels must be identified and their ramifications understood; research has shown certain approaches more beneficial than others. The training/evaluation/control of external exercises using ARTEP has been identified as a universally deficient area.

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This study, through application of organizational and managerial principles, provides practical guidance to training decision makers from division down to company level. It also provides an improved system for the training/evaluation/control of the external exercise.

THE EFFECT OF MATERIAL SHORTAGES ON PRODUCTION
AT THE NAVAL AIR REWORK FACILITY, ALAMEDA

Charles Wayne Grant
Lieutenant, United States Navy
B.A., University of Richmond, 1970

As a result of the Department of Defense Material Distribution Study, the Navy has begun to consolidate the wholesale inventories held at the Naval Air Station, Alameda and at the Navy Supply Center, Oakland. Due to this consolidation, the support responsibility for the naval Air Rework Facility, Alameda, will shift from the Naval Air Station, Alameda to the Naval Supply Center, Oakland. This support involves the positioning of a stock, the requisition processing and status function, and the movement of material through the system to the Air Rework Facility.

Planning for such support requires an examination of the industrial activity itself: the production processes involved, the policies and procedures that govern material movement, and material supply problems currently faced by

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production personnel. Research revealed that material shortages were a significant cause of production delays and inefficiencies. Material shortage induced delays also were found to have an impact on the material pipeline and on customer units. Finally, the level of material support provided to the Air Rework Facility is documented and recommendations as to changes to that service are offered.

OFFICER PROMOTION OPPORTUNITY WITHIN
THE NAVY UNRESTRICTED LINE 1973-1979

Ross C. Hansell
Lieutenant Commander, United States Navy
B.S., Florida Atlantic University, 1968

The U.S. Navy's unrestricted line (URL) officer promotion process serves as a reward system for individual officers and largely determines the officer manpower flows and grade structure within the URL.

This thesis briefly examines the historical roots and defines the mechanics of the modern promotion system. It reports the results of a promotion attitude survey administered to 128 line officers at the Naval Postgraduate School. The survey addressed numerous issues regarding promotion equity and compares perceptions regarding selection opportunity between major URL communities: aviation, surface, submarine and women officers. Most importantly, these perceptions are then compared to actual promotion success data gathered from Fiscal Years 1973-1979 for the grades of Lieutenant Commander to Captain.

The paper identifies several areas of concern to officers, but concludes that the promotion system has functioned well in an overall sense.

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AN ANALYSIS OF THE NATIONAL DEFENSE RESERVE FLEET,
THE READY RESERVE FORCE COMPONENT AND THEIR
CAPABILITY TO MEET NATIONAL EMERGENCY

Louis Francis Harlow
Lieutenant Commander, United States Navy
B.S.M.T., State University of New York at Fort Schuyler, 1968

This study examines various facets of activating the National Defense Reserve Force. Its history and background are reviewed and its present status of readiness considered. Specific areas covered are monetary costs, manpower capabilities (seagoing and ashore) as well as the physical condition and capabilities of the fleet.

The substructure of the Reserve Fleet known as the Ready Reserve Force is covered in depth. In this area the inception of the ready force idea is presented along with its goals and accomplishments to date. Of unique interest is the joint funding of the Ready Reserve Force which is contributed to by both the Department of Commerce and the Department of Defense.

Conclusions are drawn from its past performance, documented present status, and projected industrial capabilities.

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THE IMPLICATIONS OF RISING
DRUG ABUSE UPON
NAVAL STANDARDS AND POLICY

T. E. Hartzell
Lieutenant, U.S.N.
B.S., The Pennsylvania State University, 1974

The purpose of this thesis was to examine the increasing rates in illicit drug use, both in the civilian populus and within the Navy, in order to ascertain what some of the implications of the rising drug abuse incidence rates may be concerning the Navy's attrition rates, training requirements, and recruiting goals vis-à-vis existing programs and policies. One program -- the Exemption Program -- is producing results which have been adversely affecting the Navy's nuclear power program. Another program, which involves the random testing of urine samples, may soon identify substantially larger numbers of drug abusers. This may require the Navy to discharge increasing numbers of personnel. A critique of Navy programs and policies relating to drug abuse is presented. Recommendations which might serve to alleviate some of the causes of the Navy's attrition and recruiting problems are also made.

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INCENTIVIZATION OF THE MASTER SHIP REPAIR CONTRACT

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This thesis is a study of various techniques which provide incentives for contractors for work under a Master Ship Repair (MSR) contract. These techniques are used to motivate the contractor to adhere to the original schedule without degradation of quality control when growth work or change orders entitle the contractor to an increase in price, changes in schedule, or both.

The methodology used to investigate these techniques was primarily personal interviews with Government and contractor personnel involved in the ship repair/overhaul industry and literature research.

The results of this study indicate contractors are incentivized to reduce schedule slippages by a process of: stabilizing regional workloads, supplementing training, coordinating conferences, increasing manning levels, and by changing certain milestone dates and work procedures. This thesis

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also proposes an award fee contract type which incorporates the above as an alternative to the contract type presently being used.

A FRAMEWORK FOR EVALUATING CANDIDATE
FOREIGN WEAPONS SYSTEMS

Ross Joseph Hieb
Captain, United States Marine Corps
B.A., University of Washington, 1969

The Department of Defense (DOD) is under increasing pressure to purchase defense systems and subsystems which have been developed abroad. There are many unique issues to be considered before making a decision to purchase a foreign developed defense system (subsystem). The Congress and GAO have become increasingly critical of DOD's efforts in this area.

In this thesis, a conceptual model focusing on four major issue areas: Y_1 : Changes in NATO Defense Capability, Y_2 : Real U.S. Costs, Y_3 : Economic Effects, and Y_4 : Political Benefits, is developed to assist DOD personnel in considering, for acquisition, foreign developed systems and subsystems.

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OPERATIONAL SUPPORT INVENTORY FOR
NAVAL AIR REWORK FACILITY ALAMEDA

Lee David Hoffman
Lieutenant, Supply Corps
United States Navy
B.S. (EE), University of Colorado, 1971

The United States Navy is currently implementing a plan to transfer the NAS Alameda wholesale aviation supply functions to the Navy Supply Center Oakland. Supply Support of the Naval Air Rework Facility Alameda is a vital part of the consolidation plan. This thesis begins with an overview of NARF Alameda's operation and its material support. The current procedures for demand forecasting and ASO policy for Operation Support Inventory are reviewed. Finally, given the pretext that an intermediate level of inventory is desired to support NARF Alameda, suggestions for determining the inventory are made.

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IMPROVING TOW COMBAT EFFECTIVENESS
IN MECHANIZED INFANTRY FORCES

Chester William Houser
Captain, United States Army
B.S., Oregon State University, 1970

This thesis identifies and investigates potential means for improving the combat effectiveness of the TOW ATGM system. For the purposes of this research it was assumed that improvements in system effectiveness could not be achieved by increasing the number of TOW systems due to manpower and funding constraints. Given those restrictions, this thesis examines methods of improving combat effectiveness by increasing the TOW system's attrition rate and by decreasing its vulnerability.

The TOW attrition rate is a function of accuracy, lethality and rate of fire. Rate of fire parameters are investigated through an existing attrition rate model. Parameters are identified which offer significant potential for improvement, and alternative measures for influencing those parameters are developed.

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System vulnerability was assumed to be primarily a function of system exposure to enemy direct fire weapons. Means of reducing exposure and hence vulnerability during the TOW engagement process are presented.

ARMED SERVICES BOARD OF CONTRACT APPEALS:
ANALYSIS OF SUSTAINED DECISIONS
ON NAVY SUPPLY CONTRACT DISPUTES

Robert Judson Howdysshell
Lieutenant, Supply Corps, United States Navy
B.S., Central Michigan University, 1967
M.A., Central Michigan University, 1969

This research effort analyzed selected ASBCA decisions on a case-by-case basis to determine if beneficial lessons could be drawn that would potentially improve the acquisition process. Using this research methodology, many imperfections, in areas such as the consistency of acquisition team member's conduct, communications, training, and policy interpretation, were found in the acquisition process where corrective action could improve the system. Although the results of ASBCA decisions are widely publicized, from the case analyzed it was difficult to determine where acquisition policy and interpretation were sensitive to the significant contributions made by these ASBCA decisions. Additional research is required, however this study concluded that an analysis of sustained ASBCA appeals could be a fruitful area for improving the acquisition process.

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A REVIEW AND ANALYSIS OF THE
ON-GOING IMPLEMENTATION OF
BUDGET AUTOMATION AT CINCLANTFLT

Christopher Douglas Huber
Lieutenant, United States Navy
B.S., Juniata College, 1972

The Commander in Chief, U.S. Atlantic Fleet (CINCLANTFLT) was tasked with developing a prototype system for the automation of field budget data so that it could be rolled up at Major Claimant level for use as an input to the automated Major Claimant budget submission. Perhaps the most important phase of this program was the development of an integrated financial Management Information System (FMIS). This project was designed to automate substantial portions of budget formulation, presentation and justification for an annual budget of approximately 2.5 billion dollars. This thesis is a concentrated study and analysis of FMIS development at CINCLANTFLT. Analyses conducted included a review of current manual budget procedures at CINCLANTFLT, presentation of a theoretical FMIS model, and a detailed study of design and implementation of each phase of FMIS. Comparisons and conclusions are made between the model and actual FMIS implementation. Some general recommendations are submitted for consideration.

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PHYSICAL FITNESS AND ITS EFFECT ON
PERSONALITY, BEHAVIOR AND LEADERSHIP
"MANAGEMENT AND EMPLOYEE MUSCLE"

Richard P. Hular
B.S., University of Oklahoma, 1969
Master of Engineering, University of Florida, 1972

There is a growing interest among corporations and government agencies for improving management and employee muscle. The list of organizations that have established physical fitness programs for their managers and employees is expanding every day. Those not yet committed are contemplating the consequences of initiating such an effort.

This study was undertaken to give interested organizations a better idea of what to expect from improved management and employee muscle. The effort was focused on uncovering the personality and behavior changes which result from improved physical fitness because there is lack of clear and consistent information in these areas. Because of the growing number of executives and managers who are committing themselves to better fitness, the uncovered personality and behavior changes were also related to common leadership traits.

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The results indicate that improved physical fitness can significantly affect the individual in terms of changes in personality and behavior. These changes also appear to have a significant positive effect on individual leadership traits.

CONGRESSIONAL CLIMATE
FOR NAVAL AVIATION

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B.S.A.E., Syracuse University, 1967

The purpose of this thesis was to characterize the current Congressional climate for Naval Aviation budget requests. An objective approach, consisting of the measurement of three key indicators of congressional behavior during the authorization phases of the FY 1978, FY 1979 and FY 1980 budget cycles, was employed. These indicators were: (1) the questions asked of defense witnesses during the Hearings, (2) the funding adjustments recommended and (3) the rationale provided for committee decisions. Examination of the first indicator led to the development of a research typology that used the technique of content analysis of the authorization hearings to measure Congressional attempts at micromanagement. Measurement of the latter two indicators employed techniques developed and commonly used by earlier researchers. The same

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three indicators were measured for comparable Air Force Tactical Aviation programs to provide a basis for comparison.

Several dimensions of the Congressional climate were analyzed, however the major conclusion reached was that Naval Aviation programs have been subjected to less micromanagement and have received larger budget increases than comparable Air Force programs.

DECISION CRITERIA FOR COST-PLUS-AWARD-FEE CONTRACTS
IN MAJOR SYSTEMS ACQUISITION

Gwilym Howard Jenkins, Jr.
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B.T., Pennsylvania State University, 1970

The Cost-Plus-Award-Fee (CPAF) contract has useful application in Major Systems Acquisition during the Full-Scale Development Phase. This thesis examines the Cost-Plus-Award-Fee contract with Leavitt's Organizational Theory Model which identifies goals, technology, people, structure, and environment as factors for analysis. It further investigates cost reimbursement contract types versus technical risk for identification of those criteria, which best accommodate application of the CPAF contract in Major Systems Acquisitions. This thesis concludes that the CPAF contract can be viewed as an informal Management Information System (MIS) to enhance project control. It summarizes basic strengths and weaknesses of the Cost-Plus-Award-Fee contract in Major Systems Acquisition.

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AN ANALYSIS OF FOREIGN MILITARY SALES MANAGEMENT
VIEWED AT THE FIELD ACTIVITY LEVEL

Samuel Lynn Jones
Lieutenant, Supply Corps, United States Navy
A.B., University of Michigan, 1970

This study concerns the examination of the program of Foreign Military Sales from the perspective of a field activity. It attempts to identify through a historical view the evolution of the foreign military sales management process and analyze some of the observations made in the context of a bureaucratic structural framework. It concludes that the problems facing field activities managing a foreign military sales program can be best characterized by a budget-based bureaucratic structure, that is, funded from public coffers exhibiting acquisitive and consumer behavior. The Navy organization is not entrepreneurial and, therefore, has some difficulty with the concept of selling arms to "friendly foreign" countries. The thesis offers a conceptual idea of how better to conduct Foreign Military Sales.

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THE APPLICATION OF THE SURFACE EFFECT SHIP
IN U.S. OCEAN COMMERCE IN 1995

Richard Morten Joslin
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B.A., Washington State University, 1970

This study evaluates the economic opportunities in 1995 of SESs (surface effect ships) in the carrying of commercial cargo in U.S. commerce, both foreign and domestic. The principal index of SES economic opportunity is the number of SESs that could be employed in U.S. commerce at freight rates that would cover costs of operations, plus a reasonable return on the owner's equity. Four routes of differing lengths and trade conditions are studied; inter-Hawaiian Islands, New York to Puerto Rico, New York to Northwestern Europe, and San Francisco to Japan. Total U.S. foreign trade is projected as well as trade on the two domestic routes studied. Commodities potentially attractable to SES services are analyzed, and a modal split model is developed to estimate the SES market penetration potential under various conditions in competition with containerships and air cargo. An operational concept for SESs is developed and their freight rates and service characteristics are estimated.

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DECISION MAKING UNDER CRISIS CONDITIONS:
CONSIDERATIONS AND PROCEDURES

Werner Wilfried Jung
Major GS, Swiss Army

The objective of this thesis is to show how crises can develop in an organization, what their impacts are, and what managerial procedures may be used to cope with these situations. The scope of the thesis is limited to higher management levels. Crises occur especially as a result of rapid environmental changes or changes in organizational variables. The following problems may be typical: general uncertainty, necessity of extraordinary resources, multiple, simultaneous problems, time constraints, stress, change in power structures, and change in communication and information patterns. The following decision-making procedure is suggested: Establishing psychological equilibrium at all levels, structuring of the problems, adapting the organizational structure, assigning responsibilities for solving problems, establishing a time budget, coordination, and implementation and control. Preparatory measures can help to avoid crises, or at least to improve coping abilities.

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AN ANALYSIS OF THE EFFECT OF LOWERED BASIC TEST BATTERY
SELECTION SCORES ON REPHASALS AND DISENROLLMENTS
AT SELECTED COAST GUARD CLASS A SCHOOLS

Daniel E. Kalletta
Lieutenant, United States Coast Guard
B.S., United States Coast Guard Academy, 1971

This thesis investigates and evaluates the effect of lowered Basic Test Battery (BTB) selection scores on rephasals and disenrollments at selected Coast Guard Class A schools. It analyzes the differences in rephasal rate and disenrollment rate for Storekeeper, Subsistence Specialist, and Radioman Schools for the year prior to (FY 1976) and the year after (FY 1977) the lowering of the BTB selection scores (which occurred in July, 1976). It compares the performance of students entering these schools with the lower BTB scores during FY 1977. In addition, it analyzes the relationship between the successful completion of these schools and the BTB selection scores.

The results indicate the students with BTB scores lower than the earlier (higher) cutoff tend to have higher rephasal

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and disenrollment rates than students with the higher BTB scores. If the input percentage of the lower-scoring students should increase, there is likely to be a significant increase in both the rephasal and disenrollment rates for all three schools.

AN ANALYSIS OF LEADERSHIP EFFECTIVENESS
IN THE NAVAL SURFACE COMMUNITY

Bradley J. Kaplan
Lieutenant, United States Navy
B.A., University of New Mexico, 1974

This study attempts to provide empirical data which will show how and to what extent specific styles of leadership may maximize the performance and retention of units within the Navy. The study focuses upon a sample of twenty comparable destroyers and frigates within the Pacific Fleet. Leadership-style data were collected from the first and second officers in command of these units (CO and XO) by means of Fleishman's Leadership Opinion Questionnaire (LOQ), a self administering inventory which measures two important dimensions of leadership behavior: consideration, relating to the leader's degree of socio-emotional emphasis; and structure, relating to the leader's degree of task-related emphasis. These leadership-style data were compared with six measures of unit effectiveness: Overall mission readiness (OVL), personnel readiness (PER), supply readiness (SUP), equipment readiness (EQP), training readiness (TNG), and retention (RET). These measures were collected for a six month period in which the CO and XO of each unit had functioned as a "dual leadership" team.

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PERCEIVED EFFECTIVENESS OF CURRENT MILITARY
RETIREMENT ALTERNATIVES

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B.A., Colgate University, 1967

This thesis develops and evaluates a methodology designed to quantify perceptions of alternative military retirement plans and components of retirement systems. The technique consists of factoring retirement proposals into common characteristics, surveying a sample of the military population, asking them to rank and weight characteristic importance and score how each plan fulfills each characteristic, and computing a relative weighted preference for each plan. Based on successful demonstration of this methodology using a sample of military officer students at the Naval Postgraduate School, it is recommended that this method be expanded to a sample of the entire military population. In view of the recent criticism alleging inefficiency and expensiveness of the existing system, the results of such an effort could be useful to the effectiveness portion of a systematic analysis aimed at choosing among alternative retirement systems.

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A COST-BENEFIT ANALYSIS OF THE PROPOSED
CONSOLIDATION OF ALL NAVY AND MARINE A6-E
FLEET REPLACEMENT TRAINING SQUADRONS

Kevin Philip Kelley
Captain, United States Marine Corps
B.S., Boston College, 1969

This thesis contains a Cost-Benefit Analysis conducted to determine the advisability and the economic feasibility of consolidating all Navy and Marine Corps A-6E Fleet Replacement Training Squadrons. A detailed examination is made of the prevailing and projected conditions at each of the current training sites. The accumulated data is analyzed regarding its effect on the training environment overall and the requirements for aircraft and personnel support under both present circumstances and the proposed conditions of consolidation. A range of feasible alternatives is then developed and cost estimates are presented for those possibilities. It is shown that consolidation is a realistic option, with certain logistical constraints, which will produce specific benefits in the quality of the resultant aircrews and possible

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fiscal savings to the Department of the Navy as well. The final recommendation involves adoption of the proposal according to the guidelines of one of two realistic alternatives developed by the research.

A COST ACCOUNTING STANDARD ON CAPACITY-RELATED COSTS:
A DESIRABILITY AND FEASIBILITY ANALYSIS

Harvey L. Kennedy
Lieutenant Commander, United States Navy
B.S., University of Texas at El Paso, 1967

The purpose of this thesis was to examine the subjects of capacity and capacity-related costs from both a theoretical and pragmatic standpoint and to determine the desirability and feasibility of a formal cost accounting standard on capacity-related costs. The writer attempted to simulate, in an individual effort, the staff work of the Cost Accounting Standards Board (CASB) through a literature survey and an analysis of the CASB issues paper on capacity-related costs. The thesis concluded that there were potential benefits to the government if a standard could be developed. However, a standard that could meet the objectives of the Cost Accounting Standards Board did not appear feasible, primarily because of difficulties in the accurate measurement of various capacity levels and because such a standard could lead to unduly complex accounting procedures and excessive administrative costs.

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U.S. NAVAL SHIPBUILDING CLAIMS SETTLEMENT: 1974-1978

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B.S., United States Naval Academy, 1960
B.S.E.E., Naval Postgraduate School, 1966

The 1974 Seapower Subcommittee hearings, in part, expressed concern over the \$1.3 billion in shipbuilding claims then outstanding and concluded that the existing procedures allowed unacceptable delay in claims settlement. These claims grew to over \$2.7 billion before they were settled in 1978. In addition to the nature of these claims, this thesis contains an investigation of the three principal initiatives exercised within the Department of Defense to settle these claims: the 1976 attempt to use P.L. 85-804, the Navy Claims Settlement Board, and the negotiated settlements in 1978. Case studies are included for the claims from General Dynamics Corp., Electric Boat Division, and Litton Industries, Inc., Ingalls Shipbuilding Division. Finally, this thesis concludes that changes in the nature of the shipbuilding industry, contracting methods and procurement policies altered the nature of claims. Further, negotiated settlement, using claims entitlement as a basis, proved an effective alternative to litigation in resolving shipbuilding claims.

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AN ANALYSIS OF THE COST EFFECTIVENESS OF A
SPECIALIZED MISSION HELICOPTER IN THE
U.S. COAST GUARD

N. Edward King
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B.S., United States Merchant Marine Academy, 1965

The operations which might be performed by specialized mission helicopters are identified and several hypothetical mixes of these helicopters are developed and analyzed. Actual flight hours performed in fiscal years 1974 through 1978 are used as a data base for the study.

The alternatives are analyzed in terms of total differential costs of performing the same missions that were conducted during the base period. Aspects such as the adding of additional helicopters to stations without additional personnel, dual qualification of personnel, shipboard operations of single-engine helicopters, and the short-range recovery replacement helicopter are also analyzed.

It is concluded that it would have been cost effective to have operated specialized mission helicopters during the base period. Projections of future helicopter activity indicate that this advantage would continue into the future.

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THE IMPACT OF COST ACCOUNTING STANDARD
NUMBER 409 ON THE DEFENSE INDUSTRY

Jack C. Kline
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The purpose of this thesis is twofold. First, it seeks to develop a defense industry perspective on depreciation in general and Cost Accounting Standard No. 409 in particular. The historical development of the Standard and the issues arising from it provide a framework for evaluation. Second, it evaluates these issues in present terms with accurate data reflecting the opinion and experience of industry representatives. Data were gathered by the use of a questionnaire.

Results show that the Standard had a fairly modest impact on the defense industry.

Recommendations are made concerning the issuance of Cost Accounting Standards and areas for future research.

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SYSTEM INTEGRATION AT NAVY STOCK POINTS

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Navy Stock Points are vital links in the Navy's supply/maintenance network; their performance has a direct impact on supply response time and operational availability of fleet equipment. One of the major functions performed at a stock point is the commercial acquisition of non-standard material. This thesis examines the production process at a Navy Stock Point that acquires non-standard material as a system and as a series of functional organizations.

Their automated management control systems are employed at Navy Stock Points to facilitate the inventory control, material acquisition, and accounting processes involved in the commercial acquisition production process. Each of these control systems was independently designed to perform a specialized function within the stock point structure. This thesis discusses each system, UADPS-SP, APADE II, and IDA, their individual development and the interfaces among them.

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The main thrust of this thesis is to determine if the total logistic effort could be improved by integrating three independent systems into one production oriented system to better control the commercial acquisition of non-standard material at Navy Stock Points.

LOGISTICS MANAGEMENT--DESIGN AND APPLICATION

Sjur W. Knudsen
Lieutenant-Commander
Royal Norwegian Navy

Logistics management is a relatively new field of integrated management study resulting mainly from a reorganization of related materials activities that previously were scattered among the organizational units within a company.

Logistics management is a comprehensive term covering the method by which one attempts to see as a single unit the materials flow to, inside, and from the company.

In the broadest sense, logistics management views a company as a single operating system; it seeks to minimize total costs associated with the acquisition and handling of materials from the inception of materials requirements to the final delivery of finished products to their users. Logistics management can, therefore, be defined as the planning, organizing

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and controlling of all move-store activities that facilitate product flow from the point of raw materials acquisition to the point of final consumption, and of the attendant information flows, for the purpose of providing a sufficient level of customer service (and associated revenues) consistent with the costs incurred for overcoming the resistance of time and space in providing the service [1;8].

The successful management of logistics in an organization requires the careful coordination and manipulation of both movement and storage.

THE WAR RESERVE COMPONENT OF THE
MARINE CORPS LOGISTICS SYSTEM

Richard Scott Kramlich
Captain, United States Marine Corps
B.S., United States Naval Academy, 1973

The War Reserve System is designed to provide the Marine Corps with materiel support in the event it is committed to combat operations. An understanding of this system is essential not only for those who operate it, but also for those Marines who will be the recipient of its output. This thesis examines the War Reserve System in its four major phases of materiel requirements determination, attainment and storage of assets, asset withdrawal and distribution, and the replenishment of supplies in the combat objective area. Problem areas within the system are analyzed and recommendations made for alleviating them.

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CORRESPONDENT AND RESIDENT ENLISTED TRAINING WITHIN
THE US COAST GUARD: A COMPARISON

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Lieutenant, United States Coast Guard
B.S., New York State College at Oneonta, 1970
M.A., The New School for Social Research, 1976

This thesis compares the strengths and weaknesses of Correspondent and Resident Enlisted Training within the US Coast Guard. Methods of forecasting personnel training needs are discussed. Various alternatives to meet training needs are evaluated and compared. A more general model for selecting the best training method to fill a given need is developed.

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PROVISIONING RESPONSIBILITIES, PROCEDURES, AND
REQUIREMENTS DETERMINATION IN THE
UNITED STATES MARINE CORPS

Paul Melvin Lee, Jr.
Captain, United States Marine Corps
B.A., University of Pittsburgh, 1969

The United States Marine Corps spends 32 million dollars annually for the initial provisioning support of new weapon systems. This support is vital to the performance of new equipment during the initial period of operation. This thesis contains a summary of the current responsibilities and procedures for determining initial support in the Marine Corps. It also addresses such issues as level of repair analysis, provisioning technical documentation, phased provisioning, contractor provided initial support, and combat essentiality. Recommendations are made for additional investigation in the following areas; the augmentation of provisioning project teams, the formation of an ad hoc provisioning review board, the scheduling of provisioning review conferences, the elimination of excess stocks, and the contracting out of initial support.

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ANALYSIS OF THE HISTORICAL RELATIONSHIP
BETWEEN CURRENT NAVY RDT&E AND
FUTURE INVESTMENT IN PROCUREMENT

Edward Charles Long, III
Lieutenant Commander, United States Navy
A.B., Dartmouth College, 1966

In partial response to a memorandum for the Superintendent, Naval Postgraduate School, from the Director of the Fiscal Management Division, Office of the Chief of Naval Operations (Serial 922E21/587526 dated 24 April 1978), this thesis attempts to analyze the historical relationship between Navy's investment in current RDT&E and future investment in procurement. Utilizing data from fiscal years 1962 through 1979 and single equation econometric forecasting techniques, linear models predicting procurement one to four years in advance based on current RDT&E are developed. From time-series data, with the models adjusted for serial correlation of the error terms ex post forecasts and confidence interval estimations are used to evaluate the extent and usefulness of the predictive relationships discovered.

Eight separate models are developed, and analysis of results indicates the existence of a predictive relationship.

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However, there are also indications that the basic relationship may have changed during the period under study. The relative inaccuracy of forecasting methods when earlier data are ignored makes the usefulness of these procedures to those who shape future Navy budgets difficult to determine.

THE APPLICATION OF ORGANIZATION DEVELOPMENT
TO THE NAVAL AIR TEST CENTER

John Francis Lynch
B.S., University of Detroit, 1955
and
Roger Henry Seltz
B.S., Michigan College of Mining and Technology, 1956

This thesis introduces the practicing manager to the field of Organization Development. The purpose of the thesis is fivefold: To create awareness of the change forces facing the manager, to describe a technology for organizational adaptation to change (Organization Development), to provide a foundation of knowledge of Organization Development theory and applications, to demonstrate the theory and application of the Navy planned change approach (Survey Guided Development) and to suggest methods, techniques and strategies for improving the management of human resources, through the application of Organization Development concepts. An Organization Development analysis of the Naval Air Test Center is presented using the Contingency Model Theory and specific recommendations are made for Naval Air Test Center management's consideration.

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COMPUTER GENERATED COVERAGE DIAGRAMS
FOR AIR DEFENSE ARTILLERY SITES

Robert Alan Lynch
Major, United States Army
B.S., University of Texas, 1972

An essential element of air defense operations during land combat operations is the determination of the ground locations from which air defense units shall operate so that enemy aircraft can be detected and destroyed at the maximum possible range. An air defense coverage diagram shows where an aircraft that is flying at a selected altitude can be seen. Air defense planners use coverage diagrams to minimize the negative effects that terrain, vegetation, and man-made features have on detection range.

Currently, air defense personnel prepare coverage diagrams manually. Unfortunately, manual diagrams are inherently inaccurate, difficult to use, and prohibitively time consuming to prepare. However, computer routines can perform computations and provide timely and accurate information that would allow planners to position air defense sites at the best possible locations.

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This thesis describes a system that can provide air defense commanders with computer generated coverage diagrams. It discusses the use of computer routines to generate coverage diagrams as an alternative to manual methods that are currently employed. A computer program that generates coverage diagrams is presented with instructions for users, programmers, and analysts.

FUNDING CONSIDERATIONS FOR MATERIAL
MANAGED BY THE
NAVAL ELECTRONIC SYSTEMS COMMAND

Gary D. Lynn
Lieutenant Commander, Supply Corps, United States Navy
B.S., San Diego State University, 1966

The Naval Electronic Systems Command's (NAVELEX) ability to satisfy unfunded, unplanned requirement demands for 22 cognizance material has theoretically been impaired due to the budgetary exclusion of funds with which to replace attrited assets. This study considers the primary factors which have caused this funding requirement to be excluded from the budget. Factors such as the Chief of Naval Operations (CNO) definition of principal and secondary items, Stock Coordination Program policies, actual inventory item characteristics, and inventory management practices, were reviewed. This study concludes that NAVELEX should submit a budget request for the funds required, that CNO's definition of principal and secondary items should be revised, that the current Stock Coordination Program criteria for Hardware Systems Commands to manage material should be retained, and that the Stock Coordination Program should continue to be supported by NAVELEX.

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A SYSTEMATIC ANALYSIS OF THE INDONESIAN
DEPARTMENT OF DEFENSE'S LOGISTICS SYSTEM

Rianto Mangunsandjojo
Lt. Col., Indonesian Army

This thesis presents an analysis of the logistics system of the Department of Defense and Security Armed Forces in Indonesia. A comparison is made between the Indonesian implementation of defense logistics and systems that have been used by the United States.

It is postulated that due to certain political/philosophical/organizational differences between the United States and Indonesia -- especially the Indonesian concept of the "Total People's Defense" doctrine and the unique territorial organization within the Indonesian Department of Defense -- it would be disadvantageous to model the Indonesian system completely after the U.S. system. Finally, it is concluded that the function of overall management of the Indonesian logistics system should be assigned to the highest level of its territorial organization, that is, the Defense Area Command.

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EFFECT OF THE ICELAND DEFENSE FORCE
ON THE ECONOMY OF ICELAND

Robert Raymond Mantonya
Lieutenant Commander, Supply Corps, United States Navy
B.A., Saint Ambrose College, 1963

Iceland's geographic location makes it one of the most militarily important nations in the world. Iceland is, in fact, the pivotal point of NATO's northern flank. The presence of a U.S. Defense Force in that nation has been a politically sensitive issue since its arrival in 1951. This thesis attempts to examine the future of the Defense Force in light of the impact the Force exerts upon the people and the economy of Iceland.

The continued presence of the Iceland Defense Force is dependent upon the political dynamics of Iceland. This paper presents background on the unique nature of the people, the land, the political system and the economy of the nation. It traces the evolution of the military presence in Iceland and analyzes in depth the impact of Defense Force expenditures upon the economy of Iceland. The thesis further attempts to project what significance that economic impact has to the continuance of a mutual U.S. - Icelandic Defense Agreement.

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THE PROCESS OF DETERMINING MANPOWER
REQUIREMENTS AND ITS
RELATIONSHIP TO PPBS

Reginald Timothy Martel
Lieutenant, U.S.N.
B.S., U.S. Naval Academy, 1970

The purpose of this thesis is to describe the Navy's manpower requirements determination process and to demonstrate how these requirements are used by the Department of Defense Planning, Programming and Budgeting System (PPBS). This thesis discusses: the Department of Defense (DOD) PPBS, the Navy's Program Objective Memoranda (POM) development, the Navy's three manpower requirements determination programs (ships, aircraft squadrons and shore establishments), and a classroom simulation of the Navy's POM development process. The existing system, key players, major roles, chronology of events and organizational interrelationships are described as they currently function.

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AN EXAMINATION OF UNRESTRICTED LINE WOMEN OFFICERS'
CAREER PATTERNS AND RELATED ISSUES

Victoria S. Matthews
Lieutenant Commander, United States Navy
B.A., Goucher College, 1969

and

Sylvia S. Almendinger
Lieutenant, United States Navy
B.S., Murray State University, 1971

With the increasing participation of women in the Naval Service, it is incumbent upon the Navy to provide meaningful utilization of these women. Women officer career development/career patterns are of significant influence in attracting and retaining high caliber young women in the Naval Service. Of particular interest is the status of women unrestricted line officers (110X), who do not have the opportunity to attain warfare qualifications. This thesis researches the current situation regarding women URL (110X) career development/patterns, with emphasis on such areas as leadership development, functional areas, Navy requirements and their structure,

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along with the interaction of these factors. Some predictions concerning career pattern flows, career development viability, and policy implications are also addressed.

PLANNING CONCEPTS FOR ACTIVATION
OF A NAVAL SHIPYARD

Mahmoud Mazaheri
Captain, Imperial Iranian Navy
B.S., Royal Naval Engineering College, 1962

All too frequently, large industrial projects are designed and constructed without sufficient attention being paid to the resources required to operate the completed facilities. This thesis addresses some of the many issues associated with activating such an industrial complex--a conceptual naval shipyard.

The planning, scheduling, coordination and control required to manage the activation of a shipyard together with the concepts of logistics support, project management and Management Information Systems (M.I.S.) are described. The interrelationship of many government agencies/departments are discussed and some of the major activation tasks are identified. A multi-matrix organization structure along with its Matrix Authority-Responsibility Chart (MARC) are recommended to manage the activation program. Personnel and training is identified as the most critical task for this major program.

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The crucial task of manpower planning is analyzed. A manpower recruitment model, and other issues to be considered for the special environment of the shipyard are also presented. The research concludes with an overall summary and recommendations for establishing a program office and the early start of the training program.

A REVIEW OF THE MATERIAL REQUISITION BILLING PROCESS -
AN IDA APPROACH

John R. McGraa
Commander, Supply Corps, United States Navy
B.S., Los Angeles State College, 1963

This thesis presents a general review of the implementation of the Integrated Disbursing and Accounting (IDA) Project as it relates to the material requisition billing process. The manner in which the material requisition billing process was conducted before and after IDA implementation is reviewed. The primary goal of Project IDA was the improvement in the timeliness and accuracy of financial information. The specific purpose of the thesis is to determine whether or not IDA goals are being achieved. This thesis resolved that the initial IDA implementation achieved those goals with respect to procurement and to blanket purchase agreements. Additional procedures are required which will include imprest fund and referral transactions. The thesis concludes with a discussion on areas that, subject to additional procedure changes, might further improve the timeliness of financial information processing.

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ALTERNATIVE APPROACHES TO THE
U.S. NAVY OFFICER EVALUATION SYSTEM

Richard Bernard McKenna
Commander, United States Navy
B.S., United States Naval Academy, 1963

Weaknesses of the present U.S. Navy Fitness Report Reporting System are reviewed and discussed. An alternative personnel evaluation system is proposed in order to take advantage of the benefits of several evaluative techniques. Different evaluation techniques would be used in the several phases of an officer's career. In the junior officer (developmental) phase, emphasis would be on management by objectives, stressing counseling and feedback. In the middle (staffing/managerial) phase emphasis would be placed on evaluation for selection and promotion. In the senior (executive) phase, the use of assessment centers is proposed. Finally, a list of recommendations is provided.

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AN ANALYSIS OF THE RELATIONSHIP OF COAST GUARD ZERO BASE
BUDGETING AND PLANNING, PROGRAMMING AND BUDGETING

Charles L. Miller III
Lieutenant, United States Coast Guard
B.S., United States Coast Guard Academy, 1974

The purpose of this study is to examine zero base budgeting and its effect on the Coast Guard. This study is divided into four chapters. Chapter One presents the theory and process of zero base budgeting. Chapter Two presents a summary of current Coast Guard planning, programming and budgeting process and the Coast Guard accounting system. Chapter Three presents a comparison of zero base budgeting and the Coast Guard planning, programming and budgeting. The strengths, weaknesses and support requirements of the two processes are discussed. Chapter Four presents four recommendations for the improvement of the Coast Guard planning, programming and budgeting process and accounting system to facilitate the use of zero base budgeting. The four recommendations concern reports; surrogate measures; standards; and reorganization of the Coast Guard planning, programming and budgeting process.

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Each recommendation contains a cost/benefit analysis and a discussion of the basic actions needed to implement the recommendations.

WEAPON SYSTEMS SOURCE SELECTION:
IS FOUR-STEP THE ANSWER?

Michael James Miller
Lieutenant Commander, Supply Corps, United States Navy
B.A., University of California, 1967

The Department of Defense source selection process of negotiated acquisitions has been plagued by charges of unfair competition and unsound business practices for years. Beginning with the Harvard Weapons acquisition project in 1962, continuing with various Industry studies in the 1960's through the findings of the Commission on Government Procurement released in the early 1970's, DOD weapon systems acquisition procedures have come under close scrutiny and increased criticism. Past statutes have failed to control, and even encouraged such practices as "technical leveling," "technical transfusion," "auctioning," and "buy-ins." Poorly written Requests for Proposal have added to the confusion and uncertainty surrounding the source selection process. In 1976, DOD began a two year test study of a source selection method called "Four-Step" which had been adapted from NASA procedures. The four steps in the process were: (1) submission

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and evaluation of technical proposals; (2) submission and evaluation of cost proposals as well as revisions to technical proposals; (3) the establishment of a common cut-off date for "best and final" offers and selection of the apparent winning contractor; and (4) negotiation and award of a definitive contract. This study looks at current procedures and the history of continuing problems.

THE CONTROL OF LETTER CONTRACTS IN
THE DEPARTMENT OF DEFENSE

Colonus Mitchell, Jr.
Lieutenant, United States Navy
B.A., Washington State University, 1969

This thesis explores Navy and Air Force Letter Contract usage, focusing on the Naval Air Systems Command and the Aeronautical Systems Division. It considers policies, usage, problems in usage, reasons for using, and controls for Letter Contracts.

Personal interviews formed the basis for the bulk of the research effort. Some use was made, however, of prior written information.

While operating in essentially the same environment, Air Force and Navy buying commands approach the subject of Letter Contract usage in different manners. Air Force commands use few Letter Contracts, but those used are large in value. Navy buying commands use many more Letter Contracts, with the average size not significantly different than Air Force Letter Contracts. Both Air Force and Navy buying commands recognize the problems which exist when Letter Contracts are used. Timely negotiation to a definitive contract is important.

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THE TRAINING MANAGEMENT CONTROL SYSTEM AND
THE ARMY TRAINING ENVIRONMENT

Eddie Mitchell
Captain, United States Army
B.S., United States Military Academy, 1970

This paper examines the adequacy of a division level, linear programming system named the Training Management Control System. The training environment of a mechanized infantry company is described in a manner which reveals synergistic time burdening at the line unit level. An Available Time Model is developed and used to quantitatively estimate minimum, mid-range, and high time burdening of infantry units. A software/hardware test of the system is documented and shows that the TMCS fails to adequately handle time as a training constraint. Recommendations are included describing ways in which the TMCS can be improved to handle total time burdening as a constraint and ways of reducing environmental, synergistic time burdening.

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AN ALTERNATIVE METHOD OF DEVELOPING
THE ATLANTIC FLEET ISSUE LOAD LIST

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Lieutenant, United States Navy
B.B.A., McMurry College, 1969

Upon the outbreak of hostilities, it is anticipated that deployed U.S. ships and those immediately ordered to sea will experience a period when support will only be available from onboard material from Combat Stores Ships and other Mobile Logistics Support Forces. To prepare for this possibility, a projected demand based material requirement is computed annually to support surface ships in a geographical area for a stipulated period. Currently, the Fleet Material Support Office, in determining the load list for Atlantic Fleet Combat Stores Ships, uses a model to calculate the depth of stock, by line item, within a selected range of items, to obtain a projected supply effectiveness goal for this stipulated period. This thesis presents an alternative method (marginal analysis model) of calculating this load list for the Combat Stores Ships and evaluates and compares the two models.

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THE EFFECTS OF PERSONALITY AND SIMULATED NEGOTIATION ON
NEGOTIATION EFFECTIVENESS

John David Mullen
Lieutenant Commander, United States Navy
B.B.A., University of Texas at El Paso, 1964

This research sought to determine what, if any, effect the primary personality characteristics exhibited by contract negotiators have on negotiation outcome. Additionally, this research sought to determine what, if any, effect the buyer's engaging in preparatory mock negotiation has on negotiation outcome. If it were found that certain personality characteristics or buyer-seller personality similarity/dissimilarity correlated significantly with desirable negotiation outcomes, then knowledge of those characteristics or similarity/dissimilarity and their respective correlations with negotiation outcomes could enhance negotiator selection, training, and effectiveness in DOD. Likewise, if it were found that the buyer's engaging in preparatory mock negotiation resulted in a significantly improved negotiation outcome in actual negotiation, then the conduct of such preparatory mock negotiation in DOD could enhance negotiator effectiveness. Toward making

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these determinations, 70 negotiations involving 56 contract negotiators were conducted at 11 DOD activities and three defense contractors' facilities. Data collected from these negotiations included the prices negotiated and an assessment of each negotiator's personality. These data were then processed and analyzed using established statistical methods. Based on these analyses, it could be concluded neither that personality characteristics exhibited by the negotiators, nor that the buyer's engaging in preparatory mock negotiation affected negotiation outcomes significantly.

AN ASSESSMENT OF THE EFFECTS
OF BUDGETARY LIMITATIONS ON THE
NAVY'S RATE STABILIZATION PROGRAM

William R. Niemeier
Lieutenant Commander, Civil Engineer Corps
United States Navy
B.S., University of Missouri at Rolla

In February 1978, acting on guidance provided by the Office of Management and Budget, Secretary of Defense Brown addressed several issues in his Annual Report which affected the management of the armed forces. Included among these issues was the establishment of ceilings on increases in the levels of certain budget elements.

In 1975 the services had been directed to institute a "Rate Stabilization" program wherein industrially-funded activities would be required to provide to their customers firm unit prices for various services well in advance of the fiscal year.

This thesis examines the budget guidance concerning price inflation, analyzes its likely impact on the execution of the Navy's Maintenance of Real Property (MRP) program, and on the Rate Stabilization program at a Public Works Center.

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The author concludes that such limitations will have significant effects on the Navy's RPMA functions and will cause problems in managing the stabilized rate program.

OFFICER PERFORMANCE APPRAISAL IN THE COAST GUARD:
AN ANALYSIS OF THE FITNESS REPORTING SYSTEM

Robert Clarence Olsen, Jr.
Lieutenant Commander, United States Coast Guard
B.S., United States Coast Guard Academy, 1969
and
Jay Clarence Oakman
Lieutenant, United States Coast Guard Reserve
B.S., University of Oregon, 1968

The purpose of this research effort was to investigate the US Coast Guard's Fitness Reporting system, which is used to appraise and evaluate its officer personnel. The current system has been successfully used for the past fifteen years, but is now suffering from marked inflation and what have been called "the problems typical of similar performance appraisal systems." The approach used for this investigation focused on the non-numerical aspects of the system in an attempt to enhance the "quality " of information provided to the system users, and to increase the credibility of the present system throughout the service.

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An analysis of the current system was made, set against the background of a comprehensive literature review. Data from telephone interviews, a sample of 100 actual Coast Guard fitness reports, and other sources were analyzed to determine which systemic variables were/were not effective. Based on the foregoing analysis, several system modifications were suggested to increase the efficiency and effectiveness of the current system.

COST-PERFORMANCE RELATIONSHIPS FOR USE
WITH THE UNIFORM CHART OF ACCOUNTS
FOR MILITARY MEDICAL TREATMENT FACILITIES

Steven Duane Olson
Lieutenant, Medical Service Corps, United States Navy
B.S., George Washington University, 1977

In response to comments and criticisms of the military health care study, the Department of Defense developed a Uniform Chart of Accounts for Military Medical Treatment Facilities. On 1 October 1977, the uniform chart of accounts was implemented at ten test sites representative of activities of the three services. Two benefits envisioned from this reporting system were improved capability to make comparisons between the military services and the capability to make comparisons with the civilian sector. While specific criteria and procedures to be followed in collecting and reporting the cost data are specified, the uniform chart of accounts does not provide guidance as to the manner in which the data will or should be utilized or how the comparisons will be made.

This study was an attempt to identify those attributes characteristic of a suitable performance measure, suggest cost-performance relationships which are capable of being

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supported by the uniform chart of accounts, and test these relationships with data from the ten military sites selected to test the chart of accounts. Based upon the analysis, a recommendation as to the suitability of the relationships as a basis for comparisons was made. Finally, recommendations which may improve the utility of the uniform chart of accounts were also offered.

BACKLOG OF MAINTENANCE AND REPAIR (BMAR) AT PWC SAN DIEGO
DEFINITION AND METHODOLOGY FOR REDUCTION

James Walter Owens II
Lieutenant Commander, CEC, United States Navy
B.S.C.E., University of Southern California, 1965

Robert Larry Shultz
Lieutenant Commander, CEC, United States Navy
B.S.C.E., Tufts University, 1968

For many years the Naval Shore Establishment has experienced funding shortfalls in the area of real property maintenance. As a result, the Backlog of Maintenance and Repair (BMAR) projects has increased at a steady rate with the total now approaching 550 million dollars. There was growing concern at the CNO and Congressional levels that maintenance deficiencies have significantly reduced the Navy's capability to meet its national defense mission.

The Chief of Naval Operations through his Director, Shore Facilities Programming Division, OP-44, recognized the seriousness of the problem and initiated several programs directed toward clearly and concisely defining the backlog and obtaining funds to (1) reduce the nondeferrable backlog to zero, and (2) to insure sufficient maintenance money is made available on an annual basis to prevent its recurrence. The

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"steady state" condition or no growth in backlog is directly related to the minimum annual cost of ownership of the Navy Shore Establishment.

This thesis explores the Public Works Center, San Diego BMAR in some detail addressing such areas as definition, generation, accuracy, and true magnitude. Once this concept has been fully developed, long range facilities maintenance planning, including potential fund sources and programs which could be utilized in reducing the BMAR to zero are explored. Lastly, the question of minimum cost of ownership is discussed with a viewpoint toward identifying a reasonable annual maintenance funding level which will prevent the growth of any BMAR.

U.S. NAVAL OFFICER PERCEPTIONS OF BILLET ASSIGNMENTS
AND THE PLACEMENT/ASSIGNMENT PROCESS

Michael John Panchura, Jr.
Lieutenant Commander, United States Navy
B.S.N.S., U.S. Naval Academy, 1968

U.S. Naval officer perceptions of billet assignments and reactions to the detailing process preceding such assignments were ascertained by a questionnaire developed and administered to a cohort of Naval Postgraduate School (NPS) student officers which had recently received Permanent Change of Station (PCS) orders. A majority of the survey population felt that its next assignment would benefit overall career development. Similarly, the majority was satisfied with the accompanying detailing process. Significant departures from this trend were noted for the aviator and Naval flight officer community. Factors involved in new billet and detailing satisfaction as well as overall career aspirations were determined.

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THE RELATION OF NAVAL OFFICER PROMOTION TO
COMMISSION SOURCE AND BILLET HISTORY

George R. Parish, III
Lieutenant, United States Navy
B.S., United States Naval Academy, 1973

Career paths and commission source are examined for a sample of Naval officers from year groups 1958, 1959, and 1960 to determine their relationship to promotion to commander. Contingency tables and multiple regressions were used to assess the relationships. Significant effects were found for source and billets as far back as the third billet prior to entering the zone of consideration. The implications of the findings for organizational and individual career planning are discussed and recommendations made.

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SECOND SOURCING IN THE ACQUISITION OF
MAJOR WEAPON SYSTEMS

Dennis Scott Parry
Lieutenant Commander, Supply Corps, United States Navy
B.A., University of Washington, 1968

This study was undertaken for two basic reasons. It was recognized that no generally accepted definition for "second sourcing" existed either in the literature or in general use within the acquisition community. The formulation of a working definition of second sourcing was thus the first objective of this research. The main thrust of the study, on the other hand, was an attempt to formulate an evaluative model that could be used by the decision maker in determining: (1) whether or not second sourcing should be attempted in the acquisition of a major system, and, (2) which second sourcing methodology would be most suitable for the acquisition in questions.

In formulating the model presented herein (the Second Sourcing Method Selection Model), actual cases wherein second sourcing has been or is being attempted were studied in-depth; and, the lessons learned in these efforts were consolidated

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into a workable model. Both the advantages and disadvantages of second sourcing have been outlined so that the decision maker will not be misled.

THE COST OF MONEY ON ASSETS UNDER CONSTRUCTION
AND DEFENSE CONTRACTING

Glenn James Pittman
Lieutenant, United States Navy
B.A., Pennsylvania State University, 1973

On May 5, 1978, the Cost Accounting Standards Board issued a proposal containing two possible alternatives for the allocation of the cost of money associated with assets under construction. Alternative A would require capitalization while Alternative B would modify a current standard to include the interest on construction. This thesis examines the nature of the commitment by a sample of government contractors to construction-in-progress and the interest cost associated with this level of investment. It then examines and evaluates the cost streams associated with each of the alternatives and a hypothetical asset under construction account. It was determined that by using present value, and at reasonable discount rates, the differences between the two alternatives could be considered immaterial.

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PREMIUM CALCULATION FOR
SERVICEMEN'S GROUP LIFE INSURANCE

Frank Tolbert Proctor, Jr.
Major, United States Army
B.S., The Ohio State University, 1973

This thesis presents an examination of premium calculations for group life insurance policies and how they relate to premiums charged participants of Servicemen's Group Life Insurance. The focus is on those factors used in premium calculations and how they relate to Servicemen's Group Life Insurance. An alternative method of premium calculation and experience rating is presented.

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A DYNAMIC AMMUNITION AND FUEL RESUPPLY
MODULE IN SUPPORT OF THE STAR MODEL

Bruce Gordon Ripley
Captain, United States Army
B.A., University of Vermont, 1972

This thesis presents the structure of an ammunition and fuel resupply system for use with a detailed computer combat simulation. The logistics system is developed for a brigade-sized unit. Current logistics doctrine is addressed as background and is used as a basis for the module development. The parameters described for ammunition and fuel permit one to follow individual vehicle loads on the battlefield. General terms are used to describe vehicles and loads so that current or proposed systems may be used. A manual simulation provides an example of the use of the module and the analysis one may do with it. A brief description of the combat model which will use the logistics module is included.

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A COMPARISON OF MILITARY AND CIVILIAN AIR CARGO SYSTEMS

Roger W. Roberts
Lieutenant, United States Navy
B.S., University of Louisville
Louisville, Kentucky 1975

The military air cargo system was analyzed and compared to the growing civilian air cargo intermodal container system. Parameters such as cost, terminal handling, packaging and aircraft compatibility were examined.

The research was conducted to look at the challenges faced by the Military Airlift Command (MAC) during periods of military conflict and to examine possible solutions to this dilemma through containerization.

The report concludes that the 463L Materials Handling System will continue to be used by MAC in the short run, and that this may sub-optimize the military air cargo function due to its necessary interface with the civilian container community.

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AN EXAMINATION OF ARMY
OFFICER PERCEPTIONS ABOUT COUNSELING

Gordon L. Rogers
Captain, United States Army
B.S., Milligan College, 1968

The U.S. Army finds itself in a position of attempting to maintain a viable defense force in the face of decreasing budgetary and human resources, increasing technological sophistication and increasing social complexity. As a result, influencing the motivation of subordinates may also be getting more complicated as compared with years past. The view is taken that the increased complexity of motivating subordinates has caused leader interpersonal skills to take on critical importance in the effective accomplishment of U.S. Army goals and missions.

A review of the literature on the interpersonal skills of leaders is presented and a questionnaire study involving company grade and field grade officers is described. The purpose of the study is to determine how important interpersonal skills are perceived to be to personal and organizational success. Two important findings were that the more

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senior group tended to value counseling less than did the more junior group and that the more senior sample tended to be more critical of their supervisors. These findings, and others, are discussed and recommendations for the improvement of leader development efforts and interlevel communication within the officer corps are made.

CURRENT CASH MANAGEMENT EFFORTS WITHIN THE
FEDERAL GOVERNMENT, DEPARTMENT OF DEFENSE, AND THE NAVY:
OVERVIEW AND APPLICATIONS

Henry James Sanford
Lieutenant, United States Navy
B.B.A., Saint Bonaventure University, 1973

Among other economies, the Federal Government and its components can save millions of dollars annually in interest costs by implementing sound cash management principles. Cash management is simply getting the most out of the time value of money and the process of arranging finances to minimize the money borrowed and the interest paid for it. The Federal Government's cash management program stresses three principles: (1) collecting money when it is due and depositing collections promptly; (2) paying bills and making disbursements when due, neither earlier nor later; and (3) minimizing idle cash balances. Within the Department of Defense and the Navy there is room for improvement in all three principles, but especially with regard to minimizing cash balances. Improvements in this area can be made by providing additional guidance to disbursing officers in computing cash requirements, retention of summary data from which cash forecasts can

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be made, education of money managers in the cash management field, and the further study of Economic Order Quantity (EOQ) models involving the management of cash.

AN EVALUATION OF THE DEPARTMENT OF DEFENSE
DOMESTIC BASE FACTORS REPORT

Henry Michael Scarangella
Captain, United States Army
B.B.A., Hofstra University, 1969

By one account, in Fiscal Year 1977 the Defense Department spent nearly \$10.7 billion for Base Operating Support functions. The Army, for the same period, spent \$3.4 billion. Less than 10% of the DOD budget in that year, it still represents a substantial amount of money.

Congressional interest in just what constituted Base Operating Support functions and why they cost so much caused a new annual DOD report to be generated in 1978. The Domestic Base Factors Report (DBFR) attempts to answer those questions. The purpose of this thesis is to examine the report and determine to what extent it satisfies its objective. Emphasis is placed on the U.S. Army sections of the report.

Separate chapters treat the subjects of explaining what Base Operating Support (BOS) functions are and how they are financed; the background and purpose of the DBFR; a description of the DBFR format and content; the precautions to be

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taken when trying to use the data in the DBFR; an analysis of some data and potential uses; and recommendations for improving the report.

COMPETITION IN THE ACQUISITION OF MAJOR WEAPON SYSTEMS

Benjamin Russell Sellers
Lieutenant Commander, United States Navy
B.B.A., University of Wisconsin, 1969

The objectives of this research are: (1) to examine the desirability of competition as expressed by current leaders in the field of major systems acquisition in DOD, in Congress, and in private industry; (2) to evaluate the adequacy of the guidance provided by the current acquisition instructions concerning the need, and the methods available, for generating competition in the acquisition of major weapon systems; and (3) to provide recommendations for improving the guidance contained in the instructions, including the development of a model to aid in making decisions regarding production competition.

The results of this research indicate that competition is highly desirable, but that the subject is not adequately addressed in the current instructions. The major contribution

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of the study is the development of a production competition decision-making model which is presented in Chapter V. This chapter presents the benefits and various methods of obtaining a second production source. Also included is a discussion of the factors which influence the second sourcing decision and a model for determining which of the second sourcing methods, if any, is best suited for any particular acquisition program. It is written as a stand-alone chapter for use as a desk-guide by program managers and/or contracting officers who are faced with making decisions regarding production competition.

A STUDY OF INTERNAL CONTROL AND
EXTERNAL AUDITING OF COAST GUARD
NON-APPROPRIATED FUND ACTIVITIES

Jimmie L. Sether
Lieutenant, United States Coast Guard
B.S., United States Coast Guard Academy, 1973

The rapid expansion of Coast Guard Non-appropriated Fund operations within the past few years has necessitated the requirement for increased attention to internal control of exchange activities. This thesis describes the major features of an internal control system for Coast Guard NAF activities and provides recommendations concerning selection of an external audit approach to review these systems. A survey of three representative Coast Guard exchanges was conducted to determine current Coast Guard approaches to internal control. Results of the survey indicated that internal control within the NAFA organization could be strengthened through the promulgation of internal control guidelines as detailed in Table I. An analysis of four alternatives was accomplished to determine the most cost effective approach to external auditing. Although the results of this analysis indicated that use of a national accounting firm appeared to be the most cost

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effective method of external auditing, it was recommended that further investigation be conducted with additional data prior to selecting an external auditor.

SHIPBOARD OPTAR MANAGEMENT:
AN INVESTIGATION OF LINE OFFICER
BUDGET FORMULATION AND EXECUTION
PRACTICES

Robert J. Shade
Lieutenant Commander, United States Navy
B.A., University of North Carolina, 1968

This study identified and evaluated practices used by line officers engaged in the management of shipboard Operations and Maintenance, Navy (O&MN) funds aboard ships of the Atlantic and Pacific Fleet surface forces. As a preliminary action, the flow of O&MN funds to ships and the guidance provided by surface force commanders to their subordinates were discussed. The investigation determined what alternative policies were available to commanding officers and department heads for budget formulation and budget execution, which policies were actually implemented, and which policies were the most advantageous. Additionally, research was conducted to ascertain whether Navy training for surface warfare officers adequately prepare them for the level of financial management performed aboard ship.

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A FINANCIAL MANAGEMENT REVIEW
OF THE NAVAL RESERVE THROUGH THE RESERVE PERSONNEL,
NAVY APPROPRIATION

Alan M. Shriver
Commander, United States Naval Reserve
B.S., Colorado State University, 1963

The purpose of this thesis is fourfold:

(1) To ascertain the justification for a Naval Reserve as a part of the Navy's total force and national security policy as a prime requisite for the existence of the Reserve Personnel, Navy Appropriation.

(2) To examine Naval Reserve financial management through the Reserve Personnel, Navy Appropriation.

(3) To provide insights into and an understanding of certain problem areas existing in the execution aspect of the Reserve Personnel, Navy Appropriation along with recommended solutions to discussed problems.

(4) To provide a basis of familiarization for those persons undertaking the task of Reserve Personnel, Navy Appropriation management.

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AN ANALYSIS OF THE COST IMPLICATIONS OF EMPLOYING
SUCCESS PREDICTIVE CRITERIA IN THE PROCESS
OF SELECTING NAVY RECRUITERS

Mary Anderson Shupack
Lieutenant Commander, United States Navy
B.A., Southwest Missouri State College, 1969

This study analyzed the performance of enlisted Navy recruiters from recruiting stations throughout the United States against a measure of effectiveness defined in terms of the NAVCRUITCOM Honor Roll. Six variables describing personal characteristics were analyzed in an attempt to explain recruiter success. The study showed that the best predictor of recruiter success was the level of formal education attained while the best explanation for recruiter failure was the individual's rate.

Cost implications of high turnover and low productivity within the Navy recruiting force were then outlined and the role improved recruiter selection techniques could play in reducing these costs discussed.

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THE VCX PROGRAM: A REVIEW AND
ANALYSIS OF ITS ACQUISITION PROCESS

Albert Paul Skroch, Jr.
Lieutenant Commander, United States Navy
B.A., University of Wisconsin - River Falls, 1965

The VCX program has been continuously active since 1971 and is still considered a priority development. However, in the eight years since its inception, the program has not matured beyond the concept formulation stage of its life cycle. This thesis examines the progression of the VCX program and compares it to the prescribed acquisition process. Conflicts between the prescribed process and actual developments in this program are described. Acquisition of new systems may benefit from the lessons learned during the analysis of the VCX program.

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THE CAPITAL INVESTMENT PRACTICES
OF A MAJOR COMMERCIAL AIRCRAFT REPAIR FACILITY
A CASE STUDY AND APPRAISAL

Jesse Jerome Stewart, Jr.
Commander, United States Navy
B.S., United States Naval Academy, 1961

The purpose of this study is to identify the capital investment practices of a major commercial aircraft repair facility. The majority of projects were aircraft modifications. This study isolated the facility capital budget items from the bulk of the program and evaluated the management of facility capital investments. A detailed review of the 1978 capital project documentation, supplemented by facility staff interviews, was conducted.

Major conclusions are that financial analysis techniques were technically correct, quality of management decisions seemed extremely high; however, emphasis on short term results and aircraft modifications detracted materially from the effectiveness of facility capital planning, scheduling of capital planning milestones was unrealistic, and there did not seem to be much incentive for facility middle management to emphasize capital planning. Major recommendations are to

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manage the facility capital program systematically by budget areas, define objectives within budget areas, further decentralize corporate capital investment decision responsibility, revise capital planning milestones, and budget in detail for years 2 and 3 of the 5 year plan.

A COMPARISON OF THE SHIP SYSTEM ACQUISITION PROCESS OF
THE INDONESIAN NAVY AND UNITED STATES NAVY

Gerardus Sukardono
Major, Indonesian Navy
M.S., Moscow Electrical Power Institute, 1968

A comparative study was made between the U.S. Navy and Indonesian Navy ship acquisition process. Models of the general ship acquisition process are discussed. Conclusions and recommendations are then generated for applying a ship acquisition framework to Indonesia given consideration of the environment and applicability of U.S. systems to the Indonesian Navy.

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USING ORGANIZATIONAL MECHANISMS TO ENCOURAGE INNOVATION

Thomas Francis Sullivan
B.S., San Diego State University, 1969

The concept that innovation can help improve organizational effectiveness is advanced. An examination of the organizational environment suggests innovation is underutilized within the corporate structure. The rationale for its not being used more extensively is modeled and discussed. It is proposed that an organizational mechanism can be designed, built, and used to initiate the changes needed to exploit innovation. Finally, how the mechanism affects the chief executive and the organization is analyzed and evaluated.

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THE TWO-CAREER FAMILY IN THE NAVY

Della J. Suter
Lieutenant, United States Navy
B.S., Southeast Missouri State University, 1972

Two-career couples are studied and compared with military families having either a one-career/one-job lifestyle or a single-income lifestyle. The purpose of the study is to determine differences in attitudes and behavior of families with the two-career lifestyle concerning their career intentions, career satisfaction and family services needs.

A random sample of 459 married Naval officers was studied in the initial survey. The follow-up study involved 55 military members and 47 civilian spouses.

It is found that two-career families were significantly different from one-career/one-job or single-income families in age, rank, designator, career intentions and family service needs. Transfers are the number one problem for two-career families. It is concluded that both the Navy and these families would benefit from adaptation of current transfer policies to the needs and desires of the more non-traditional career/family lifestyles.

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CHALLENGE FOR OPERATIONAL EXPERIENCE
FEEDBACK IN AIRCRAFT DESIGN

Stanley John Sweikar, Jr.
Naval Air Systems Command, Washington, DC
B.S., Aeronautics, St. Louis University, 1961

Since the early 1960s, the Department of Defense and the air transport industry have seen a downward trend in the number of new aircraft production starts. One of the effects of fewer new development programs has been a declining level of practical design experience acquired by individual engineers in aerospace design organizations. When compared to the growing need for design experience build-up, a result of expanding technology, the situation becomes worse. To acquire needed levels of practical design experience, feedback and utilization of operational experience is becoming increasingly important. Responsive feedback systems are used by the commercial air transport industry for providing operational experience applicable to product improvement and new development programs. Feedback systems in Naval aviation provide

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data and information for application primarily in areas of manpower and material management. This thesis analyzes and discusses the present situation and basic needs for operational experience feedback in aircraft design.

AN INDEPENDENT LOOK AT THE CONTROVERSY OF
RELIABILITY IMPROVEMENT WARRANTIES

Robert Lee Sweney
Lieutenant, Supply Corps, United States Navy
B.S., Lambuth College, 1970

The Reliability Improvement Warranty has grown in acceptance as a plausible contractual method of improving field reliability and reducing maintenance costs of military hardware. The acceptance of RIWs has not been universal, however, with many factions doubting the actual success and value of the RIW concept. Much confusion and uncertainty clouds warranty experimentation and more orderly progress is necessary to determine the feasibility of future RIW expansion. This study examines the current issues of RIW development and the controversy that has arisen over its use. The aspects of expanding Reliability Improvement warranties to shipboard equipment is also explored. Interviews with personnel in the

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reliability field, case studies and other reports are used to collect information on the facts and issues influencing the controversy. An attempt is made to distill these facts and issues and to place them into an orderly and understandable perspective. This is done with the hope that the value and future of Reliability Improvement Warranties might be more easily determined.

JAPANESE-AMERICAN ECONOMIC RELATIONS AND
THEIR IMPACT ON OVERSEAS MILITARY BUDGETING

Mark Allen Teipel
Lieutenant, Supply Corps, United States Navy
B.A., Northern Illinois University, 1970

The economic relationship between the United States and Japan has undergone significant changes recently, causing changes and repercussion beyond international economics, including U.S. military budgeting. The U.S. Navy's present system of budgeting for overseas activities assumes stable exchange rates. Fluctuating exchange rates are now basic to the operation of the international financial system. It is proposed that budgeting be done using a target rate, with fluctuations above and below that rate going into general Treasury receipts or supplemented by a specific appropriation, as the case may be. Otherwise, local overseas commanders have budgets nearly totally dependent upon exchange rates, which can subvert the original intent of the granted budget when the dollar's value varies in either direction. This problem is particularly acute in Japan when the dollar's value has changed drastically and often, and where the Navy has a significant presence.

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A STUDY DIRECTED AT RECOMMENDATIONS
FOR THE IMPROVEMENT OF THE NOAA
CORPS FITNESS REPORT SYSTEM

Albert E. Theberge, Jr.
Lieutenant Commander, NOAA
Professional Degree, Colorado School of Mines, 1969

In order to formulate recommendations for improvement of the NOAA Corps Fitness Report System, the problem is attacked from three directions: (1) a study of industrial performance appraisal; (2) a study of appraisal methods in the six larger uniformed services of the United States; and (3) a study of the attitudes of NOAA Corps officers regarding the present NOAA Corps Fitness Report System.

After assimilating and categorizing the information obtained from the above three areas, it is concluded that the NOAA Corps must redesign its appraisal system to better encompass both evaluative appraisal needs (past performance oriented) and development appraisal needs (future performance oriented).

Specific recommendations are offered to bring about the necessary changes. These recommendations include adoption of

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Management-by-Objectives, implementation of a form of self-assessment, and the addition of greater internal controls such as reviewing officers, total score guidelines, and written justification of all extreme marks.

COSTS AND DECISION-MAKING PROCESSES IN
NON-PROFIT, GENERAL-PURPOSE HOSPITALS

Hamilton Smith Todd, Jr.
Lieutenant, Medical Service Corps, United States Navy
B.S., George Washington University, 1978
and
Stephen Charles Rice
Lieutenant, Medical Service Corps, United States Navy
B.S., George Washington University, 1978

This paper surveys the literature on the relationship between hospital costs and decision-making processes. Costs are seen as consequences of decisions made by four groups within the hospital setting: (1) board of trustees; (2) administrator; (3) medical director; and (4) medical staff. These sets of organizational players are studied in terms of functions and responsibilities, compatibility in a professional bureaucracy, powers and influences, and goals. Attempts are made to discern what kinds of decisions are made by each group and what impact those decisions will have on costs.

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The authors conclude that cost control mechanisms can focus on either resource availability or resource utilization. The former is seen as multi-influenced while the latter is essentially controlled by physicians. An argument is made for the need to internalize cost information into the physician's clinical judgements.

A STUDY OF SPARE PART PROVISIONING

Mehmet Tokmak
Lieutenant J. G., Turkish Navy
Turkish Naval Academy, 1973

The position of a second user (not the producing country) in Spare Part Provisioning and the utilization of maintenance related provisioning models are studied in this thesis.

The second user has to determine what his position is in the System Life Cycle, how much control he has over system life cycle cost, his needs with respect to spare parts provisioning and what the crucial issues are. In the first part of the thesis, the concepts, activities and expenditures on these subjects are studied and modified from a second user's position.

In the second part, two maintenance-related provisioning models (METRIC and OPUS) are described and compared. Finally, a sensitivity analysis utilizing the OPUS model was attempted for a hypothetical maintenance and support organization with supplemental data. Difficulties with the OPUS program precluded completion of this phase.

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A SYSTEMS ENGINEERING APPROACH
TO NATO STANDARDIZATION

Douglas M. Turner
B.S., California State Polytechnic University, 1963

The increased threat from Warsaw Pact forces combined with recognition of the inability of NATO forces to cooperate fully in combat has caused emphasis to be placed on standardization of equipment, procedures, and tactics. The Conference of National Armaments Directors (CNAD) and the Military Agency for Standardization (MAS) are the NATO organizations tasked with implementation of standardization. The CNAD concerns itself primarily with requirements determination. The MAS develops NATO-wide agreements at a low system level. Neither organization is concerned with the total system life cycle nor does an effective user-producer dialogue exist. A systems approach is presented as a rational way of making standardization decisions. A hierarchy of standardization and a system design model are described as methodologies for decision-making. Alternative ways of implementing the systems approach are examined using the system design model. A recommendation is made to establish a systems engineering activity, within CNAD, to direct and coordinate all standardization activities.

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ELECTRONIC FUNDS TRANSFER (EFT)
AND ITS USE IN THE NAVY

Patrick Paul Valenty, Jr.
Lieutenant Commander, Supply Corps, United States Navy
B.S., Naval Postgraduate School, 1972

The application of Electronic Funds Transfer (EFT), a new technology, and its potential use in the U.S. Navy is examined. The present payments system is reviewed and found to be performing satisfactorily as far as consumers are concerned. However, business, government and financial institutions see opportunities for reducing costs and improving services, given new technology and changes in banking regulations.

The EFT system is described along with the climate for changing the current payment system, suggesting the existence of a fertile base for growth of EFT in the Navy. Accordingly, implementation of EFT at a naval field activity is simulated, showing that significant dollar savings and payee service benefits can be realized. Since consumer acceptance of EFT is vital for its implementation, an analysis is made of a survey given to payees who have accepted EFT.

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INTERNAL CONSULTING, A KEY ELEMENT IN THE
INTEGRATED APPROACH TO MODERN PROBLEM SOLVING

Wayne James Vanderslice
Lieutenant Commander, Supply Corps, United States Navy
B.S., Miami University, 1969

All very large organizations are beset with problems, some of which are beyond the expertise of management. The Navy is no exception. In an effort to rectify these problems the private sector is placing heavy reliance on management consulting services. Internal consultants are playing an increasingly significant role in that process in conjunction with their external counterparts. Therefore, it seems logical to incorporate, in an integrated approach, the prudent use of internal, as well as external, consultants to assist Navy management to economically solve their problems. This thesis supports such an integrated approach.

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MAINTENANCE REPORTING SYSTEMS
FOR ELECTRONICS SYSTEMS

Duane R. Velte
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B.A., Ohio State University, 1966

The REWSON project (PME-107) of the Naval Electronics Systems Command is concerned with obtaining maintenance information for its equipment in a timely and accurate manner. They want to identify and correct problems as they are developing rather than waiting until they become critical. This study reviews the available alternatives for obtaining maintenance information. It discusses the advantages and disadvantages of each and provides a recommended course of action. The recommendations suggest that expanded use of the Fleet Reliability Assessment Program (FRAP) is the best alternative for analyzing an identified problem equipment, while the actual identification of problem equipment is best done through a coordinated use of the 3M system, supply demand data and casualty reports.

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AN EVALUATION OF THE
STRUCTURE AND ORGANIZATION
OF THE NAVAL AIR TEST CENTER

John Emil Vomastic
Lieutenant Commander, United States Navy
B.S., Illinois Institute of Technology, 1965

and

Edward Thomas Schneider
Lieutenant Commander, United States Navy
A.B., Villa Madonna College, 1968

This thesis provides an organizational history of the Naval Air Test Center (NATC), Patuxent River, Md., evaluates the effect of the April 1975 reorganization, identifies current problems and proposes a reorganization to solve these problems. Data were obtained from a survey and interviews.

The 1975 reorganization resulted in a more effective organization at NATC with improvements in the maintenance of aircraft and in contact with Naval Air Systems Command (NAVAIR) sponsors. The Anti-Submarine and Rotary Wing Aircraft Test Directorates benefited the most from the reorganization. Current problems with the organization still exist.

A matrix organization would solve many of the current problems. The prerequisites for a matrix organization are

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shown to be present at NATC. This type organization is proposed to solve the existing problems and prepare NATC to best meet future Test and Evaluation (T&E) requirements.

RATE STABILIZATION AND ITS IMPACT ON US NAVAL SHIPYARDS

Melville Joseph Walters, III
Lieutenant Commander, Supply Corps United States Navy
B.S., US Naval Academy, 1968

The eight United States Naval Shipyards commenced operation under the rate stabilization concept in 1976. Rate stabilization refers to the use of annually predetermined rates for the billing of customers for work accomplished in the shipyard. A primary objective of rate stabilization was to provide improved planning and budgeting to the customer and the shipyard.

The objective of this thesis was to assess the impact of rate stabilization on the US Naval Shipyards.

Conclusions are that the overall operational, planning and programming advantages provided by rate stabilization more than offset the disadvantages. Indications are that the concept of rate stabilization is working and that the shipyards are learning to work within the program. It is important that, once stabilized rates have been set, major changes in workload at the individual shipyards do not occur.

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AN ANALYSIS OF THE ROLE OF TRANSPORTATION IN THE
U.S. COAST GUARD PHYSICAL DISTRIBUTION SYSTEM

John Anthony Wcislo
Lieutenant, United States Coast Guard
B.S., United States Coast Guard Academy, 1974

The purpose of this study was to analyze how the United States Coast Guard utilizes transportation to effect the physical distribution of goods. The study examined the existing organizational, managerial, and financial structures of transportation and physical distribution within the Service, as well as the transportation management activities that occurred at the working level. The focus of this working level examination was the traffic management organization at two of the Coast Guard's supply centers: the U.S. Coast Guard Supply Center, Brooklyn, New York, and the U.S. Coast Guard Aircraft Repair and Supply Center, Elizabeth City, North Carolina.

From analysis of the available information, it appeared that concerted efforts were being made at the working level to manage transportation effectively. The recommendations contained in this study have emphasized a realignment of authority and accountability for transportation management, in order

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to effect a greater integration of these working level efforts into the physical distribution system of the Coast Guard.

AN ANALYSIS OF THE ISSUES AFFECTING
THE COAL SLURRY PIPELINE MOVEMENT

Fred Alan Williams
Lieutenant Commander, United States Navy
B.S., University of Southern Mississippi, 1967

This thesis contains an examination, analysis, and commentary upon the prospective use of slurry pipelines as a supplemental means of coal transportation in support of the announced United States goal to double coal production by 1985. It examines the rudiments of the slurry industry and traces its growth to the present. A thorough review of the technical, legal, and political aspects of the controversial issues influencing the construction and operations of long distance coal pipelines is presented along with a commentary on the cases for and against slurries. Finally, sets of both general and specific conclusions are offered regarding the potential use of the coal pipelines.

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MANAGEMENT OF US COAST GUARD INFORMATION SECURITY
PROGRAM USING MANAGEMENT BY OBJECTIVES

Bradley Joseph Willis
Lieutenant, United States Coast Guard
B.S., United States Coast Guard Academy, 1974

This thesis is a study of the management process of management by objectives and its use as a method for management of the United States Coast Guard information security program. The thesis develops management by objectives as a systematic, phased process which managers throughout the Coast Guard security program could be encouraged to use. Several problem areas in the security program have been identified and analyzed. Solutions within a management by objectives context have been proposed for these problems. This study has combined MBO theory and discussion of specific problems in the Coast Guard security program so that managers could have a foundation for installing management by objectives.

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PRICING FOR OBSOLESCENCE IN THE NAVY STOCK FUND:
IS THERE A BETTER WAY?

William Patrick Wilund
Lieutenant, United States Navy
B.S., University of Idaho, 1969

The use of pricing surcharges in recovering costs associated with transportation as well as losses by inventory and obsolescence has long been used by stock fund managers. At the request of the Naval Supply Systems Command, this study was undertaken to assess the methodology of surcharge development for Navy Stock Fund items, and to determine if improvements were possible. Methods used for developing transportation and physical inventory loss portions of the surcharge have been examined and are considered adequate. Methods used for developing the obsolescence portion of the surcharge have been examined and several changes have been recommended. Such changes include the use of indexing to assist in comparing different years' prices, a possible use of replacement cost accounting for inventory valuation, and a method of statistical accounting to better ascertain the adequacy of surcharges established.

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ANALYSIS OF THE SHORE FACILITIES
INSPECTION SYSTEM AND ITS IMPORTANCE IN THE
MAINTENANCE BUDGET FORMULATION PROCESS

James Albert Wood
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B.S. (Arch. Engr.) California State Polytechnic College

This thesis addresses the current Shore Facilities Inspection System and its adequacy in generating the necessary background data and justification for the annual Real Property Maintenance Activity Resource Requirements Request. The responsibilities of the Facilities Manager and his use of the Annual Inspection Summary in preparing his annual Maintenance of Real Property Budget Request are discussed and reviewed. A review of the overall inspection system and the budget formulation process is conducted in an attempt to evaluate the effectiveness of the techniques used in establishing resource requirements. The thesis concludes with observations regarding the methods employed and their effectiveness and makes specific recommendations to improve the system currently in use at the Naval Postgraduate School.

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THE POTENTIAL IMPACT OF THE GOVERNMENT'S
"BUY COMMERCIAL" POLICY
ON SMALL BUSINESS

Willie E. Woods
Lieutenant, Supply Corps, United States Navy
B.S., Purdue University, 1972

This thesis examines the Federal Government's decision to shift from almost total reliance on Government Specifications and Standards to a greater reliance on commercial off-the-shelf products and commercial specifications and standards. The policy is analyzed from a Department of Defense perspective, with special emphasis placed upon the impact that the policy will have on competition, pricing, quality and the small business community. The conclusion is that the "Buy Commercial" policy will have a positive effect on competition and pricing without sacrificing any of the essentials of quality. The effects on the small business community overall will be positive, in that more small firms will be encouraged to compete for Government contracts. For those small businesses however, that are heavily involved in producing products to meet Government specifications and standards and policy may spell financial disaster unless the Federal Government renders special consideration and assistance to them.

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A MANAGEMENT PERSPECTIVE ON THE ROLE OF
INFORMATION PRODUCTION IN THE ORGANIZATION

Richard L. Wooten
B.S. Physics
San Diego State University, 1965

The explosive growth of information technology in the last decade has caused a demand for experienced information system managers far beyond the present supply. Consequently, many of these positions are filled by personnel who may lack a comprehensive understanding of the role of information production in the organization. This paper addresses organization processes and interactions of which the information system manager must be made aware in order to perform his job effectively. Discussion includes organization purpose, structure, decision processes, and information production. When appropriate, descriptive models were developed in order to better understand the synergistic relationships which exist. Particular attention was given to the need for systematic valuation of organization information products, and development of the "product-worth function" is proposed as a possible approach to this problem.

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INTRODUCTION OF F/A-18 PHASED SUPPORT
FOR THE USMC AT MCAS EL TORO

Donald L. Yaney
Commander, Supply Corps, United States Navy
B.S., Purdue University, 1962

To achieve and to sustain a high level of aviation fleet readiness with an aircraft and its weapon systems continues to be a major goal associated with every aircraft acquisition program. To date the Navy has not been able to achieve this goal. Some aircraft have enjoyed brief moments of high operational readiness, but no aircraft has enjoyed sustained high operational readiness.

The F/A-18 represents an ongoing aircraft acquisition program where Integrated Logistic Support innovations have become routine to the normal conduct of business. This thesis examines the F/A-18 Aircraft Program in the area of phases support concept and the Program's implementation approach with the Site Specific Phased Support Plan and the Support Site Activation Plan at the first operational site, the USMC at MCAS El Toro.

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Using the methodology of systems engineering, the thesis develops and recommends a logistic system design approach and an organizational structure to accomplish site optimization of the Site Specific Phased Support Plan.

STEADY STATE FLOW CHARACTERISTICS
OF A FLEXIBLE DUCT CONTROL VALVE

William Kirk Boyd, Jr.
Lieutenant, United States Navy
B.S.M.E., United States Naval Academy, 1971

Flow characteristics of a flexible duct valve have been investigated experimentally. Data have been obtained to demonstrate the ability of the valve to control the flow. One dimensional flow analysis was applied and shown to provide some guidance in the design of the valve.

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EXPERIMENTAL DETERMINATION OF MELTING
RATES OF ICE MOVING IN SEAWATER

William Francis Clifford
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1969

and

Reginald Joseph Erman
Lieutenant, United States Navy
B.S., North Carolina State, 1973

Large, fresh-water ice blocks (0.5m X 1.25m X 5m) were towed in Monterey Bay at speeds in range from 0.7 to 1.2 knots. The objectives of the experiments included measurement of gross regression rates of ice surfaces, wake temperature, turbulent thermal boundary layer, ice interior temperature profile, and observation of shape changes over the melting period. The research was conducted over a period from October 1977 to January 1979. The measured regression rates at several points on the ice blocks were compared to theoretical predictions using a turbulent flow ice ablation model developed by Dr. Owen Griffin of the Naval Research Laboratory. Griffin's model predicted a regression rate of 280mm/hr compared with the measured value of 260mm/hr at a selected point.

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Temperature profiles in the ice interior and ice-water boundary layer were used in a one-dimensional energy balance across the melting interface. Ice ripples were observed on all ice block tests. The ripples are important for both heat transfer and drag considerations. The wavelengths of the ripples were measured and the average wavelength determined. The measured average wavelength was 6.1 inches compared to the theoretical average predicted by Tatinclaux and Kennedy of 5.8 inches for a selected experiment.

WASTE HEAT RECOVERY UNIT DESIGN
FOR GAS TURBINE PROPULSION SYSTEMS

Robert Meredith Combs
Lieutenant Commander, United States Navy
B.A., University of North Carolina, 1967
M.S., Naval Postgraduate School, 1973

A design model for a once-through waste heat recovery unit with a segmented fin-tube arrangement was developed along with a simple model of a combined gas and steam (COGAS) turbine propulsion system. These models were integrated and applied in a computer program written in FORTRAN IV for the IBM 360-67 computer. Waste heat recovery unit designs were produced and tested at off-design conditions. Using the space constraints and power requirements of a Navy destroyer-type ship, one design was selected and employed to make estimates of possible fuel savings to be realized through the application of a COGAS system.

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NUMERICAL INVERSION OF LAPLACE
TRANSFORMS

John Hollis Duncan
Lieutenant Commander, United States Navy
B.S., University of South Carolina, 1967

Inversion of Laplace transforms has been accomplished by a numerical integration along appropriate paths in the complex plane. Two general procedures have been used. The simpler and more economical employs a simple path, such as a parabola, which bends to the left. Accuracy is maintained by monitoring the oscillation of the integrand. A second method employs a steepest descent contour.

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VIBRATION ANALYSIS AND NONDESTRUCTIVE TESTING USING
DOUBLE-EXPOSURE HOLOGRAPHIC TECHNIQUES

John Michael Fahey
Lieutenant Commander, United States Navy
B.A., University of Tennessee at Chattanooga, 1966

Double-exposure holograms were made of aluminum 2024-T4 rectangular plates. The double-exposure technique was applied to an aluminum plate in a nonflawed and then a flawed condition. Results of these experiments, comparing the effects at various resonant frequencies, were then compared with results previously obtained in other studies to ascertain their applicability to Naval Engineering.

The plate was then flawed with a 1 inch through-thickness vertical slit, and double-exposure holograms were generated. The resonant frequencies of the flawed plates were recorded, and the mode shape deviations were analyzed. A comparison was made of resonant frequencies and mode shapes of flawed and nonflawed plates to determine the applicability of holographic procedures to nondestructive testing of vibrating mechanical parts.

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Results of the experiments indicate that holographic non-destructive testing (HNNT) of vibrating objects in a shipboard environment holds promise for future applications. Further research is required to develop systems for use aboard ships. These procedures are being used successfully in the aerospace industry and automobile manufacturing.

HOT FLOW TESTING OF MULTIPLE
NOZZLE EXHAUST EDUCTOR SYSTEMS

James Allan Hill
Lieutenant, United States Navy
B.A. Economics, University of Nebraska, 1972

Hot flow model tests of multiple nozzle gas turbine exhaust eductor systems were conducted to evaluate the temperature effects of several eductor design modifications. A one-dimensional analysis of a simple eductor system based on conservation of momentum for an incompressible gas was used in determining the nondimensional parameters governing the flow. Eductor performance is defined in terms of these parameters. Compared to existing solid wall eductors, the addition of film cooling slots in the mixing stack, a mixing stack shroud and a double split ring diffuser section was found to significantly improve the pumping coefficient of the eductor, and drastically decrease all external surface temperatures as well as moderately reduce the maximum gas discharge temperature.

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VIBRATION ANALYSIS AND NONDESTRUCTIVE
TESTING USING HOLOGRAPHIC TECHNIQUES

Phillip P. Hoffmann
Lieutenant, United States Navy
B.S., United States Naval Academy, 1973

Real-time holograms were made of Aluminum rectangular plates. The plates were cyclically vibrated with a piezoelectric driver to allow the fundamental frequencies to be measured and the mode shapes observed. The results were compared with theoretical frequency calculations.

The plates were flawed by three different methods, and real-time holograms were again made. The resonant frequencies of each plate were recorded, and each mode shape was observed.

A comparison between the plates before and after the flaws was made to determine the applicability of holography to the nondestructive testing of vibrating objects.

Results indicate that holographic nondestructive testing (HNDT) of vibrating objects shows great promise for future applications.

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AN APPLICATION OF OPTIMAL CONTROL THEORY
TO THE FFG-7 GAS TURBINE PROPULSION SYSTEM

Richard A. Kalyn
Lieutenant Commander, United States Navy
B.S.E., Princeton University, 1964

An optimal integral control design program was applied to a linearized state variable model of the FFG-7 ship class gas turbine and Controllable Reversible Pitch (CRP) propeller main propulsion system. Various combinations of output parameters were investigated in an attempt to produce a feasible control design. Only one acceptable design was achieved which did not violate any physical constraints.

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SOLAR ENERGY DESIGN IMPROVEMENT:
A METHODOLOGY FOR HYDRONIC FLAT PLATE
COLLECTOR SYSTEMS

Lawrence William Kozoyed
Lieutenant Commander, United States Navy
B.S.E.P., University of Oklahoma, 1965

A methodology for solar energy system design improvement has been developed and coupled with a constrained function optimization code resulting in an automated solar energy system design procedure. The scope of the methodology is limited to systems using flat plate collectors and water as the working fluid.

Eight parameters have been included as independent design variables. The design variables include collector area, collector tilt angle, collector and storage fluid stream velocities, and collector to storage heat exchanger dimensions. The procedure includes an accounting for economic parameters as an intimate part of the design process. The resulting methodology has been used for the design of solar energy systems which would use shelf item collectors for the purposes of determining the optimum design variable vector for

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a given situation. The methodology could also be used on a limited basis for collector design optimization by exploring the effects of changing selected collector parameters on system performance. The methodology is coded in the FORTRAN computer language under the name SOLOAD-1. (SOLAR ENERGE OPTIMIZATION ANALISIS OR DESIGN).

Initial system trials indicate complete stability with minimal constraint activations. Based on the results of approximately fifty design experiments using SOLOAD-1, new findings concerning optimum collector tilt angle and an invariant optimum collector flow factor are suggested.

AN EXPERIMENTAL STUDY OF
DROPWISE CONDENSATION ON
HORIZONTAL CONDENSER TUBES

John Talbot Manvel, Jr.
Lieutenant, United States Navy
B.S.O.E., United States Naval Academy, 1972

Three types of drop promoting coatings were applied to the outside of 15.9 mm (5/8 in) outside-diameter condenser tubes to determine their effect on heat transfer performance. The coatings included a new fluoroepoxy, a commercial series of fluorocarbon coatings, and sputtered TFE. Coating thickness varied from 0.02 to 12.7 microns. Steam at about 21 KPa (3 psia) was condensed on the outside surface of each coated tube, horizontally mounted in the center of a dummy tube bundle. Each test tube was cooled on the inside by water at velocities of 0.80 to 7.60 m/sec (3 to 25 ft/sec).

The overall heat transfer coefficient was determined directly from experimental data. The inside and outside heat transfer coefficients were determined by using the Wilson Plot technique.

Of the commercial fluorocarbon coatings, the "Nedox" coating on a copper-nickel tube enhanced the outside heat

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transfer coefficient by 53% and improved the corrected overall heat transfer coefficient by 27 percent. Of the sputtered TFE coated tubes, the 0.08-micron thick coating on a copper-nickel tube enhanced the outside heat transfer coefficient by 45 percent and improved the corrected overall heat transfer coefficient by 21 percent. Evidence of the effect of the thermal conductivity of the condensing surface substrate and evidence of an optimum coating thickness were found.

HOT WIRE ANEMOMETER INVESTIGATION OF TURBULENCE LEVELS
AND DEVELOPMENT OF LIQUID CRYSTAL FLOW VISUALIZATION
TECHNIQUES FOR THE RECTILINEAR CASCADE TEST FACILITY

William R. Miller
Lieutenant Commander, United States Navy
B.S., United States Naval Academy 1969

Using hot wire anemometry, a base line turbulence intensity level was determined for the Rectilinear Cascade at the U.S. Naval Postgraduate School Turbopropulsion Laboratory. The turbulence with straight inlet guide vanes was compared to the turbulence without guide vanes. Results indicate a uniform though slightly greater turbulence level when using guide vanes.

The use of liquid crystal themography was investigated as a technique for visualizing flow across cascade test blades. Methods of applying crystals to and resistance heating of the blade surface were investigated in bench tests. Recommendations are made which should lead to the successful application of the technique in the cascade wind tunnel.

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FRACTURE TOUGHNESS CHARACTERIZATION OF SELECTED
ULTRA-HIGH CARBON STEELS

James Louis Taylor
Lieutenant Commander, U.S. Navy
B.S., United States Naval Academy, 1965
M.S., Naval Postgraduate School, 1977

This effort, part of an ongoing program examining the microstructural and mechanical properties of extensively warm-worked ultra-high carbon (UHC) steels, was directed at measurement of the fracture toughness of these steels. A facility was constructed to test bend-type fracture toughness specimens in accordance with the American Society for Testing and Materials (ASTM) Standard E399-78; several UHC steel alloys were evaluated and the results correlated with microstructural and other mechanical test results. With one exception, processing failed to eliminate coarse carbides from the microstructures of these materials and fracture toughness, K_{IC} , values were accordingly low. A commercial alloy, AISI 52100, processed similarly to the other experimental alloys, did not have the coarse carbides present to as great an extent, and was significantly tougher, as manifested by a strength ratio twice that of the other alloys.

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DYNAMIC STRUCTURAL MODEL
OF A SUBMERGED RING

Jack Thomas Waller, Jr.
B.S.M.E., New Mexico State University, 1975

A dynamic structural model of a submerged ring is developed using trigonometric series. It is constructed for use in conjunction with a finite element fluid model to examine the effects of cavitation on underwater shock loading of a structure. The governing equations and the time integration algorithm used in the model are described. Results predicted by the model are compared to known results. The program listing is given.

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A SYNOPTIC STUDY OF THE NORTHEASTERN MONSOON OVER THE SOUTH
CHINA SEA AND ITS VICINITY DURING DECEMBER 1974

John Erick Erickson
Captain, United States Air Force
B.S., Mathematics, Minot State College, 1966
B.S. Meteorology, University of Utah, 1969
M.S., Systems Management,
University of Southern California, 1973

Through the study and evaluation of cold surges in the northeast monsoon, insight is gained into the relationship of the surges with large-scale mid-latitude and tropical systems, their horizontal and vertical structure, their equatorial penetration and their effects on other phenomena. The results lead to the tentative conclusions that due to the varying degree of air-sea interactions between cold air originating from the South China coast, the near-equatorial latitudes of the South China Sea will experience a freshening of the low-level northeasterly monsoon winds prior to a decrease in surface temperature which, if it occurs, is confined to the western portion of the South China Sea. This allows a near equatorial disturbance (which may originate from the semi-stationary near-equatorial trough over the coast of northern Borneo or from a westward propagating wave in the

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western Pacific) to be intensified at an early stage of the surge by enhanced low-level convergence and organized deep cumulus convection. Afterwards it may be weakened by either cold incursion along the Vietnam coast or a slackening of the northeasterlies.

STATISTICAL ADJUSTMENT OF DYNAMICAL
TROPICAL CYCLONE MODEL
TRACK PREDICTIONS

Dennis Robert Frill
Captain, United States Air Force
B.S., St. Louis University, 1974

A technique of statistically adjusting dynamical forecasts of tropical cyclone motion was tested. All tests were performed with operationally-analyzed data from the U.S. Navy Fleet Numerical Weather Central (FNWC). Three sets of regression equations were developed to modify forecasts of typhoon tracks. The first set of equations was based only on forward integration of the FNWC Tropical Cyclone Model (TCM) for 28 cases in 1975-76. An independent sample of cases from 1977-78 indicated that the first equation set was based on too small a sample size, especially considering the anomalous nature of the 1975-76 storm tracks. A second equation set based only on forward integration of the TCM was derived from 61 storm track forecasts from 1975-78. Results from the experiments with these equations indicate that systematic data and model errors can be used to statistically adjust forecast storm tracks. The second equation set based on forward integration showed improvement over the unmodified model

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predictions at all forecast times. A third equation set based on forward and backward integration of the TCM explained the greatest amount of variance of all the equation sets. In a dependent test of these equations using 31 of the 1977-78 cases, the U.S. Navy 7th Fleet error goal of 100 and 150 nautical miles at 48 and 72 hours was nearly met.

A STUDY OF INTERANNUAL AND INTRAANNUAL
TROPICAL ATMOSPHERIC CIRCULATIONS
DURING NORTHERN HEMISPHERE SUMMER

Earle Leslie McCormick
Captain, United States Air Force
B.S., Saint Louis University, 1973

This thesis contains a study of the interannual and intraannual tropical atmospheric circulations for the Northern Hemisphere summer seasons of 1974, 1975 and 1976 using satellite observations of infrared radiation and albedo in conjunction with parameters available from conventional 200 mb data. The 200 mb flow regimes are contrasted for the three seasons and power spectra and cross-spectral analysis are used to find significant correlations between the parameters from time series generated within a given area and between the areas. These areas were picked for each parameter to represent regions of maximum time-averaged values. The anomalously warm sea surface temperatures in 1976 (Bepristic, 1977) occurred in conjunction with major circulation changes paralleling Bjerknes' (1969) hypothesis and the differences in flow regimes between a normal and dry monsoon season are in general agreement with Kanamitsu and Krishnamurti (1978). Significant

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correlations were found to exist between parameters within the eastern Pacific and western Pacific and also between these two regions. Particularly strong correlations involved the u^2 , v^2 and IR parameters.

REFINEMENT OF STATISTICAL DIAGNOSTIC
MODEL OF MARINE FOG USING FNWC
MODEL OUTPUT PARAMETERS

Steven O'Neal Ouzts
Captain, United States Air Force
B.S., Auburn University, 1969

The study represents a continuation of the development of a model output statistics scheme to specify marine fog over the open ocean and in coastal waters. Thirty-seven direct and derived Fleet Numerical Weather Central model output parameters, monthly climatological fog frequencies, combinations of the aforementioned parameters (i.e., interactive parameters) and a persistence parameter are used as predictors in a step-wise multiple linear regression approach to estimate a predictand defined as marine fog probability. The predictand is categorized in two ways, in one case (FOGCAT I) as smoothed probabilities from 0 to 100% as a function of present weather, past weather, visibility and low cloud type; and, in another case (FOGCAT II) as a limited number of discrete probabilities (to include 0 and 100%) derived from present weather, past weather and visibility only. This study derives diagnostic regression equations only using as a dependent data sample

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over 24,000 surface synoptic ship observations at 0000 GMT for June through August 1976 and 1977. The predictor parameters contributing most significantly to the variance are sensible and evaporative heat fluxes, monthly climatological fog frequencies, and meridional wind speed. Threat, Heidke skill, and Panofsky-Brier probability scoring methods are applied to a selection of the derived equations. Predictand variance explained reaches .170, threat/skill scores reach 0.42 and probability scores are as low as 0.28 using the FOGCAT I categorization scheme for the predictand. Equations for June and July appear more stable than those for August.

THE EFFECTS OF A PRESCRIBED SALINITY FIELD ON A 10-LEVEL
PRIMITIVE EQUATION OCEAN CIRCULATION MODEL

Kenneth Eicher Barbor
Lieutenant, United States Navy
B.S., University of Michigan, 1972

A prescribed salinity field is inserted into a 10-level primitive equation ocean circulation model. The model has been developed and is being improved in order to study large-scale thermal anomalies observed in the Central North Pacific Ocean by the North Pacific Experiment (NOR-PAX). The salinity field, based on observations along 160 W longitude, is independent of longitude and time, and is smoothed in the north-south direction to remove small-scale variations. A new equation of state which is a function of temperature, salinity and depth is used to determine density in the calculation of pressure from the hydrostatic equation. The parameterization of vertical mixing is changed to account for the stabilizing effect of salinity and the supercooling of the surface layers at high altitudes during winter.

The addition of salinity induced changes in the currents at high latitudes when compared to the model without salinity. A Rossby wave was excited in the middle latitudes which

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produced transient changes. The convective adjustment process enabled significantly colder water to overlie warmer water in the regions where salinity increases with depth. Supercooled surface temperatures, encountered during winter at high latitudes, are handled through convective mixing, but further investigation into the dynamics of sub-grid scale vertical convection at near freezing temperatures is recommended.

PRODUCTION OF ULTRA LOW FREQUENCY MAGNETIC NOISE
BY OCEAN SURFACE GRAVITY WAVES AND ITS
REAL TIME REMOVAL FROM AIRBORNE MAGNETOMETER MEASUREMENTS

James Francis Etro
Lieutenant, United States Navy
B.S., Oceanography, U.S. Naval Academy, 1973

The major environmental Ultra Low Frequency (ULF) magnetic noise sources observed on the airborne AN/ASW-81(V) optically pumped magnetometer are electromagnetic micropulsations, geological structures and ocean wave noise.

Experimental determinations of the amount of magnetic noise produced by ocean surface gravity waves were made. The author's current research designed to remove the wave noise and increase the probability of Magnetic Anomaly Detection (MAD) is summarized.

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SOME TESTS OF THE PENNSYLVANIA STATE UNIVERSITY MESOSCALE
MODEL WITH TROPICAL CYCLONES

Michael Richard Hacunda
Lieutenant, United States Navy
B.S., Pennsylvania State University, 1973

A three-dimensional, primitive equation model by Anthes and Warner (1978) was used to predict five typhoon cases. The five-layer model on a 40x40 staggered grid with 120 km resolution included a moisture cycle, sensible and latent heat flux at the earth's surface, and a bulk parameterization of the planetary boundary layer. The model is initialized using operational wind fields and two forms of a wind bogus.

Due to the lack of a representative moisture analysis in the vicinity of tropical cyclones, simulated moisture fields were used to initialize the model. Initial experiments conducted with these fields produced widespread convection and heating which developed circulations in areas well removed from the actual storm. The associated modifications to the steering flow, and the overly intense storm circulations resulted in premature recurvature. Use of a second moisture bogus, which provided less available moisture (especially at

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upper levels), reduced the amount of convection over the entire grid and the effect on the steering current.

A second wind bogus based on a scheme described by Hovermale (1976) was also tested. This technique resulted in a smaller and less intense initial storm, which also resulted in considerably less convection. The tracks forecast by the different wind and moisture fields were compared with forecasts of the 60 km resolution Madala and Hodur model using the same initial data.

AN EVALUATION OF THE GOSSTCOMP MODEL IN DETERMINING
OCEAN THERMAL FEATURES WITH A LITERATURE SUMMARY
OF REMOTE SENSING OF THE OCEANS (NORTHEAST
PACIFIC OCEAN, AUGUST 1977)

Fred Corwin Klein
Lieutenant, United States Navy
B.S., Oceanography, U.S. Naval Academy, 1971

Current problems and methods in satellite remote sensing of sea surface temperatures (SST) are treated; as well as a review of the National Oceanic and Atmospheric Administration, National Environmental Satellite Service (NOAA/NESS) Global Operational Sea Surface Temperature Computation (GOSSTCOMP) model as it accounts for the interference of clouds in determining SST. In the eastern North Pacific Ocean between 10 August and 30 August 1977, a three-way correlation study was conducted using GOSSTCOMP daily analyzed SST fields generated from NOAA-5 satellite data; Fleet Numerical Weather Central (FNWC) SST analyzed SST fields for 1200 GMT; and ship SST estimates from the Mixed Layer Experiment (MILE), Pacific Ocean Survey Operation, 1977 (PACSURVOPS-77), and sea injection temperatures archived by FNWC. The satellite SST values were found to be biased with respect to the ship data by

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approximately 3.5°C to 3.9°C. The cause for the bias is suggested to be from overcorrections for atmospheric attenuation by water vapor or from system noise.

Data from heavy cloudiness areas suggests a possible cloud contamination in the FNWC data. Bias in the FNWC and GOSSTCOM SST estimates in the higher temperatures is speculated to be from poor data availability in the lower latitudes and from atmospheric attenuation overcorrection in the vicinity of the eastern subtropical high. Both FNWC and the GOSSTCOMP SST products were equally accurate in light cloudiness and cloud-free areas. Further investigation is needed, especially in view of the new operational TIROS-N satellite, and the new computation procedures incorporated into the GOSSTCOMP model after the data were taken for this study.

TROPICAL DISTURBANCES IN AN OCEANIC
GENERAL CIRCULATION MODEL
WITH SEASONAL FORCING

Richard Duane LeRoy
Lieutenant, United States Navy
B.S., Purdue University, 1971

A ten-level primitive equation ocean circulation model is used to investigate the formation and propagation of baroclinic wavelike responses to annual variations in wind stress forcing. At 12.2°N , a thermal response to Ekman pumping is observed to be in phase across the entire longitudinal extent of the model Pacific Ocean. A zonal fluctuation in interior ocean current systems is also suggested. Eastern boundary disturbances not related to local forcing are observed to propagate poleward. At 6.1°N , main thermocline displacements are observed to propagate westward as the result of vertical advection induced by Ekman pumping. Surface layer temperature disturbances also exist which are produced by meridional advection of mean temperature (colder to the south) by surface Ekman currents. Eastern boundary disturbances also exist at this latitude and extend to a deeper level. All disturbances observed in this investigation are considered to be permanent features of the model circulation. Grid size limitations preclude detailed investigation of the observed boundary disturbances with this model.

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MASS, SALT, AND HEAT TRANSPORT ACROSS FOUR LATITUDE
CIRCLES IN THE SOUTH ATLANTIC OCEAN

J. Robert Mason
Lieutenant, United States Navy
B.S., United States Naval Academy, 1972

In this report, classic dynamic height calculations were made from International Geophysical Year (1957-1958) and adjacent 1959 oceanographic data to obtain geostrophic currents and estimates of mass, salt, and heat transports in the South Atlantic Ocean. The cross sections extend from South America to Africa along the 8°S, 16°S, 24°S, and 32°S latitude lines, providing temperature and salinity data from the surface to near bottom.

A level of no motion was determined by establishing mass and salt continuity across each of the latitudinal cross sections. This level varied from 1100 meters at 8°S to 1270 meters at 32°S. It is approximated by the 27.57 sigma-t surface and corresponds closely to the boundary between the Antarctic Intermediate Water and the South Atlantic Deep Water masses.

The resulting meridional heat transport was then examined and compared with other estimates. Northward (equatorward)

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heat transports resulted at each latitude, which would seem to oppose the conventional view of the role of the ocean in the earth's heat budget as a means to transfer heat from equator to poles. However, the northward direction of the net absolute heat transport agrees with the consensus of previous work and is attributed to the warmer surface currents with a net northward transport dominating the cooler deeper currents and their net southward flow.

A general circulation pattern was developed from mass transport values for each of three layers of water: Upper, Intermediate, and Deep and Bottom Water. These derived circulation patterns are then compared to general descriptive circulation patterns found in the literature. General agreement was found with the notable exception of lacking a strong Brazil current in the surface and central waters. Vertical cross sections of velocity, mass, salt, and heat transport were contoured to examine the eddy field circulation pattern and further describe general circulation patterns.

ANALYSIS OF STATISTICAL PARAMETERS DERIVED FROM
SATELLITE DIGITAL DATA (JULY 1987 GOES-WEST)
FOR USE IN DIAGNOSING MARINE FOG AREAS

Otto Frank McNab
Lieutenant, United States Navy
B.S., Centenary College of Louisiana, 1971

GOES West Infrared (IR) and Visual (VIS) satellite observations for the North Pacific Ocean area, 35-55N, 120W-180°, at 2345 GMT for eight June/July 1978 dates are processed to yield 20 statistical parameters which are analyzed for their use in discerning the existence of marine fog. The exploratory sample of 522 satellite observations, at 3 nmi x 3 nmi resolution (at subsatellite point) are related to the associated 0000 GMT synoptic ship reports which serve the role of ground truth. The best discrimination between fog/no-fog observations, using the statistical parameters, occurs for stratification of the data by the meridional component of the wind (south vs north), IR temperature (≥ 269 K vs ≤ 268 K) and the standard deviation of IR temperature (≤ 2 K vs > 2 K).

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MASS, SALT, AND HEAT TRANSPORT BY OCEAN
CURRENTS ACROSS 35° NORTH LATITUDE IN THE
PACIFIC OCEAN

Dennis James Whitford
Lieutenant, United States Navy
B.S., United States Naval Academy, 1972

This work represents a synoptic study conducted in the North Pacific Ocean to determine mass, salt, and heat transports from a calculation of geostrophic currents. Comprehensive depth, temperature, and salinity data were obtained from the INDOPAC I and XVI expeditions (April 1976 and July 1977) which covered a complete cross-sectional area along 35°N from California to Japan.

The geostrophic approximation was assumed valid. A level of no motion was determined at 851 meters by establishing mass continuity across the latitudinal cross section. A net northward salt transports of 16.27×10^{12} °/oo/sec was determined.

A resulting meridional heat transport of 288×10^{12} cal/sec toward the equator was determined. It would have been expected that most of the oceanic heat transport would take place in the upper waters where the temperature and currents are much higher and stronger and that the transport would be

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poleward. However, this study showed that the lower temperatures found at depth, transported at slower velocities, can balance the upper waters' heat transport due to the tremendous volume of middle, deep, and bottom water.

The southward heat transport agrees with previous research estimates by several authors using earlier and less synoptic data with other methods and may be compensation for excess atmospheric poleward heat transport.

TIDAL AND RIVER DATUMS
IN THE SACRAMENTO RIVER

Fred Carl Zeile III
Lieutenant, United States Navy
B.S., United States Naval Academy, 1973

The problem of extending vertical tidal and river datums through the ocean/river transition zone of navigable rivers is examined through the analysis of water-level measurements from an ocean and a river station at San Francisco and Sacramento, California. Modification of the tides after passage into the transition zone was analyzed by decomposing the raw water-level data for both stations into a tidal and a non-tidal component, and comparing the tidal components for tide range ratios and time differences. It was determined that as the mean river stage increases, the range ratio and the effective tide wave speed both decrease and the symmetry of the tide wave changes. Of the six standard Pacific Coast tidal datums and five river datums defined in this study, MSL-MRL is the only common tidal/river datum that is continuous through the transition zone. The MLLW ocean charting datum and the MHW tidal waterfront property boundary datum can be carried upriver, where both effectively merge with the MRL, by a separation-addition procedure.

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KOREANS IN JAPAN:
THEIR INFLUENCE ON KOREAN-JAPANESE RELATIONS

Alice K. Lee
B.A., San Jose State University, 1971

Since the Japanese annexation of Korea in 1910, many Koreans migrated to Japan seeking a livelihood. The majority of these emigrants were in the lowest economic status of Japanese society.

After World War II, of the 2.5 million Koreans in Japan, the majority were repatriated to their homeland, leaving approximately 600,000 Korean residents.

Koreans in Japan are divided factionally, each group separately favoring either South or North Korea. This, in turn, creates political differences and animosities.

The South Korea-Japan Treaty of 1965 granted permanent resident status of Korean residents. However, the inconsistencies in the Japanese government's treatment of Korean residents caused Koreans many disadvantages. Despite the phenomenal growth in the Japanese economy, the economic situation of Korean residents in Japan has not improved much since the South Korea-Japan Treaty of 1965.

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From the sociological aspect, a degree of assimilation has taken place among Korean youths but it remains to be seen whether such assimilation is desirable.

MEASUREMENT OF THE
CALIFORNIA COUNTERCURRENT

Keith Coddington
Lieutenant, United States Coast Guard
B.S., United States Coast Guard Academy, 1973

Direct measurements by moored current meters and indirect measurements from geostrophy are compared and discussed for a region over the continental slope off central California during the Davidson Current period.

During that same period, vertical temperature and salinity profiles were made at 23 stations on four separate cruises in the study area south of Monterey, California. These arrays of moored current meters simultaneously recorded the flow of the current at specified levels.

The California Countercurrent was found to be present in the region of study during the entire observation period. Its offshore position and extent, its intensity and its vertical location and extent varied in a way largely consistent with its reported behavior in other locations along the U.S. West Coast.

Master of Science in
Oceanography
June 1979

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WINTER AND SPRING OCEANOGRAPHIC CONDITIONS IN AND
UNDER THE ICE OF THE BERING SEA

Walter Richard Lohrmann
Lieutenant, United States Navy
B.S., United States Naval Academy, 1970

A search for thermal fronts and presumed associated fine-structure near the ice of the Bering Sea was carried out using historical oceanographic data. A few weak fronts were found during the months of February to May. Strong fronts and, probably, finestructure existed in the northern Bering Sea in June. Some conclusions were drawn about the winter brine convection process.

Master of Science in
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A STUDY OF THE RELATIONSHIP BETWEEN OCEANIC
CHEMICAL MESOSCALE AND SEA SURFACE THERMAL
STRUCTURE AS DETECTED BY SATELLITE INFRARED IMAGERY

Don Alan Nestor
Lieutenant, United States Navy
B.S., United States Naval Academy, 1972

In recent years, the study of ocean fronts and eddies has become increasingly important to the U.S. Navy for they are of vital importance in understanding underwater sound transmission. From the history of satellite pictures for the area of the ocean off the central California coast, it appears that cold water which has come to the surface as a result of upwelling has become intertwined within the California Current. The persistent thermal features in the sea surface which are formed were the subject area of this study. Direct telephone contact was established with the satellite receiving station which afforded real time satellite information as to the thermal structure of the sea surface on a mesoscale. This satellite sensed thermal structure was then compared with in situ nutrient and temperature data collected on three separate cruises on board the research vessel ACANIA. A strong inverse correlation was observed between nutrient concentrations and sea surface temperature in the case of a recent

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upwelling. The nitrate to phosphate ratio ranged from 1.9:1 to 12.4:1 in this study with the highest values observed in the upwelled waters, and an overall modal value of 5:1 observed in the open ocean waters. The agreement between the in situ data and the satellite imagery was very strong and the utilization of satellite imagery was shown to be a very effective method to localize an ocean front.

FINESTRUCTURE, FRONTS AND CURRENTS IN THE PACIFIC
MARGINAL SEA-ICE ZONE - MIZPAC 78

Warren Edgar Small
Lieutenant Commander, United States Navy
B.S., Rensselaer Polytechnic Institute, 1969

Sharp vertical temperature fronts, complex temperature inversions and current patterns in the Chukchi Sea during MIZPAC 78 in July 1978 were investigated in a further effort to define the mechanisms for the formation and distribution of finestructure. In conformity with previous findings, upper and lower-layer fronts near the ice tended to be coincident in the V-shaped zones between bifurcating current streams; such fronts were not associated with significant finestructure. Previous thought would indicate that finestructure is found near wedge-like fronts. However, the situations for which this could be tested in 1978 were too few to be conclusive.

Two of the principal ice embayments, which were apparently caused by warm water streams, were found in approximately the same locations as in previous years. Upper-level current streams, deduced from the ice melt-back into embayments and from warm-water cores, appear to be bathymetrically

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steered. Both of the above mentioned bays contain temperature finestructure. In the embayment north of Cape Lisburne, the finestructure was fairly widely distributed in the southern half; in the embayment west of Pt. Barrow, the finestructure was principally near the northern ice boundary. In the central Chukchi Sea, some finestructure was found well south of the ice.

REPRESENTATION OF HYDROGRAPHIC SURVEYS AND
OCEAN BOTTOM TOPOGRAPHY BY ANALYTICAL MODELS

Alan J. Pickrell
Lieutenant Commander, NOAA
B.A., University of California at Los Angeles, 1971

Hydrographic surveys for nautical charting contain many discrete data points. Analytical models for ocean bottom topography could save computer storage and reduce the complexity of automating the nautical charting process, but they must meet stringent accuracy requirements. Polynomials, double Fourier series, finite elements, Duchon's analysis, Shepard's formula and Hardy's multiquadric analysis were investigated as possible modeling techniques. Multiquadric analysis in which the surface is represented by an analytical summation of mathematical surfaces such as cones and hyperboloids was the only method found to be suitable. An iterative method of model point selection was found to give the best results. Smooth and unambiguous junctions of adjacent models were made by using a Hermite polynomial weighted sum of overlapping areas. Highly irregular surfaces can be represented by about 20% of the original survey data points; more regular bottom topography can be represented by a smaller percentage.

Master of Science in
Oceanography (Hydrography)
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APPLICATION OF LORAN-C POSITIONING
TO HYDROGRAPHIC SURVEYING

Kurt J. Schnebele
Lieutenant Commander, NOAA
B.S., University of Washington, 1970

The possible application of hyperbolic LORAN-C as a positioning system for hydrographic surveys was investigated. It was found that the present capabilities of the system did not meet the 40 meter (drms) accuracy required for offshore surveys. The use of differential LORAN-C techniques and geodetic calibration procedures was examined. A field test was conducted in Monterey Bay, California, using a microwave positioning system to test the accuracy of the West Coast LORAN-C chain, specifically the 9940-W and Y rates. Overland propagation corrections for the test area are presented. It was found that scrupulous application of the differential technique and rigorous calibration procedures improved the absolute position accuracy of a mobile LORAN-C receiver to something less than 100 meters (drms).

Master of Science in
Oceanography (Hydrography)
September 1979

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THE EVALUATION OF DUAL BEAM
ECHO SOUNDERS IN HYDROGRAPHIC
SURVEYING

Dean Robert Seidel
Lieutenant Commander, NOAA
B.S., University of Washington, 1969

A limited area hydrographic survey was conducted in shallow water, using a launch equipped to sound concurrently with three beam widths, in order to evaluate the benefits of dual beam echo sounds. The narrow beam echo sounder has become commonplace in hydrographic surveying. This has reduced the bottom area insonified by the echo sounder's beam which decreases the probability of detecting navigational hazards. The dual beam echo sounder, equipped with a narrow and wide beam, sounding concurrently, represents a relatively inexpensive means to increase the detection capabilities, while preserving the narrow beam operation.

The wide beams detected significant peaks that were absent on the narrow beam trace. The wider hyperbolic returns of the wide beams served to emphasize the narrow beam returns over features with little horizontal extent. The narrow versus wide beam depth differences over feature peaks were found useful in isolating the peak's apex.

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Oceanography (Hydrography)
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THE TRANSPARENCY OF SELECTED U.S. COASTAL WATERS
WITH APPLICATIONS TO LASER BATHYMETRY

Maxim F. van Norden
Civil Engineer, U.S. Naval Oceanographic Office
B.S., University of Maryland, 1972

and

Steven E. Litts
Cartographer, Defense Mapping Agency
B.S., Pennsylvania State University, 1975

The operational effectiveness of airborne laser hydrography systems, considering the optical environment of the coastal waters of Oregon, Washington, and the Gulf Coast states, is examined. The best times of the year are predicted for conducting laser bathymetry, considering the temporal and spatial variability of optical properties due to seasonal effects, and charts of seasonally averaged optical measurements are given. Original formulas to convert beam attenuation coefficients and Secchi depth measurements to irradiance attenuation coefficients are included. The number of irradiance attenuation lengths to the bottom depth (K_d) are used as the indicator to estimate areas where laser hydrography systems would be successful and are shown by season and region.

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The conclusions of this thesis are that airborne laser hydrography is not practical in the coastal waters of Oregon and Washington, would be practical in limited areas of the western Gulf Coast, and would be very practical in the eastern Gulf Coast area. Along the eastern Gulf Coast, a 38,800 nmi² area, delineated by a Kd = 4 contour, is judged surveyable by laser.

COASTAL CONTROLS ON VERTICAL SOUND SPEED
DETERMINATION AND CORRECTIONS TO ECHO SOUNDINGS

David Winston Yeager
Lieutenant Commander, NOAA
B.S., Auburn University, 1970

Present methods for determining sound speed corrections for echo soundings in continental shelf areas are time-consuming and expensive. This study was undertaken to determine whether or not sound speed correctors of sufficient accuracy could be deduced from historical data.

Historical sound speed data for an east coast, shelf area indicates that temporal and spatial variability exceeds acceptable limits for sounding corrections, thus precluding the use of historical data only for corrector determination.

Examination of temperature and salinity data indicates that historical salinity values in the region are sufficiently stable to allow acceptable sound speed corrections to be made derived on the basis of in-situ temperature measurement and historically derived salinity values. Expendable bathythermograph probes are capable of meeting temperature requirements.

The constancy of the T-S relation in such regions may allow salinity determination from water temperatures alone.

Master of Science in
Oceanography (Hydrography)
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AN ANALYSIS OF REQUIREMENTS
FOR THE DEVELOPMENT OF
AN INTELLIGENCE AND COMMUNICATIONS MODEL

Gayne Alan Clifford
Major, United States Army
B.S., University of Montana, 1967

and

Michael Ken Nelson-Palmer
Captain, United States Army
B.S., United States Military Academy, 1971

This thesis represents an initial effort to define the requirements for modeling a command, control and communications (C^3) system within an army division. The ultimate goal is the development of a C^3 model which would be compatible with the STAR combat model being developed at the Naval Postgraduate School. The objectives are threefold: the development of a division level conceptual command and control (C^2) model and identification of some important modeling considerations; a description of how the intelligence perspective is developed, how it relates to the C^3 system, and a proposed methodology for modeling this process; and the development of a proposed methodology for modeling the communications networks required to support the proposed C^2 model.

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Operational Decision Systems
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TACTICAL AIR THREAT
QUERY SYSTEM DEMONSTRATION

William Arthur George, Jr.
Major, United States Air Force
B.S., Davis and Elkins College, 1965
M.S., West Virginia University, 1968

This work demonstrates an application of recent computer technology to the tactical air force intelligence field - Operations and Estimates. The demonstration integrates message handling, data manipulation, threat assessment and labeling, as well as graphic and visual displays into a battle management information system - Query AF.

Emphasis was placed on the human interface capabilities with the structured data base query system. The data base was representative of those Warsaw Pact forces envisioned to oppose the air forces of the North Atlantic Treaty Organization within the Southern Region of Europe.

A scenario of data base inquiry (query) and management was chosen from the tactical air force command and control environment. The format for the commands is a structured subset of English in the Air Force Intelligence context.

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Prompting insures the user is always aware of computer required inputs.

Query AF was primarily directed towards the capability to rapidly present, update, assess, and disseminate the air threat. Other applications are foreseen in such areas as target intelligence and force status.

INVESTIGATING SHIP-TO-SHORE C³ REQUIREMENTS
FOR THE
1990 AMPHIBIOUS ASSAULT

Mark Keir Hayden
Captain, United States Marine Corps
B.S., Southern Illinois University, 1971
M.A., Pepperdine University, 1976

This thesis investigates the command control (C²) informational requirements for the over-the-horizon (OTH) amphibious assault envisioned for the 1990s. The initial ship-to-shore (STS) surface assault in the classic amphibious assault is characterized as a system in order to identify its interacting organizational and operating elements. The relationships between these elements determine formal communications networks. From these networks emerges a command control (C²) structure. An information model is applied to this C² structure to establish an informational baseline for the classic STS system. This same procedure is then applied to the C² structure in the OTH STS system in order to identify informational requirements for the OTH assault. A comparative analysis between the informational requirements of the two STS systems highlights new essential information needs required

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for the OTH assault. These new needs are then evaluated to determine whether or not each need can be satisfied by information currently existing within the C² structure.

ISSUES IN AFLOAT COMMAND CONTROL:
THE COMPUTER-COMMANDER INTERFACE

E. J. Hurley
Lieutenant, United States Navy
B.A., University of Minnesota, 1972

This thesis examines afloat command control with emphasis on the computer-Commander interface. Emphasis is placed on command displays found in Combat Information Centers and on the bridge. The configuration and development strategy for these two areas on SPRUANCE class destroyers are examined in some detail. The planned Aegis Combat System is also discussed from the command control point of view. Several issues in afloat command control are discussed including: 1) Role of the afloat Commander and "President-to-Foxhole" communications, 2) Location of the afloat Commander in a crisis, 3) Manual backup to computerized command control systems, and 4) The Commander-Computer interface.

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A DEVELOPMENTAL COMPUTER MODEL FOR INVESTIGATIONS
OF AIR TRAFFIC MANAGEMENT PROBLEMS: A CASE
INVESTIGATING TWO DECISION STRATEGIES

John Thomas Malokas, Jr.
Major, United States Air Force
B.S., Ohio University, 1966
M.S., University of Southern California, 1973

and

Arvid Paul Pederson
Captain, United States Air Force
B.S., University of North Dakota, 1967

A computer simulation model designed to help solve regional air traffic scheduling problems was developed. Bases, mission areas, and aircraft were modeled using the simulation language SIMSCRIPT. Events in the simulation included takeoffs, departures, en routes, missions, arrivals at Initial Approach Fixes (IAFs) and landings.

To demonstrate potential use of the model, the problem of rescheduling Strategic Air Command (SAC) aircraft upon base closures was addressed. Two strategies for the diversion of such aircraft were developed, implemented and the results compared on the basis of impact on final destination bases and average aircraft airborne time. Strategy 1 entailed the

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rerouting of aircraft to designated alternate bases or to the nearest open base without constraint. Strategy 2 involved the selection of an alternate base by insuring that parking spaces and appropriate maintenance support were available.

Finally, extensions to the model and recommendations are discussed.

A FRAMEWORK FOR AN INTERACTIVE, COMPUTER-SUPPORTED,
BATTALION-LEVEL WAR GAME

Dominic Nicolosi, Jr.
Major, United States Marine Corps
B.S., University of Texas, 1968

This thesis analyzes in depth the Army's PEGASUS free-play, manual war game, and develops in detail the event-sequenced logic which comprises the battle simulation. The resulting logic has been structured to serve as a framework for the programming of an interactive, computer-supported, battalion-level war game. The game is designed for 2 players, rather than the 35-40 required in the PEGASUS manual mode, with the players role-playing the adversary force commanders. Battle results are determined stochastically, and relevant battle information is filtered and displayed to the players to enhance their tactical decision-making.

The framework is sufficiently flexible so that future weapon systems and sophisticated sensors can be incorporated into the game. Exercising this potential in future studies may provide unique insights into the processing of information and decision-making on the modern, automated battlefield.

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AN APPLICATION OF RULE-DIRECTED
INTERACTIVE TRANSACTION AGENT (RITA)
FOR THE AUTOMATED TECHNICAL CONTROL
OF THE DEFENSE COMMUNICATIONS SYSTEM (DCS)

Mark Howard Smith
Major, United States Air Force
B.S., California State University (Long Beach), 1964
M.S., University of Southern California, 1967

Historically, military technical control facilities (TCF) have performed their supervisory and control functions over communications-electronics systems by manual processes, using verbal and/or teletype conversations for coordinating with distant stations. These methods will soon be changed with the application of computers to automate many of the manual tasks and assist the technical controllers and others. One of these manual tasks, that of record-keeping and report generation, promises to yield significant manpower savings but has been deferred from implementation due to high cost and technical complexity. Accordingly, this thesis proposes a representative software program for an automatic report generator using the Rand Corporation developed production rule system, Rule-directed Interactive Transaction Agent (RITA). It facilitates the automatic entry of data into reporting formats, automatic

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generation of data into files/reports, a capability to alter report formats and file building rules, and algorithms for automated statistical analysis of data files.

DEVELOPMENT OF CLUSTER ANALYSIS METHODS
SUITABLE FOR STUDENT OPINION DATA

Joel Weston Aiken
Lieutenant Commander, United States Navy
B.S., University of North Carolina at Chapel Hill, 1969

The Naval Postgraduate School's Student Opinion Form data were subjected to study through the use of two cluster analysis techniques: (1) K-MEANS partitioning method and (2) Chernoff's FACES. Much developmental work was performed to tailor these methods to the special requirements of the data set. A thorough multivariate statistical review provided the basis for choosing optimality criteria and distance functions for use in the MIKCA (Multivariate Iterative K-MEANS Clustering Algorithm). Alterations were made to the computer code to allow the analysis to include the effect of class size on cluster membership. Use of the linear discriminant function aided in identifying variables for use in constructing features of the computer-drawn faces. This approach to the Chernoff's FACES technique shows promise but needs further

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development. A principal components analysis of the data showed it to be essentially one dimensional. Partitioning the data into four clusters shows that the scoring of the courses varies inversely with class size.

IMPACT OF U.S. NAVAL VESSEL MOVEMENTS WITHIN THE
SAN FRANCISCO BAY AREA ON NAVAL SUPPLY CENTER OAKLAND'S
TRANSPORTATION SYSTEM

Gary J. Angelopoulos
Lieutenant Commander, Supply Corps, United States Navy
B.S., Philadelphia College of Textiles and Science, 1966

This simulation is a versatile SIMSCRIPT program designed to determine transportation destination fluctuations caused by U.S. Naval Vessel movements in the San Francisco Bay Area. The through-put model was designed to investigate the relationship between the annual number of delivery trips and the average delivery delay. Numerous parameters have been taken into consideration in the generation of a model that is as realistic as possible. Requirement priority, item quantity, customer movement, ultimate destination, and process time are the significant random variables which have been assigned probabilistic distributions. In view of the simulation results, it would appear that actual modification of the current shipping parameters may yield substantial transportation savings.

Master of Science in
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PREDICTION OF NAVY E-4 TEST PASSERS

Edwin Franklin Beach
Lieutenant, United States Navy
B.S., New Mexico Institute of Mining and Technology, 1971

This thesis applies hierarchical clustering and quadratic discriminant function techniques to the problem of predicting E-4 test passers and non-test passers (including non-test takers) in the Navy. The biographic data base includes items such as test scores and education to serve as separators and predictors in the techniques.

The clustering of rates permitted accumulation of personnel in the lightly staffed ratings into similar groups of substantial size, was objective, and may be useful for purposes other than the present one. The discriminant analysis produced correct classification rates of about 60 to 70 percent based on the data at hand.

Master of Science in
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Analysis
September 1970

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THE USE OF THE EMPIRICAL PROBABILITY
GENERATING FUNCTION TO ESTIMATE THE
NEYMAN TYPE A DISTRIBUTION PARAMETERS

Harold Ralph Bishop
Lieutenant, United States Navy
B.A., San Jose State College, 1971

The Maximum Likelihood estimators for the Neyman Type A distribution parameters are very difficult to compute. In this thesis, the Empirical Probability Generating Function is used to provide estimators that are easier to compute and have asymptotic efficiency at least as high as 97% of that for the Maximum Likelihood estimators over most of the parameter space considered. The estimators found by this method are consistently better than the Method of Moments and the Method of Zero Frequency estimators with respect to asymptotic efficiency. The considerations of preference in using one method over another are discussed.

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A DYNAMIC STUDY OF FACTORS IMPACTING ON THE
TANK COMMANDER'S TARGET SELECTION PROCESS

Glenn Joseph Broussard
Captain, United States Army
B.S., United States Military Academy, 1970

This thesis presents a dynamic study of the target selection process of the current generation of US Army tank commanders. Eleven relevant factors were investigated utilizing a 1/16 Replication of the 2^{11} factorial experimental design. The development and basic characteristics of this experimental design are discussed as an introduction to the actual experiment conducted. The methodology used in conducting the experiment as well as the major effort devoted to establishing the data base are presented prior to the discussion of the analysis. Factors and interactions impacting significantly on the target selection process were identified using analysis of variance techniques and an interpretation of these is given. A target selection model based on a best fit regression on the data is proposed as a viable alternative to those target selection models presently used in existing high resolution combined arms simulation models.

Master of Science in
Operations Research
March 1979

Co-Advisors: S. H. Parry
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AN AIR-TO-GROUND AND GROUND-TO-AIR
COMBINED ARMS COMBAT SIMULATION
(STAR-AIR)

William John Caldwell
Captain, United States Army
B.A., St. John's University, 1969

and

William Daniel Meiers
Captain, United States Army
B.A., LaSalle College, 1968

This thesis represents a stochastic simulation model of ground-to-air and air-to-ground combat within the combined arms ground combat environment. The tactics represented, model capabilities and input requirements are explained in detail.

A simulated battle is presented with a detailed explanation of the output to enable the reader to appreciate the potential applications of the model. This model represents an expansion of STAR, "Simulation of Tactical Alternative Responses," developed by Wallace and Hagewood [Ref. 15] to include air and air defense play.

Master of Science in
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SEAGUARD:
A GENERAL PURPOSE ANTISHIP MISSILE
DEFENSE COMPUTER SIMULATION

Alexander Joseph Callahan, Jr.
Lieutenant, United States Navy
B.A., Jersey City State College, 1973

SEAGUARD is an event store computer simulation of the antiship missile defense of a naval task force using surface to-air and air-to-air missiles. It simulates the interaction between the antiship missiles and the defensive missiles of a task force at sea in a non-jamming environment. Using SEAGUARD, the military analyst can measure the relative effectiveness of alternative defensive dispositions or alternative forces. SEAGUARD was designed to be general in order to facilitate the analysis and avoid the use of a large or extremely detailed data base.

Master of Science in
Operations Research
March 1979

Advisor: E. F. Roland
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PSYCHOLOGICAL, SOCIAL AND ATTITUDINAL VARIABLES
ASSOCIATED WITH INFANTRY COMBAT EFFECTIVENESS
AND THEIR RELATION TO WOMEN

Phillip Karl Carreon
Captain, United States Marine Corps
B.A., The University of California, Riverside, 1971

Currently, consideration is being given to opening up combat occupations to women. This thesis reviewed relevant literature in the fields of psychology and sociology, and found that several individual and group variables (body dimensions, personality, activity level, and social cohesion) were related to adequate combat performance. The results of the literature search suggest that women may not be as well suited to combat as are men.

In addition, 55 graduate students were asked to rate 51 jobs as to suitability for women. The results of the questionnaire were analyzed using multidimensional scaling and cluster analysis. The analysis resulted in the identification of two criteria that appear to have been used by the subjects to rate the jobs: traditional masculine/feminine occupations, and the degree to which a job was or was not physically demanding.

Master of Science in
Operations Research
June 1979

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Research

MEASURES OF PERFORMANCE FOR A MECHANIZED
INFANTRY PLATOON AND SQUAD IN THE ACTIVE DEFENSE

Roland Walter Carter
Captain, United States Army
B.S., United States Military Academy, 1970

Without a data base, unit commanders and training managers in the US Army are left to plan their training based on what they perceive as their unit's weaknesses while analysis agencies are helpless to assist in providing meaningful direction to training efforts. With a data base drawn from ARTEP or SQT type evaluations, analysis agencies could model both the hardware parameters associated with equipment and the human parameters associated with unit or individual performance. Such modelling efforts could provide results which would be helpful in measuring the cost effectiveness tradeoffs associated with various levels of unit or individual training.

The purpose of this study is to explore what data should be collected during Army training exercises in order to facilitate analysis through combat models. More specifically, this

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thesis will examine a Mechanized Infantry Platoon and Squad in the Active Defense and recommend measures of performance which are representative of the various functional areas which make up the Active Defense. Data representative of these measures of performance could then theoretically be used to accomplish analysis of training alternatives as previously discussed.

MODELS FOR CALCULATING MULTIPLE ROUND
HIT PROBABILITY WITH 4 BOMBS

Ok Hwan Cha
Major, Republic of Korea Air Force
B.S., Republic of Korea Air Force Academy, 1969

Models for calculating multiple round hit probability (the chance of at least one hit) with 4 bombs on a circular target are constructed by computer simulation. Pattern firing and artillery registration are compared to determine which firing method is optimal. It is proved neither one is optimal. Therefore, another method called modified artillery registration is developed. The basic idea of modified artillery registration is feed back superimposed on a pattern. This method always gives higher probability than the former two methods.

Master of Science in
Operations Research
March 1979

Advisor: Alan R. Washburn
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METHODOLOGY FOR EVALUATION OF
AIR ARMAMENT PLANNING

Chang Song Chon
Lt/Col, Republic of Korea Air Force
B.S., Republic of Korea Air Force Academy, 1968

This thesis considers the problem of allocating tactical aircraft to missions in conventional air-ground operations. Several analytical models of increasing complexity are proposed for the evaluation of such air-war strategies. Since the broad mission of tactical airpower is to support the ground war, these models all represent the ground battle in some sort of aggregated fashion.

Master of Science in
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March 1979

Advisor: James G. Taylor
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A METHODOLOGY FOR IMPROVING THE PERFORMANCE OF A TAOC

Paul Frederick Cibuzar
Captain, United States Marine Corps
BAero. Eng., University of Minnesota

This research effort suggests a methodology whereby efficiency of a United States Marine Corps tactical air operations center (TAOC) may be improved. The research:

(1) defines an optimal organization for the air control team (ACT) which operates the TAOC,

(2) defines each air control team member's (ACTM's) job, duties, tasks and subtasks which support the ACT's organization and maximize each ACTM's performance, and

(3) suggests systems which should be integrated into the present TAOC (ITAOC) to increase the TAOC's capabilities.

Master of Science in
Operations Research
September 1979

Advisor: D. E. Neil
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THE DISTRIBUTION OF THE MINIMUM DISTANCE
BETWEEN A RANDOM TARGET AND UNITS PATROLLING
ALONG A LINE

Joseph Dallas Clarke IV
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1966

The probability distribution of the minimum of the distances from a randomly occurring trouble spot to n carriers patrolling along a line of length L is analyzed. Two approximations, a Poisson process and a fixed lattice of equally spaced points, which bound the analytic model are developed and their usefulness and limitations are discussed. It is hypothesized that a two-dimensional Poisson field and a two dimensional lattice of fixed points will form upper and lower bounds for the more algebraically tedious two-dimensional area patrol model. The hypothetical bounding distributions are developed for n units patrolling an area. Finally a one-dimensional radius of influence model is developed which quantifies the contribution that the effective operational radius of a carrier airwing makes to the initial minimum distance analytic model.

Master of Science in
Operations Research
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Advisor: D. Barr
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IMPROVED CONFIDENCE INTERVALS FOR THE RATIO
OF THE VARIANCES AND STANDARD DEVIATIONS
FROM TWO NORMAL POPULATIONS

Jeffrey Warren Clouse
Captain, United States Army
B.S., Ohio State University, 1972

Shortest confidence intervals for the ratio of two variances of normal populations are found as superior alternatives to the widely used equal tails confidence intervals. Extensive tables of high precision are presented which enable the user to easily construct shortest confidence intervals for the ratio of two variances, the ratio of two standard deviations and the shortest unbiased confidence interval for the ratio of two variances. Characteristics and improved performance of the alternative confidence intervals are discussed in detail and illustrated graphically, with an emphasis on the optimal distribution of complementary tail area between the upper and lower tails.

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Operations Research
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Advisor: R. R. Read
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AN EXAMINATION OF TWO FORMAL SCHOOL INITIAL SPECIALIZED
TRAINING PIPELINES WITH RESPECT TO RETENTION

Norbert Anthony Commons, Jr.
Lieutenant Commander, United States Navy
B.A., University of Texas, 1967

This thesis examines two formal school initial specialized training pipelines in order to determine if the present distribution of personnel in these pipelines could be modified to yield a higher retention rate. Over 80 percent of bootcamp graduates go directly to an initial specialized training "A" school while only about 3 percent take the delayed school pipeline and return to "A" school after having been to a fleet assignment following bootcamp. After making an adjustment to account for the loss that occurred during this time delay for the delayed school pipeline, a regression analysis was done to determine the effect of certain demographic characteristics on retention. The regression was then used in combination with the loss adjustment to predict the marginal retention rate for individuals shifted from the direct to the delayed pipeline.

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March 1979

Advisor: J. K. Hartman
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Research
Department

It was found that marginal retention rate could be increased nearly 50 percent by greater utilization of the delayed training pipeline and at a significant reduction in training load. Such a shift would also result in a more preferable manning profile in the fleet because it produces more untrained sailors with less than one year experience where presently shortages result in "A" school graduates being initially assigned menial tasks outside their specialty.

EVALUATION OF A PROPOSED MODIFIED
LOG-GAMMA CONFIDENCE BOUND METHOD
FOR FLEET MISSILE SYSTEM RELIABILITY

Peter Allen Craig
Lieutenant, United States Navy
B.S., Marquette University, 1973

A statistical method is evaluated to determine its accuracy for estimating lower confidence bounds on system reliability of a mixture of missile configurations using component data. Monte Carlo simulations are used to establish the accuracy of these bounds.

Master of Science in
Operations Research
September 1979

Advisor: Max Woods
Operations Research
Department

AN ANALYSIS AND FORECAST OF THE SUPPLY OF
FIRST TERM ENLISTEES TO THE UNITED STATES MARINE CORPS

Paul Parsons Darling
Major, United States Marine Corps
B.A., Dartmouth College, 1974

Two distinct analytical techniques were used to develop models in order to forecast monthly first term regular enlistments in the United States Marine Corps. A multiple regression model was derived based on its compatibility with a theory of occupational choice, the intuitive appeal of the explanatory variables, the past literature of manpower supply, and the statistical significance of each variable's impact on monthly enlistments. A second model was developed by applying the Box-Jenkins methodology to the time series of monthly enlistments spanning the period from July 1973 to June 1978. As a further refinement the residuals from the multiple regression equation were treated as an original time series and the Box-Jenkins technique applied to them. Then the two models were combined and forecasts calculated.

Master of Science in
Operations Research
March 1979

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Administrative
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Department

A MODEL TO DETERMINE THE
NUMBER OF WEAPONS REQUIRED FOR THE
ROYAL NORWEGIAN NAVY IN ITS ANTI INVASION TASK

Jan Henrik Eriksen
Lieutenant-Commander, Royal Norwegian Navy

When buying a weapon system, one of the difficult problems is to decide on the number of weapons to buy. This study attempts to gain some insight into this problem area by building a model of an invasion situation. The scenario is chosen to resemble a Red force attack being opposed by Norwegian naval units. Most of the conclusions have been drawn on the basis of parametric studies. For the effectiveness of Norwegian defense the results stress the importance of Command, Control and Communications (C^3), and the ability to select good attacking positions. The model will have to be exercised in a classified environment before specific quantitative conclusions can be drawn.

Master of Science in
Operations Research
September 1979

Advisor: D. P. Gaver
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Department

RELIABILITY CONTROL MODEL FOR
STORED ITEMS REQUIRING REWORK

Paulo Antonio Ferreira
Lieutenant Commander, Brazilian Navy
B.S., Naval Postgraduate School, 1978

An application of control theory to an administrative problem is given for the case of a system of stored items which are periodically reworked to improve their reliability. Expressions are developed for the final value of the reliability when the system is stable and the limits of stability are found. A Kalman filter is used in the control model to obtain an estimation of the item reliability when there are random errors in the measurement and in the rework process. An extension is done for more than one dimension for systems composed of subsystems in series, parallel or a combination of both. A procedure for an optimal sequence of levels of rework is found in the sense of optimizing a linear combination of several performance measures. Numerical examples are presented to demonstrate the use of the several expressions.

Master of Science in
Operations Research
December 1978

Advisor: G. F. Lindsay
Operations Research
Department

ATHENA: A SYSTEM TO INTERACTIVELY ANALYZE LARGE
SCALE OPTIMIZATION MODELS

Panagiotis Ioannou Galatas
Captain, Hellenic Army
B.S., Military Academy of Greece, 1965
M.S., Highest School of Economic Science of Athens, 1976

The analysis of the solutions of large-scale optimization models is very difficult without computer aids because typical outputs may exceed 40,000 lines. A computer system to allow efficient storage and interactive analysis of the solution file was designed and implemented in FORTRAN. This system, called ATHENA, has been initially designed for problems with up to 30,000 rows and columns; tests show the system has fast response time for these large problems. A description of the system, its data structures and commands as well as a user's manual is included.

Master of Science in
Operations Research and
Master of Science in
Computer Science
March 1979

Advisor: Gordon Bradley
Computer Science
Department

INFORMATION PROCESSING AS A FUNCTION OF PRESENTATION RATE

Gunadi Gandi Gan
Major, Indonesian Navy

An individual's information processing capability is a function of many variables - stimulus frequency, redundancy, stimulus clarity and practice. This thesis examines the effect of varying stimulus presentation rate: 1) from a low rate through a high rate and back to a low rate again and, 2) from a high rate through a low rate and back again to the high rate. The four randomly presented visual stimuli were equally probable.

Performance, expressed as the rate of information transmission was observed (for twenty-three participants) in the key-pressing task on the RATER (Response Analysis Tester). By limiting the subject to only one response per stimulus, the number of correct responses was the rate of information transmitted. The results confirmed the hypotheses, i.e., the rates of information transmitted depended on the rate of information

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presentation ($p < .001$). The average information transmitted in the increasing presentation rate was significantly higher than in the decreasing presentation rates, irrespective of the sequence of presentation (Low High Low or High Low High).

AN APPROACH TO THE PROBLEM OF
MEASURING SAFETY PERFORMANCE

George Milt. Germanos
Lieutenant Commander, Hellenic Navy
Graduate of Hellenic Naval Academy, 1961

A literature survey concerning the problem of measuring safety performance was accomplished with primary emphasis to the problem of evaluating occupational injury and illness safety performance. Having accomplished this survey a new methodology for measuring occupational safety performance is proposed based on "cost" criterion. Finally an analysis of real safety occupational data is accomplished since analysis of safety data is considered to be a basic step of the proposed methodology.

Master of Science in
Operations Research
September 1979

Advisor: D. E. Neil
Operations Research
Department

COMMUNICATIONS/ELECTRONIC WARFARE MODULES FOR
SIMULATION OF TACTICAL ALTERNATIVE RESPONSES (STAR)

William Albine Haislip Jr.
Captain, United States Army
B.S., United States Military Academy, 1970

This thesis presents stochastic simulation modules that represent the communications process within the AIM battalion and the hostile electronic warfare activities that are used against those communications. These modules were designed for use with the Simulation of Tactical Alternative Responses (STAR) Model. Assumptions and algorithms for simulation of the point-to-point tactical FM voice communications process, retransmission through relays, frequency changes, net calls, and the passage of detection information within a platoon are discussed. Algorithms and assumptions for the hostile radio interception, radio direction finding and jamming processes are also discussed. The results of employment of these routines under varying conditions are presented and statistically analyzed. Conclusions resulting from the analysis are presented and potential future applications and expansions of the modules are discussed.

Master of Science in
Operations Research
March 1979

Advisor: Arthur L. Schoenstadt
Department of
Mathematics

A TWO-DIRECTIONAL TARGET OPTIMIZATION MODEL

Gregory R. Hamelin
Lieutenant, United States Navy
B.S., United States Naval Academy, 1972

This paper presents an algorithm for computing the optimal target path for two aircraft traversing a target area from different directions. There are constraints on the maneuverability of each aircraft which prohibits it from attacking every target. The algorithm chooses a subset of targets whose destruction will yield maximum value to the attacking force. The basis of the algorithm is the branch and bound method, with upper bounds computer by dynamic programming. Several variations are considered, such as payload limit, an increased number of aircraft from each direction, and a three-directional attack. An example problem is solved using the basic model.

A FORTRAN IV computer program is included. Computation time versus problem characteristics is discussed.

Master of Science in
Operations Research
March 1979

Advisor: Gilbert T. Howard
Operations
Research
Department

ACCURACY AND REPEATABILITY INDICES
FOR JOINT OIL ANALYSIS PROGRAM DATA

Douglas Carlton Hatcher
Lieutenant Commander, United States Navy
BSEE, Purdue University, 1967

This thesis examines spectrometric oil analysis data in an attempt to construct tables of statistical estimates for use in evaluating a laboratory's performance individually and in comparison to a control laboratory. Tables of estimates were obtained from data provided by twenty-six laboratories.

Master of Science in
Operations Research
September 1979

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Operations Research
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A PROCEDURE FOR DETERMINING
BENEFITS OF LIFESAVING
FOR COAST GUARD
SEARCH AND RESCUE PROGRAMS

Timothy William Hylton
Lieutenant, United States Coast Guard
B.S., United States Coast Guard Academy, 1974

A procedure is developed that places a value on Coast Guard efforts in lifesaving. The value is obtained for use in cost-benefit analysis of new programs. The procedure derives a dollar value for lifesaving by examining the potential changes in risk levels that are introduced by new Coast Guard programs. This value is the sum of three separate components. The first two components are derived by the use of accounting methods and encompass the productivity and external losses brought on by the death of an individual. The third component is the value that an individual places upon his own life given a change in risk levels for a particular activity. This value is computed using willingness to pay procedures which utilize subjective measures of risk change values through interview

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techniques. These three components are combined and then applied to the Coast Guard problem of valuing changes in risk in the marine environment.

AN ANALYSIS OF SELECTED ARMY PROMOTION BOARD RESULTS

Gerald Lee Jenkins
Captain, United States Army
B.S., University of Wyoming, 1969

This thesis presents a review of recent Army officer professional development and an analysis of selected promotion board results. The review consists of descriptions of the Officer Personnel Management System (OPMS) and the pre-OPMS system, a comparison of the two systems, and the reasons for the change over to OPMS. From this review the following question is developed: Is OPMS meeting its stated goals through promotions? To answer this question, two Lieutenant Colonel promotion lists are selected for analysis. The analysis consists of a contingency table analysis and individual tests for the difference of proportions for each specialty listed as over or under aligned at the time of the convening of the promotion board. The analysis shows that promotion under OPMS is not alleviating specialty alignment problems for the lists analyzed. To remedy this specialty alignment problem, a two-step course of action of providing guidance to promotion boards is recommended.

Master of Science in
Operations Research
March 1979

Advisor: Paul R. Milch
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Research
Department

AGGREGATION OF MEASURES OF EFFECTIVENESS WITH
CONSTANT SUM SCALING METHOD AND MULTIPLE REGRESSION

Hyung Bae Kim
Lieutenant Colonel, Republic of Korea Army
B.S., Korean Military Academy, 1963

This thesis explores a method of aggregating the measures of effectiveness of a weapon, the constant sum method and multiple regression are used to develop a functional relationship between system effectiveness and system characteristics. As an example, a study of a tank weapon system was conducted with data from the U.S. Army Armor School. It was concluded that the aggregation method is feasible, and that for the tank system studied, the reciprocals of system characteristics give a good estimating equation for measuring tank system effectiveness.

Master of Science in
Operations Research
March 1979

Acvisor: G. Lindsay
Operations
Research
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THE EFFECTS OF HELICOPTER ACCELERATION ON THE
PROBABILITY OF HIT BY A TANK MAIN GUN

Thomas Ripley King
Captain, US Marine Corps
B.A., Centre College of Kentucky, 1971

Main battle tanks use a "linear lead fire control solution" to determine lead angle when engaging moving targets. The lead angle is based on sensed target speed, range, and projectile time of flight. Since the fire control solution is based on constant speed, the tank is not capable of compensating for displacement due to target acceleration. This thesis develops an analytical model to predict the relative effectiveness of various helicopter acceleration maneuvers in minimizing the probability of hit by a tank main gun. The unmeasured target displacement due to acceleration is incorporated as a main parameter in the model and an expression is developed to compute the probability of a hit against a targeted helicopter. Hit probabilities are computed for several acceleration profiles and the results are compared with the probability of hit against a helicopter that is flying at a constant speed.

Master of Science in
Operations Research
June 1979

Advisor: P. R. Milch
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AN EVALUATION OF THE IMPACT OF THE OPERATIONAL
PROPULSION PLANT EXAMINATIONS UPON CASUALTY REPORTS

Francis Joseph Klingseis
Lieutenant, United States Navy
B.S., United States Naval Academy, 1973

Operational Propulsion Plant Examination (OPPE) scores were analyzed to determine those examination areas (Materiel, Administrative, Crew Knowledge, Casualty Control, Boiler Flexibility) which appear more difficult to pass than the others. The number of Casualty Reports (CASREPTS) the ships experienced from six months before the OPPE to six months after the OPPE were analyzed to determine the association between equipment failures and the OPPE. Generally, non-engineering department CASREPTS have higher frequency of occurrence after OPPE than before. Fleet assignment, ship type (cruiser, destroyer, frigate), month of CASREPT occurrence, type of CASREPT (engineering or non-engineering), time of CASREPT occurring in a given month were accounted for. Implications are drawn and changes in policies are suggested for ships preparing for the OPPE.

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Operations Research
March 1979

Advisor: R. Read
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Research
Department

A COST/EFFECTIVENESS COMPARISON OF THREE
CLOSE AIR SUPPORT AIRCRAFT

Chong Mu Ko
Major, Republic of Korea Air Force
B.S., Republic of Korea Air Force Academy, 1969

The Republic of Korea Air Force (R.O.K.A.F.) should consider procurement of a specialized close air support (C.A.S.) aircraft to destroy tanks, artillery batteries and bunkers. North Korea has superior quantities of tanks and artillery. This thesis makes a cost/effectiveness analysis of three C.A.S. aircraft candidates, the A-10A, A-7D, and A-7 Derivative. By means of a compound events probabilities model, a comparison is made of the three aircrafts' capabilities in performing a specific set of missions with a given effectiveness level. The aircraft fleet that has the lowest 15 years life cycle cost is then determined lastly, the effects of variation in the target array is analyzed to demonstrate the sensitivity of the findings to variations in the assumed target value. It is shown that the A-10A is the preferred C.A.S. aircraft among the three candidates.

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Operations Research
March 1979

Advisor: P. M. Carrick
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SIMULATION OF DYNAMIC TACTICAL ROUTE SELECTION WITH
APPLICATION IN THE STAR MODEL

James Stephen Kramer
Captain, United States Army
B.A., Iowa State University, 1972

This thesis presents a deterministic simulation model for the dynamic selection of offensive tactical movement routes. The factors which influence route selection are identified, and the performance objectives that are to be optimized are defined. Alternative modeling concepts are investigated, and one method is selected for implementation. The organization, data structure, and computational aspects that were developed to implement this concept are explained. A FORTRAN program listing of the route selection model is presented. The test situations in which the model was exercised are documented, and the conclusions resulting from these tests are presented. Potential expansions and applications of this dynamic route selection model are also discussed.

Master of Science in
Operations Research
March 1979

Advisor: S. H. Parry
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DEVELOPMENT OF INFORMATION THEORY CONCEPTS AND
EQUATIONS FOR HUMAN MENTAL PROCESSING

Jose Alberto Martinez
Captain, Peruvian Air Force
B.S., Peruvian Air Force Academy, 1972

This report presents the research and analysis accomplished in order to develop new concepts of information theory and new equations that could allow the researcher to compute with more precision, the amount of information processed by a subject during the execution of a sequential mental task.

A very sophisticated piece of equipment was used in order to simulate a sequential task of military nature. The results of the experiment proved that new equations to compute the amount of information processed should be used when the task to be performed implies that the operator has to go through different levels of "thinking" before he reacts to a stimulus.

Master of Science in
Operations Research
March 1979

Advisor: G. K. Poock
Operations
Research
Department

OPTIMAL FIVE-YEAR PLANNING USING MIXED-INTEGER
LINEAR PROGRAMMING THREE MODELS IMPLEMENTED
FOR NAVAL AIR TEST CENTER

Christos Efthimios Mavrikas
Major, Hellenic Army
B.S., Military Academy of Greece, 1963
M.S., National Technical University of Athens, 1974

The application of Linear Programming (LP) models in the resource allocation process of organizations with workload partitioned in discrete projects was examined by developing two integer and one mixed-integer, large-scale LP models. These models have been implemented to seek optimal five-year project plans for Naval-Air-Test-Center (NATC).

In allocating resources, the optimal solution is the solution which yields the 'best' value, or the most desirous return to the organization; this return can also be called the solution benefit. Solutions should be feasible in terms of the limitations on the availability of the resources by location and by time.

Master of Science in
Operations Research and
Master of Science in
Computer Science
March 1979

Advisor: G. G. Brown
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MODEL-1 and MODEL-2 use a static workforce distribution and MODEL-3 allows limited reallocation of personnel to improve the solution; when reallocation is ordered, both reduction in labor efficiency and a penalty in the project benefit are introduced by MODEL-3. All three models have been implemented successfully using real data from NATC. The implementation is described and the solutions are compared with the solution given by NATC without models. A proposal is made to use the models in practice so that NATC can achieve more optimal five-year plans and also to improve the existing workforce distribution by location and by time.

IMPROVING RADAR AND SONAR OPERATOR
PERFORMANCE: A VIGILANCE REVIEW

Robert Ernest Mayo
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1969

Since the widespread introduction of radar and sonar to the fleet in World War II, man's inadequacy as a monitor has become all too apparent. He gets distracted. He gets bored. He misses targets.

The phenomenon which describes man's performance in monitoring tasks is called vigilance. This thesis reviews the current literature on vigilance. It examines the impact of signal, task, and environmental variables plus individual differences on monitoring performance. For the most part, conclusions represent the consensus among researchers. Administrative procedures, such as watch rotation and supervisory techniques, plus hardware/software modifications, such as alarms and artificial signals, are proposed as possible solutions to the vigilance problem.

Master of Science in
Operations Research
September 1979

Advisor: D. E. Neil
Operations Research
Department

EXPERIMENTAL DESIGN CONSIDERATIONS
IN THE OPERATIONAL TEST AND EVALUATION
OF AIRBORNE ACOUSTIC PROCESSING SYSTEMS

Donald James McClure
Captain, Canadian Armed Forces
B. App. Sc., University of Windsor, 1972

The successful evaluation of airborne acoustic processing systems requires the use of well planned experimental designs. A good design will enable the evaluator to report results which can be used to predict system performance in a wide range of operating environments. A method for determining detection performance from the results of a controlled experiment is developed. An example of the procedure for a hypothetical system is presented with a suggested method for comparing forecast detection performance with in-flight test results.

Master of Science in
Operations Research
September 1979

Advisors: F. R. Richards
R. H. Bourke
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Department

PREDICTION INTERVALS FOR
FIRST ORDER MARKOV PROCESSES

T. S. Murthy
Lieutenant Commander, Indian Navy
B.Sc(Hons)., Utkal University, 1963
B.Tech(Hons)., I I T Kharagpur, 1966

Prediction Intervals for future observations in serially correlated samples from a normal distribution are derived. The results are extended to predict a future observation in a linear trend model. The properties of the prediction intervals are examined.

Master of Science in
Operations Research
September 1979

Advisor: T. Jayachandran
Department of
Mathematics

A CONTAINER STUFFING ALGORITHM FOR
RECTANGULAR SOLIDS WHEN
VOIDS MAY BE REQUIRED

Napoleon Bonaparte Nelson III
Lieutenant Commander, Supply Corps, United States Navy
B.S., Georgia Institute of Technology, 1966

An algorithm was designed to load different sized rectangular solids into a container. It allows the option of forming pallets of material before loading the container. The algorithm will permit loading of cargo that may or may not be used as load bearing support for other cargo. Cargo is allowed to be rotated if desired to improve efficiency and both the pallets and the shipping container may contain "voids" or volumes in which cargo is not permitted. A test of the algorithm utilizing an actual cargo list showed two-dimension (area) efficiencies of 95% and three-dimension (volume) efficiencies of 89%.

Master of Science in
Operations Research
September 1979

Advisor: Alan W. McMasters
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EXPERIMENTAL AVAILABILITY TABLES FOR
FINITE SPARES BACKLOGS

Park, Kil Ju
Lieutenant, Republic of Korea Navy
B.S., Republic of Korea Military Academy, 1973

Experimental tables of availabilities at time t are obtained for a device whose performance is described by an alternating renewal process with a finite number of failure-renewal cycles, corresponding to having a finite spares backlog. Failure and repair rates are assumed to be constant, and attention is restricted to cases in which the repair rate is larger than the failure rate.

Master of Science in
Operations Research
March 1979

Advisor: J. D. Esary
Operations
Research and
Administrative
Sciences
Department

A STUDY OF SURFACE WARFARE JUNIOR OFFICER RETENTION

Jimmy Wayne Parker
Lieutenant Commander, United States Navy
B.Ch.E., University of Louisville, 1968

The retention of naval officers is often assumed to be independent of the economic circumstances of the individual. This study makes use of classical, normal linear least squares regression techniques and recent surface warfare officer retention data in an attempt to determine whether the retention of lieutenants can be related to a set of economic control variables. In the pursuit of that goal, several previously-developed econometric models which describe first-term enlisted retention are modified for use on officer data and compared for goodness of fit.

Master of Science in
Operations Research
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Advisor: Paul M. Carrick
Department of
Operations Research

THE ASSOCIATION OF COLORS WITH PURE TONE FREQUENCIES
AMONG MILITARY OFFICERS OF THREE NATIONALITIES

Henry A. Pyzdrowski, Jr.
Captain, United States Marine Corps
B.S., United States Naval Academy, 1970

This experiment was designed to determine whether there was a natural association of color and pitch that was common among military officers of three nationalities. Fifty military officers were used as subjects. The analysis of experimental data was to produce additional evidence for information display design employing the senses of audition and vision in presenting redundant information. The data analysis indicated that the amount of transmitted information was less than one bit when the maximum possible was 2.32 bits. There was a significant difference in the amount of transmitted information per nationality though no learning trends among nationalities were observed. The Korean subjects' average number of trials to criterion was significantly different from the Americans' but not from the Indonesians'. A significant association of selected color combinations and tones existed for the Indonesian and American subjects.

Master of Science in
Operations Research
March 1979

Advisor: J. Arima
Operations
Research
Department

GENERATION OF NON-HOMOGENOUS POISSON PROCESSES BY THINNING:
PROGRAMMING CONSIDERATIONS AND COMPARISON WITH
COMPETING ALGORITHMS

John Scott Redd
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1966

In this thesis we study several computer implementations of the thinning algorithm, a new method for generating non-homogenous Poisson processes. The method, developed by Professor P. A. W. Lewis, Naval Postgraduate School, Monterey, California, and G. S. Shedler, IBM Research Laboratory, San Jose, California, is valid for Poisson processes with any given intensity function. The basic thinning algorithm is modified to exploit several refinements which reduce computer execution time by approximately one-third. The basic and modified thinning programs are compared with a previous algorithm of Lewis and Shedler, the Poisson decomposition and gap-statistics algorithm, which is easily implemented for Poisson

Master of Science in
Operations Research
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processes with intensity functions of the form $\exp(a_0 + a_1 t + a_2 t^2)$. The thinning programs are competitive in both execution time and computer memory requirements. One program implementation generates the events in a Poisson process one at a time; another program implements the algorithmic refinements which improve efficiency.

TANK PLATOON IN THE DEFENSE: MODEL FOR ANALYSIS

Henry John Schroeder, III
Captain, United States Army
B.S., United States Military Academy, 1969

A model of the tank platoon in the defense of a pre-selected battle position is presented. Time sequential crewman level tasks are integrated into crew level and platoon level aggregate tasks. The model shows the crewman's reaction to his environment and his interaction with other crewmen and equipment.

A portion of the model is task analyzed to develop platoon measures of performance in the defense. Factors relevant to each measure are also developed.

The model structure and contextual task analysis can be applied to improve training and doctrine literature, institutional and unit training programs, training measurement and analysis, and existing computer simulations.

Master of Science in
Operations Research
March 1979

Advisor: S. H. Parry
Operations
Research
Department

AN EXAMINATION OF THE CONCEPTUAL BASIS OF THE
ATTRITION PROCESSES IN THE INSTITUTE FOR DEFENSE
ANALYSES GROUND-AIR MODEL (IDAGAM)

Stephen Lewis Shupack
Captain, United States Army
B.S., Polytechnic Institute of Brooklyn, 1970

The purpose of this thesis is to review the attrition methodology for ground combat in the Institute for Defense Analyses Ground-Air Model (IDAGAM), a principal model used in military analysis. The conceptual basis of IDAGAM is discussed and the principal constructs of the ground attrition processes contained within the model are highlighted. A clear picture of IDAGAM battlefield attrition is presented with emphasis on explaining the differences between various attrition options. A brief discussion concerning air attrition equations and the interdiction of reserve divisions is given. The goal of this effort is to present a clear conceptual picture of how battlefield attrition is represented and thus to enhance the general user's awareness of the conceptual basis of IDAGAM so that better model inputs can be prepared and the model can be used more effectively in support of analysis.

Master of Science in
Operations Research
March 1979

Advisor: J. G. Taylor
Operations
Research
Department

A SYSTEMS APPROACH TO INTEGRATING
THE H-46 OPERATIONAL FLIGHT TRAINER (OFT)
DEVICE 2-F11/7B INTO THE H-46 FLIGHT
TRAINING PROGRAM

Robert Dale Smith
Lieutenant, United States Navy
B.S. California State University at San Jose, 1972

The increasing annual costs associated with helicopter fleet replacement squadron training, along with the shrinking fiscal budgets, has necessitated the use of flight simulators as integral parts of many flight training programs. The realization that the simulator coupled with a well designed training program provides a training platform with more training potential than the traditional approach (aircraft), is also a factor which has stimulated the increased use of flight simulators. With the introduction of device 2-F117B the Navy H-46 community will have a state-of-the-art simulator to employ in their training programs. With this introduction, the training program must become responsive to factors influencing training effectiveness and transfer of training.

Master of Science in
Operations Research
September 1979

Advisor: Douglas E. Neil
Operations Research
Department

This report explores factors influencing training effectiveness and applies them to a proposed flight training syllabus for the H-46 fleet replacement squadrons.

A SYSTEMS APPROACH TO INTEGRATING
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Master of Science in
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Operations Research
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Master of Science in
Operations Research
September 1979

Advisor: Douglas E. Neil
Operations Research
Department

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OPERATIONAL LANCHESTER-TYPE MODEL
OF SMALL UNIT LAND COMBAT

Josef Smoler
Major, Israel Army
B.S., Technion-Israel Institute of Technology, 1973

This thesis describes an operational Lanchester-type model of small-unit land combat. It is a time sequenced, deterministic, battalion-level, force-on-force model implemented on a digital computer. In comparison with other existing battalion level analytic models, this model contains some new modelling ideas about detection and fire allocation policies.

Master of Science in
Operations Research
September 1979

Advisor: J. Taylor
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A TWO-SIDED FIELD ARTILLERY
STOCHASTIC SIMULATION

Steven Gage Starner
Captain, United States Army
B.S., United States Military Academy, 1970

This thesis presents a stochastic simulation model of Field Artillery that is designed to be used in conjunction with the Simulation of Tactical Alternative Responses (STAR) battalion combat model. The tactics modeled, the assumptions made, and the interface requirements are detailed, with the computer code that is used to execute the model included. A clustering algorithm that was developed to simulate the grouping of detected vehicles by the forward observer is discussed. A typical simulated fire mission is presented with computer plots of each element of the fire mission, accompanied by the computer output that details the interactions. This graphical presentation will enable the reader to better appreciate the potential applications of the model. The input requirements to use the model are explained so that this thesis could

Master of Science in
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March 1979

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become the initial user's manual for future applications of the FA model with the STAR model. The design requirements for an FA model to support the brigade version of the STAR model are discussed.

AN ANALYTIC APPROACH TO DETERMINING RUSH DISTANCE FOR
AN INFANTRY SQUAD IN THE FRONTAL ATTACK

Cortez DeLeon Stephens
Captain, United States Marine Corps
B.S., Miami University, 1972

A differential equation attrition model is used to deterministically simulate an infantry squad frontally attacking a four-man defensive position. The simulation results are used to determine the optimum rush distance.

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TRANSFERABILITY OF COMBAT MODELS:
LIMITATIONS IMPOSED BY DOCUMENTATION PRACTICES

Robert Walter Szymczak
Lieutenant Colonel, United States Army
B.S., United States Military Academy, 1962

This thesis proposes a hierarchy of documentation for combat modes. It begins by examining criticisms and credibility of combat models to establish underlying causes and effects, and then it addresses model proliferation and ever increasing complexity as they affect one's ability to understand and transfer models. A methodology for determining whether or not a model is applicable to a specific problem is presented, as are examples of potential problem areas. Current documentation practices are examined for conditions that limit the transferability of models and contribute to the credibility problem. The above examinations have led to a proposed three-tier hierarchy of documentation, including for the analyst documentation that is presented from the context

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of discovery rather than from the traditional context of justification. Recommendations are made for supplemental studies to examine related issues.

GROUP DECISION MAKING WITH FEEDBACK

Amnon Tamir
Major, Israeli Air Force
B.S.A.E., Technion, Israel Institute of Technology, 1970

A computer tool is developed for the purpose of eliciting group utilities for multiple attributes of one complex system relative to a base line. The procedure accommodates multiple users simultaneously providing anonymous feedback to each user to aid in the process of assessing utilities.

The procedure provides complete visibility to a manager (umpire) of changes to the data base, so that the process can be monitored in real-time. The software is written so that it is completely self-documented and user friendly.

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and
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AUTOMATIC FACTORIZATION OF GENERALIZED UPPER BOUNDS
IN LARGE SCALE OPTIMIZATION PROBLEMS

David Samuel Thomen
Captain, United States Marine Corps
B.A., Alma College, 1971

To solve contemporary large scale linear, integer and mixed interger programming problems, it is often necessary to exploit intrinsic special structure in the model at hand. One commonly used technique is to identify and then to exploit in a basis factorization algorithm a generalized upper bound (GUB) structure (also called a static signed identity basis factorization). This report compares several existing methods for identifying GUB structure. Computer programs have been written to permit comparison of computational efficiency. The GUB programs have been incorporated in an existing optimization system of advanced design and have been tested on a variety of large-scale real life optimization problems. The identification of GUB sets of maximum size is shown to be

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among the class of NP-complete problems; these problems are widely conjectured to be intractable in that no polynomial-time algorithm has been demonstrated for solving them. All the methods discussed in this report are polynomial-time heuristic algorithms that attempt to find, but do not guarantee, GUB sets of maximum size. Bounds for the maximum size of GUB sets are developed, in order to evaluate the effectiveness of the heuristic algorithms.

EFFECTS ON A-6E BOMBARDIER/NAVIGATOR FLIGHT TRAINING
WITH THE INTRODUCTION OF DEVICE 2F114, A-6E
WEAPON SYSTEM TRAINER

John Richard Tindle
Lieutenant, United States Navy
B.S., United States Naval Academy, 1972

As weapon systems grow increasingly complex and sophisticated, the training requirements for operator personnel become correspondingly more demanding. This increase in training requirements, coupled with increased operational costs, necessitates the use of simulators as an integral part of many training programs. With the introduction of device 2F114, A-6E Weapon System Trainer, the A-6 community will have a state-of-the-art simulator to employ in their training programs. Along with new devices, training programs must become more responsive to factors influencing training effectiveness and transfer of training. This report explores factors influencing simulator training effectiveness, and compares them with factors incorporated in device 2F114 and proposed training syllabi. Appendix B, "Alternatives in Bombardier/Navigator Training," identifies syllabus flights that have the potential to be substituted by the A-6E Weapon System Trainer.

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MODELING THE EFFECT OF INFORMATION
ON CONFLICT OUTCOME

Kemal Tonguc
Lieutenant, Turkish Navy

The representation of certain qualitative features such as information and coordination of combat situations in the Lanchester formulations are discussed. The purpose of this thesis is to develop some simple models to describe the influence of information and coordination upon combat progress. Some graphical outcomes of these representations were obtained.

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A CONCEPTUALIZATION OF FIRE SUPERIORITY FOR GREATER
REALITY AND CREDIBILITY OF COMBAT MODELS

Falk Falkenstein von Fabeck
Captain, Federal German Army
Bauingenieur (graduiert), 1972, Technical Military Academy
Munich, West Germany

Formal combat models are a means for military analysts and planners to support decisions concerning military projects. The reality, validity and credibility of combat models is still a controversial subject. This paper provides a discussion of the process of gaining fire superiority in combat. Three different input parameter categories - tactical, technical, and human parameters - were selected to serve as combat input. The combat environment transforms these inputs into combat outputs (or combat effects) in the form of operational target and human effects. Human effects are the suppressive or psychological effects, whereas target effects are only physical effects. A conceptual model of fire superiority is developed from a theoretical definition of fire superiority.

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SIMULATION OF TACTICAL ALTERNATIVE RESPONSES (STAR)

William Scott Wallace
Captain, United States Army
B.S., United States Military Academy, 1969
and
Eugene Gordon Hagewood
Captain, United States Army
B.S., Georgia Institute of Technology, 1969

This thesis presents a stochastic simulation model of ground combat. The tactics represented in the model are explained in detail, and a brief explanation of the SIMSCRIPT programming language used in the model is presented. The model is explained in detail, and the computer routines which make up the model are included. The input requirements for execution of the model are explained in detail so that this thesis might become the initial user's manual for future applications of the model. A typical simulated battle is presented with detailed explanation of the output to enable the reader to better appreciate the potential applications of the model. The current status of the model referenced in the thesis is prior to the version which will be used for production runs.

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AN ANALYSIS OF THE RELIABILITY OF CONVENTIONAL MINEFIELDS

Youn Hiang We
Major, Republic of Korea Army
B.S., Republic of Korea Military Academy, 1971
B.S., Seoul National University, 1975

Several measures of effectiveness for the reliability of a conventional minefield are developed in terms of two main factors: the continuous reliability loss of the unit mine over time, and the configuration of the minefield. A series of analytic analyses for minefield reliability are presented for a simplified minefield environment.

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LASER-INDUCED ACOUSTIC PULSES IN WATER

David John Armstrong
Lieutenant, United States Navy
B.S. Naval Science, United States Naval Academy, 1970

and

John Herbert Cocowitch
Lieutenant, United States Navy
B.S.I.M., The Georgia Institute of Technology, 1970

The interaction of Q-switched neodymium glass (1.06 μm) laser radiation with distilled water for the purpose of creating acoustic pulses was investigated. Average laser output was 80 MW. Two sound generation mechanisms were studied: thermoelastic expansion and dielectric breakdown. The thermoelastic process was shown to produce a spherically expanding pressure wave with a fundamental frequency of 50 kHz. Maximum sound pressure levels of 65 dB (re 1 μbar) were observed with an energy coupling efficiency on the order of $10^{-6}\%$. The breakdown induced sound wave had a frequency of 200 kHz and produced sound pressure levels near 120 dB (re 1 μbar). The coupling efficiency was approximately 1%. Additionally, Schieren system shadowgraphs revealed the formation of a dense plasma bubble in the breakdown region. Peak pressures within

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the bubble were calculated to be as high as 450 kbars. Maximum shock velocities of 8.5×10^5 cm/sec were measured from the shadowgraphs.

FREQUENCY CONTROL OF A CO₂ LASER USING STARK CELL
STABILIZATION

Daniel Morris Brown
Lieutenant, United States Coast Guard
B.S., United States Coast Guard Academy, 1975

Preliminary studies have been carried out for the frequency and intensity stabilization of the output of a Sylvania Model 941 Carbon Dioxide laser, by feedback control of resonator length. Fluctuations due to discharge current and temperature and flow rate of coolant were studied. Current regulation of the power supply was found to be necessary for intensity stability. Cavity length tuned allowed vibration-rotation line selection, with a strong hysteresis effect. A computer analysis of error signal production for a pyroelectric detector and for an HgCdTe detector indicated that phase sensitive detection of the first harmonic signal component give the typical frequency discriminant. Operation of a servo loop integrator for the feedback loop has been considered. A suitable Stark Effect absorption cell for feedback signal generation has been constructed, but has not been applied to the laser.

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POWER SPECTRA OF GEOMAGNETIC FLUCTUATIONS
BETWEEN 0.4 AND 40 Hz

Frederick William Clayton
Lieutenant, United States Navy
B.S.M.E., University of Washington, 1970

Power spectra of the fluctuations of the geomagnetic field were obtained for the frequency range of 0.4-40 Hz using an optically pumped Cesium vapor magnetometer. The measurements were made at Monterey, California in May, 1979. The spectra displayed a gradual decrease in slope at low frequencies with zero slope occurring between approximately 5 Hz and 15 Hz followed by a slight increase in slope. Data was collected at local midnight (0000-0200), local morning (0800-1000) and local afternoon (1600-1800). The morning and afternoon spectra exhibit what is believed to be a Schumann resonance peak at 8.0 Hz. A peak at 2.2 Hz and its first harmonic (4.4 Hz) were also observed, but are believed to be a man-made phenomenon or a sensor related instrumentation effect. Considerable high frequency disturbances (20-40 Hz) were observed around local midnight and are believed to be ELF "Sferics". A comparison between a magnetically disturbed day .

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(Fredericksburg Index of 7+) and a quiet day (Fredericksburg Index of 2+) at the same time period (0800-1000) showed a difference of 7-9 dB in power spectral density.

INVESTIGATION OF ELECTRODE MATERIALS FOR
LOW FREQUENCY ELECTRIC ANTENNAS IN SEA WATER

Lawrence Charles Dearth
Lieutenant Commander, United States Navy
B.S., University of Idaho, 1966

This paper describes and gives the results of an experiment to measure the D.C. and ULF (0.1 to 1 Hz) relative impedance in sea water of several materials considered as possible electrodes for a submerged electric dipole antenna. The results of the ac and dc impedance tests are given for Ag, Al, C, Cu, Ni, Pb, Pt, Sn, Ti, W, Zn, and Stainless Steel, in the form of potential difference vs current and impedance vs frequency curves. Tests concerning the relative receiving impedance of Silver Silver-Chloride, Platinum Platinum-Black, carbon and zinc electrodes are reported. A comparison is made between the submerged magnetic loop and electric dipole antennas for characteristics of open circuit voltage, short circuit current, antenna gain, and noise. Based on the analytical and experimental results obtained recommendations are made to further test the impedance and noise characteristics of the Silver Silver-Chloride, Platinum Platinum-Black, and carbon electrodes.

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STIMULATED EMISSION BY RELATIVISTIC ELECTRONS
TRAVERSING A PERIODIC MAGNETIC FIELD

Robert Boyce Ellis
Lieutenant, United States Navy
B.S., University of South Carolina, 1971

A historical survey of scientific developments predating the free electron laser (FEL) concept is presented. A general theory of operation of the FEL is discussed. The use of electromagnets to generate a static periodic magnetic field of alternating polarity (as a pump wave source) is proposed. Preliminary measurements with respect to the proposed electromagnet design are analyzed.

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A SIMPLE MODEL FOR CALCULATING
THE INDEX OF REFRACTION OF NEON I AND NEON*(3s)
IN THE CAVITY OF A XENON FLUORIDE LASER

James Etchechury
Captain, United States Army
B.S., United States Military Academy, 1970

A model for calculating the index of refraction of atomic species present in the cavity of a Xenon Fluoride laser is applied to Neon and Neon*(3s). The model considers the variation from unity to be a function of the absorption cross section. Below the ionization threshold, the cross section is a set of discrete transitions between the various energy levels of the species of concern. Above the 5p level, the discrete transitions become indistinct and the continuum cross-section function is extended into this region. The continuum cross-section function is a polynomial function fitted to independent research results. The results for Neon I agree with previous theoretical and experimental results. The model is extended to Neon*(3s). Comparison with the results of independent research of the polarizability and cavity phase shift derived from the calculation indicate accuracy is within ten percent.

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EXPERIMENTAL FLIR STUDY

James Powell Gruber
Lieutenant, United States Navy
B.S.S.E., United States Naval Academy, 1973

A single cell, serially scanned, thermal imaging FLIR system has been constructed at NPS Monterey. The system consisted of a Cassegrain type reflecting telescope with a convergent beam, oscillating mirror scan system, and HgCdTe and InSb single cell infrared detectors. The system was first tested using visible light and then switched to the infrared wavelengths. The FLIR has imaged scenes with a temperature difference of 9°K above ambient. MTF measurements have shown it to be diffraction limited by the active area of the detector crystal and the optics.

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HIGH RESOLUTION COMPUTER CALCULATION
OF OPTICAL TRANSMITTANCE
AT SEA LEVEL OVER MONTEREY

Nusret Guner
Lieutenant, Turkish Navy
B.S., Naval Postgraduate School, 1978

Computer programs have been developed for calculation of molecular absorption and aerosol extinction for horizontal path propagation of radiation in the wavelength range above 0.55 μm . The AFCRL line parameters compilation is used as input data with local weather conditions for the Monterey Bay and model of typical aerosol size distribution from Shettle and Fenn. Wind speed and relative humidity are included in the form developed by Wells, Gal and Munn. Infinite resolution computations have been carried out for 1.06, 3.8 and 10.6 μm and results tabulated for monthly and yearly average weather conditions on Monterey Bay. Bandwidth-average spectral transmittances have been calculated at 0.01 cm^{-1} and 0.5 cm^{-1} resolution for the same conditions.

Comparisons with previously published data show agreement to 1.8% with maritime model aerosol Mie-scattering calculations by Selby using LOWTRAN III B. [Ref. 12]

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Analysis of sensitivity to changes of pressure and temperature for the 3.8 μm range showed only small effects of these parameters. However a change in water vapor partial pressure results in a 0.75%/mbar change in transmittance in the 3.8 μm region.

LASER INDUCED EVAPORATION FROM
STAINLESS STEEL SURFACES

Zen Wen Hwang
Lieutenant, Republic of China Navy
B.S., Chung Cheng Institute of Science and Engineering, 1972

Laser-induced evaporation from a stainless steel surface was the laser-target damage mechanism which was studied. Infrared laser pulses with irradiances higher than 10^9 W/cm² were produced by a Q-switched neodymium glass laser. Experiments were performed in a vacuum chamber evacuated to about 10^{-6} Torr. The mass of evaporated material, area of laser-drilled hole and depth of damaged hole were measured. Results showed that the mass of evaporated material was proportional to $F^{1/2}$ where F is the laser flux in W/cm². Surface damage phenomena were studied by metallographic methods using an optical microscope and scanning electron microscope (SEM). Evaporated materials were partially collected and analyzed separately with the SEM and Princeton Gamma Tech (PGT) 1000 x-ray analyzer. Results for 40 laser shots on one target showed the deposition of small pellets on the collector. The number of pellets depends on the number of

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laser shots. After 40 shots a pellet density of 10^8 particles/cm² with an average particle separation of 10^{-4} was observed. The PGT analyzer showed that Fe/26 and C_r/24 were the primary elements contained in the pellet ejected from the 304 stainless steel target.

INDUCED EVAPORATION OF METAL
FROM AN ALUMINUM SURFACE
BY A NORMAL PULSE NEODYMIUM LASER

Christopher Brinton Johnson
Major, United States Army
B.A., Washington State University, 1968
M.S., University of Southern California, 1975

Laser induced evaporation of material from the surface of an aluminum target in a vacuum was studied. Based on a literature examination, material removal using a normal pulse laser was judged to be more efficient than for a Q-switched laser. The experiment was conducted using a neodymium glass laser modified for normal pulse operation. The energy density was varied from 8.5×10^2 J/cm² where no breakdown occurred to 5×10^3 J/cm² where the threshold for breakdown was exceeded. The normal pulse duration was 600 μ s. Analysis of the ejected material was achieved by using a Hughes Ionization Gauge placed on the path of the ejected material. Oscilloscope traces of the ionization gauge output show that the gauge "sees" what is flying past it. There is good correlation between laser radiation, plasma radiation and ionization gauge fluctuations. The ionization gauge gave distinguishable

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signals for ions, electrons, and neutral particles ejected from the target surface. Signal sequence was dependent on the particle velocity. By measuring the elapsed time after ejection from the surface and the target to collector distance, the first arriving neutral particle velocity was determined to be 5.2×10^4 cm/s.

AN EXPERIMENTAL SYSTEM TO MEASURE ATMOSPHERIC
EXTINCTION OF VISIBLE, NEAR AND FAR INFRARED
RADIATION IN THE MARINE BOUNDARY LAYER

J. R. MacDonald
Lieutenant Commander, United States Navy
B.B.A., Saint Bonaventure University, 1965

A method of measuring atmospheric extinction of radiation along a 13.3 kilometer path in the marine boundary layer has been devised and demonstrated. The design allows for selective measurement of extinction from the visible to the far infrared wavelengths. Two greybody sources, one covering the visible and near infrared and the other covering all bands out to the far infrared were each mounted on reflecting telescopes which were used to project the radiation. A reflecting telescope with selectable detectors was employed as the receiver. Two feasibility trials were conducted and the equipment was successfully calibrated.

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PROCEDURE FOR STATISTICAL ANALYSIS OF SINGLE
SCAN MODULATION TRANSFER FUNCTIONS FOR OPTICAL
TRANSMISSION IN THE MARINE BOUNDARY ATMOSPHERE

Rolf A. Molland
Lieutenant Commander, Royal Norwegian Navy
B.S., Norwegian Naval Academy, 1966

A computer data reduction system has been reprogrammed to sample individual scan recordings of the line-spread function of laser light propagating through the turbulent marine boundary layer.

The distribution of spatial frequencies of the Modulation Transfer Functions from random single scan samples from experimental data sets has been investigated. A preliminary analysis indicates that the zero spatial frequency component of the MTF is log-normal distributed.

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SELF GENERATED MAGNETIC FIELDS
IN LASER-PRODUCED SHOCK WAVES

Cem Yildirim Parlar
Lieutenant, Turkish Navy
B.S., Naval Postgraduate School, 1978

The generation of spontaneous magnetic fields in a plasma, produced by a 5.0 Joule, 22 nanosecond laser pulse and the generation of the reversed magnetic fields after several hundred nanoseconds due to the interaction between the laser produced plasma and a background plasma was investigated.

The generation of the reversed magnetic fields coincides with the steepening of the expanding plasma front. This steepening is caused by a collisional shock wave which is formed during the interaction of the expanding laser-produced plasma with the photoionized background gas. The analysis of the source term for magnetic field production indicates that the generation of the reverse fields is due to an axial temperature gradient and a radial density gradient. This axial temperature gradient is a result of the heating of the plasma in the collisional shock wave.

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The width of the shock was measured to be 0.2 cm. The magnitude of the maximum reverse field was measured at 5.0 Torr (H_2) background pressure to be 150 Gauss.

DATA ACQUISITION SYSTEM FOR GEOMAGNETIC WAVES

David Anthony Sadler
Lieutenant, United States Navy
B.S., University of Utah, 1973

The study of geomagnetic wave phenomena in the ocean required the development of a small, low cost, low power digital data acquisition system. Other considerations required that the system be able to adapt to changing requirements as the study progressed, be easily interfaced with existing digital equipment, and be able to be left unattended on the sea floor, for long periods of time. A prototype data acquisition system was designed and constructed with these requirements in mind.

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EXPERIMENTAL STUDY OF THE RADIATION
PROPERTIES OF A PARAMETRIC FOG HORN

Stephen Edward Trenchard
Lieutenant, United States Coast Guard
B.S., United States Coast Guard Academy, 1973

An experimental study of the radiation properties of a parametric fog horn was conducted using a 4 unit x 5 unit horn driver array as the primary source. The horn was operated as two separate 10-unit acoustic arrays each transmitting one primary frequency. The frequency combinations studied were 4240-5520Hz and 4960-5520Hz. The acoustic properties of the parametric array were observed for both frequency combinations. Source levels were varied between 122dB re 20 μ Pa and 134dB re 20 μ Pa at 1 meter to study the transition from absorption limited performance to saturation limited performance. Results consistent with the predictions of Moffett and Mellen [JASA 61, 325-337 (1977)] for the source level of the difference frequency beam and saturation broadening of the difference frequency beam were observed. The horn was also operated as a single array with all units radiating both primary frequencies. Equivalent results were obtained. A discussion of fog signaling applications is included.

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CONVERGENCE ZONE PREDICTION MODELS
WITH PROGRAMS FOR USE ON HP-67 AND HP-97
PROGRAMMABLE CALCULATORS

Richard L. Badger
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1966

Convergence zone (CZ) prediction models are developed based on acoustic ray tracing theory as applied to linearly segmented sound velocity profiles (SVP). The models were developed into three calculator programs, two for CZ range predictions under different source and receiver depth conditions and one for CZ gain and transmission loss (TL) predictions. The performance of the models as programmed on Hewlett-Packard HP-67 or HP-97 programmable calculators was compared to the Fast Asymptotic Coherent Transmission (FACT) model which is based on similar but more elaborate theory and which is designed for use on large digital computers. Agreement of the calculator programs with the FACT model is fairly good when conditions are within the design limitations of the programs and environmental conditions are not unusual.

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APPLICATION OF COLOR-CODING IN
AIRBORNE TACTICAL DISPLAYS

Hilton L. Conner, Jr.
Lieutenant, United States Navy
B.S., University of Kansas, 1972

This thesis analyzes the operational environment and task variables of the Tactical Coordinator in the S-3A for possible application of color coding in the display symbology in the multi-purpose display. Beginning with the ASW threat to the carrier force under the CV concept, the missions of the S-3A are presented. The roles, tasks and functions of the Tactical Coordinator are identified and form the basis for an analysis of the need of color in airborne displays. Current display design requirements and discrepancies in the S-3A are discussed as a basis for areas of color application. Color research recently conducted is reviewed with the results directed toward the symbology currently used in airborne displays.

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HORIZON EXTENSION FOR THE
CARRIER TASK GROUP

Robert J. Heifner
Lieutenant, United States Navy
B.F.A., Florida Atlantic University, 1972

Because of the speed and sophistication of modern weapon systems, the carrier task group commander has a need for a system which would extend the radar horizon of the task group for both defensive and offensive roles.

Present task group assets are examined to discover a possible solution to this need. The solution sought must be available in the near future, and should consist of existing equipments and platforms to the extent possible. Several possible such systems are discussed, and a suggestion is made to develop a manned carrier aircraft system for this purpose. Specifically, and within the constraints mentioned above, the suggestion is an upgrading of the current EA-3B aircraft to serve as a near-future horizon extension system for the carrier task group.

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Co-Advisors: S. Jauregui, Jr.
Electrical
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National
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COMPUTER SIMULATED DEVELOPMENT
OF IMPROVED
COMMAND TO LINE-OF-SIGHT MISSILE GUIDANCE TECHNIQUES

Frank F. Hewitt
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1967

Three computer simulations of command to line-of-sight missile guidance systems were developed within an electronic warfare environment to test the feasibility of improved guidance techniques while maintaining simplicity for generic application among the various missiles of this general guidance classification. The first simulation modeled the basic guidance scheme; the second introduced a "lead-angle" concept; and the third simulation combined these techniques for use depending upon whether the target took evasive action or employed electronic countermeasures. It was found that consideration should be given for use of a "lead-angle" variant in conjunction with the basic guidance technique to enhance the effective engagement envelope of these missile systems against relatively slower-maneuvering targets employing only low-duty-cycle denial jamming.

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A STUDY OF AMBIENT NOISE LEVELS IN THE MARGINAL-
SEA-ICE ZONE EAST OF GREENLAND, SEPTEMBER 1978

Kenneth Warren Peters
Lieutenant, United States Navy
B.S., Cornell University, 1972

This thesis discusses the results of short term measurements of ambient noise levels in the marginal-sea-ice zone east of Greenland during September 1978 utilizing AN/SSQ-57A calibrated sonobuoys. Coincident measurements of ocean swell attenuation and ice floe distribution and dimensions were performed by Scott Polar Research Institute personnel. Noise near the ice edge was higher than typical open ocean values. The spatial distribution of noise levels within the ice field differed significantly from the results of previous studies. As the noise sources within the ice field appeared to correlate to wave interaction with individual floes within the ice field, the different results were attributed to variations in well energy and ice floe dimensions and distributions. The data supported the theory that there are significant noise sources within the ice field (not just at the ice edge) that must be considered in any model of the noise intensity within the marginal-sea-ice zone.

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System Technology
March 1979

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ELECTRONIC WARFARE IN CLOSE AIR SUPPORT

Ernest Michael Schneider
Captain, United States Marine Corps
B.S., Bradley University, 1971

The conduct of electronic warfare in the context of Marine Corps close air support in a non-nuclear war against the air defenses of one Soviet army is investigated using currently available equipment. The optimum role of EA-6B assets is emphasized. Changes in current tactics are recommended where appropriate.

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OPERATIONAL EA-6B MISSION PLANNING
PROGRAMS

Stephen Wayne Smith
Lieutenant, United States Navy
B.S., University of South Florida, 1970

Since World War II, the electronic warfare officer has been planning his missions by hand. The threat today is too large and complex for hand planning. The Operational EA-6B Mission Planning Program is designed to automate much of the clerical work involved in planning electronic warfare missions. It is an interactive computer program utilizing the WANG 2200T installed on all U.S. aircraft carriers. The program consists of eight subprograms linked together through an interactive main program. This design concept allows for easy access to each program. In addition, future programs may be added without difficulty. Since each program is a separate entity, one may be changed or deleted without affecting the others.

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RAND INTELLIGENT TERMINAL AGENT (RITA)
APPLICATIONS
IN TELECOMMUNICATIONS MANAGEMENT

Fredrick Arlo Adams
Lieutenant, United States Coast Guard
B.S., United States Coast Guard Academy, 1973

Rand Intelligent Terminal Agent (RITA) is a set of computer programs designed to be applicable as a front-end module to remote computing systems, and as a heuristic modeling tool. RITA is felt by its designers to have broad applications in the design of interfaces to computer networks for logistics, command and control systems, intelligence collection and dissemination, and remote accessing of large data bases.

RITA applications displayed in this thesis are in the field of telecommunications management. Specifically, programs in the areas of automated message processing, equipment management and frequency selection are displayed.

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Telecommunications
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ELECTRONIC WARFARE TECHNOLOGY

Abdulhadi A. M. Almoghrabi
Lieutenant, Royal Saudi Naval Forces

An analysis of contemporary technology as utilized in an electronic warfare system is presented. A variety of phases of the state of the art, particularly related to electronic and optical system currently employed in signal identification is studied in some detail. An understanding of its consequence to possible tradeoffs, the economic possibilities, and the efficient management of these complicated electronic systems are discussed.

Master of Science in
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June 1979

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STATE-OF-THE-ART FIBER OPTICS
AND ITS APPLICATIONS TO THE
SHIPBOARD DATA MULTIPLEX SYSTEM

James A. Bollengier
First Lieutenant, United States Marine Corps
B.S., University of Rhode Island, 1973

This thesis contains an overview of the present status and possible future roles of fiber optics for shipboard applications. Subjects addressed include state-of-the-art materials and fibers, their optical and mechanical properties, environmental testing, design of fibers and cables and fiber systems. Specific shipboard applications of fiber optic systems are related to the Navy's Shipboard Data Multiplex System (SDMS) along with the advantages and payoffs expected with deployment. The fiber optics market is discussed including an economic analysis of fiber optic technology versus conventional coaxial cable. Present major advantages and problem areas confronting decision makers when considering fiber optic systems are outlined. Conclusions and recommendations suggest that the rate at which the evolution of fiber optic applications progresses is primarily a function of the aggressiveness at the system management level and the timely solution of technical deficiencies.

Master of Science in
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THE TRI-TAC PROGRAM:
MATURITY OR MYTH?

Frank J. Clement
Commander, United States Navy
B.S., United States Naval Academy, 1958
M.A., University of Southern California, 1977

This thesis effort is a study of the Joint Tactical Communications (TRI-TAC) Program with specific emphasis upon its ability within its concept and scope to provide for the objectives proposed by its charter. The principal elements of this study concern the prognosis of the TRI-TAC as a major defense program effort, where it is heading, and whether it will reach the maturity intended. Particular attention is directed towards the management concepts of the program, the compatibility of the TRI-TAC program with other Department of Defense (DOD) telecommunications program initiatives, and the degree of success in developing TRI-TAC thusfar. Recommendations for management reorientation and program changes focus on those areas which, in the author's opinion, require major emphasis in order to ensure that the TRI-TAC program fulfills its intended purpose.

Master of Science in
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SATELLITE NAVIGATION IN THE U.S. COAST GUARD

Richard Sheridan Hartman, Jr.
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This thesis investigates many of the issues surrounding the civil maritime navigation dilemma facing the USCG. At present, LORAN-C and OMEGA, which are hyperbolic radionavigation systems and TRANSIT, a Doppler shift satellite-based system, are the main systems employed in the civil maritime field. NAVSTAR GPS, a passive ranging satellite navigation system is, in the meantime, showing great promise as the replacement system for primary radionavigation in the U.S. There are several key questions, one involving national security, which must be answered, however, before NAVSTAR becomes operational. What positional accuracy will be made available to the civil community? What are the economics of the user equipment? Will NAVSTAR be accepted as a successful replacement for LORAN by the civil community? To aid in answering some of these questions, the results of an informal survey of the civil maritime industry are presented. The final outcome remains to be seen. These issues will require careful

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thought by this country's top leaders before any final commitment to NAVSTAR can be made or prior to any decision to discontinue LORAN-C or OMEGA.

THE DEVELOPMENT OF THE NAVY'S SATELLITE
SYSTEM - MOON RELAY TO LEASAT

Alfred George Heinemann, III
Lieutenant Commander, U.S. Navy
B.S., United States Naval Academy, 1967

This thesis effort is a study of the development of the Navy's satellite system from the earliest moon relay to LEASAT. The study highlights various planning decisions which have materially affected design features and operations of today's Navy satellite system. Particular attention is focused on the selection of modulation, multiple access, and data transmission techniques. The concluding section describes future technological advances that have potential for improving military satellite communications.

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MODERN TELECOMMUNICATION TECHNOLOGY
AND ITS FUTURE IMPACTS

Mogbel Hamad Al-Mogbel
Lieutenant, Royal Saudi Naval Forces
B.S., Pakistan Naval Academy, 1972

This thesis presents a study of the future developments in the telecommunications technology and market. The impacts of these developments on the industrialized, as well as developing countries, were analyzed in terms of the social and economical factors. Particular emphasis was placed on Saudi Arabia, as an example of the developing countries, whenever applicable. Most of the inventions in the telecommunications area were presented and examined.

The first part of this thesis presents an introduction and a brief history of telecommunications. The second part is an examination of the future of telecommunications from the technological and economical points of view and the services that may evolve. The third part is a study of the telecommunications market in producer and consumer terms.

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SHIPBOARD MESSAGE PROCESSING

James Martin Mohr
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The techniques of message processing within the Defense Communications System have developed significantly over the past fifteen years. This has been the result of automation made possible by computer technology applied to specific communications processing tasks. The cost-effective automation of portions of the Naval Communications System has isolated the major part of message processing delay at the peripheral system entry points.

The potential for information processing automation over a wide spectrum of shipboard functions is increasing with the advent of the mini and microcomputer. Automation is becoming a more cost-effective alternative to many currently manual and labor intensive tasks.

The purpose of this thesis is to look at problems facing the Navy in shipboard message processing. Related automation efforts and trends will be discussed in order to obtain a clearer perspective of our present status. Future alternative directions will be explored.

Master of Science
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THE FEASIBILITY OF MICROCOMPUTERS IN
THE COMMON USER DIGITAL INFORMATION
EXCHANGE SUBSYSTEM

Charles David Moore
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B.S., College of Charleston

The Common User Digital Information Exchange Subsystem (CUDIXS) is a communication system based on the AN/UYK-20 minicomputer. The feasibility of using microcomputer systems and off the shelf software packages to implement this system are investigated. The system's functional requirements are assumed to be fixed. The proposed hardware/software capabilities are analyzed to verify that the functional requirements of the CUDIXS system can be implemented using off-the-shelf hardware and a particular operating system, CP/M. The resultant is a replacement system with considerable cost savings, smaller size and potentially higher reliability. The proposed microcomputer system was used to demonstrate that the systems life cycle cost can be substantially reduced by using commercially available hardware and software to as large an extent as possible.

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SECURITY/PRIVACY CONSIDERATIONS
IN DATA PROCESSING

Kenneth Lee Nelms
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B.A., University of Guam 1969

This thesis contains the results of a study of the computer security/privacy problem. The primary purpose is to present the fundamental issues of computer security in survey form. Various protection schemes and administrative techniques are examined and related to security programs. Problems in the development of secure systems for the future are appreciated, and approaches for secure interim programs are suggested. This paper is directed at data processing managers with the goal of helping them better understand the vulnerability of data in computers. It is intended to foster a sense of security awareness among people who use computers to process data.

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THE RADIO SPECTRUM INTERNATIONAL ALLOCATION AND REGULATION

Vernon Thomas Williams
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B.S., University of New Mexico, 1973

Martin Kevin Collins
Lieutenant Commander, United States Navy
B.S., U.S. Naval Academy, 1967

This thesis contains a study of International Radio Spectrum Allocation and Regulation with particular emphasis upon the U.S.'s relationship with the International Telecommunications Union. (ITU). The authors develop a model of the technical, political and economic aspects of the radio spectrum allocation and regulation processes. The principal elements of the model concern the benefits of use, increased demand, cost of technical expansion, technological advances and the decision making process of the international regulatory body. In particular, a significant amount of attention is directed toward the historical development of the ITU and spectrum allocation within the framework of the authors' model. Concluding work focuses on the use of the model to determine possible U.S. courses of action with respect to future World Administrative Radio Conferences (WARC).

Master of Science in
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DEFENSE COMMUNICATIONS SYSTEM
EUROPE
ANALYSIS OF IMPROVEMENTS

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B.S., University of Oklahoma, 1972

This paper deals with the Defense Communications System in the European theater and the vulnerabilities of the system in the spectrum of threat environments from peacetime to general war. A general background is presented of the DCS and the organization tasked with enhancing survivability of the European DCS: the European Communications Working Group. Specific threat environments are examined as well as certain logistics issues which impact on the survivability of the DCS. Current and projected survivability improvement programs are discussed relative to their contribution to communications survivability and level of costs. An attempt is made to establish the need for pre-positioning of mobile/transportable communications assets in Europe and the need for better management of both assets and personnel.

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ANALYSIS OF THE NEED FOR A PROPAGATION
FORECASTING CAPABILITY (PROPHET) IN THE U.S. NAVY

Margaret Mary Zielinski
Lieutenant, United States Navy
B.S., Louisiana State University, 1970

The purpose of this thesis is to demonstrate a need for a propagation forecasting capability in the Navy, the use of which can be applied to all electromagnetic systems, but more specifically to communications. An analysis of the design, capability and effectiveness of PROPHET, a Propagation Forecasting Terminal, developed by Naval Ocean Systems Center, San Diego, California, follows an introduction to propagation theory and media. Included in the study is an application of the system to Navy requirements and systems and a proposed operational implementation.

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QUESTIONNAIRE RESULTS ON THE PROSPECTS FOR
SOVIET DEVELOPMENT OF PARAPSYCHOLOGY
FOR MILITARY OR POLITICAL PURPOSES

James David Bray
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This thesis examines the judgments of experts as to the potential threat the development of parapsychology would play in the national security of the United States. In order to accomplish this, a questionnaire distributed to authors of articles on parapsychology was analyzed using the statistical package for the social sciences (SPSS). In addition, a section is included on the history of Soviet studies in this field. Recommendations are made for areas requiring further investigation.

Master of Arts in National
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GREECE AND THE EUROPEAN ECONOMIC COMMUNITY

Frederick William Butler
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This work offers the major hypothesis that political stability is directly related to economic stability in Greece and then investigates whether Greece's accession to the European Economic Community will provide the economic prerequisites necessary for equilibrium. The study traces Greek economic development through three eras: the pre-junta period of Karamanlis influence, the seven years of dictatorship by the Colonels and the New Democracy period from July 1974 on. It investigates the existing relationships between Greece and the EEC by discussing their historical ties and the advantages, disadvantages and political implications of accession. Finally, it analyzes several factors crucial to Greece's economic welfare by determining each factor's movement, by weighting each factor with respect to economic development and EEC accession and by comparing the weighted results. The work suggests from the results of this comparison that accession to the EEC will enhance Greece's economic stability.

Master of Arts in
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THE MAKING OF CHINESE FOREIGN POLICY:
ACTORS AND PROCESSES

Freeland Henry Carde III
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B.A., Yale College, 1968

This thesis focuses on the decision-making processes in Chinese foreign policymaking. Roles of institutions and individuals in these processes are explicated in different types of decisions. The information "windows" through which China views the world are identified. Career backgrounds on foreign ministry officials and the diplomatic corps are presented, China's behavior in negotiations and crisis management are analyzed, and a case study of decisions leading to the 1979 Sino-Vietnamese war offered in example.

Master of Arts in
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THE POLITICS OF BALANCE IN TITO'S YUGOSLAVIA

Paul William Dahlquist
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B.S., United States Naval Academy, 1972

This research provides an analysis of the forces and actors, internal and external, that presently effect Yugoslavia's domestic and foreign policies. The departure of Josip Broz Tito will challenge the country's multinational balance, its socio-economic system, and the leadership capabilities of both the League of Communists of Yugoslavia and the Yugoslav Peoples Army. Additionally, Yugoslavia's relationships with the Soviet Union, the United States, the Eurocommunists, the nonaligned nations, and the Peoples Republic of China will be severely tested. Thus far, the interactions of these forces and actors have resulted in a delicate balance of multinational and economic pressures interwoven with an equally precarious foreign policy. Much evidence indicates Yugoslavia can survive Tito's passing, but internal weakness combined with external superpower interests may lead to instability. A concerted dedication to peace in Yugoslavia and Europe will be necessary if stability is to be assured in Yugoslavia's post-Tito era.

Master of Arts in
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CHINA'S OCEAN DEVELOPMENTS

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During the past fifteen years, the Chinese maritime presence throughout the world has become increasingly apparent. Its effects on international stability, or U.S. national security, warrant a close examination.

This study identifies, defines, and analyzes the components of the Chinese maritime community and makes some conclusions and predictions about this maritime development and its effect on international stability. The components examined include the Chinese Navy, oceanographic community, merchant marine (including port facilities and trading patterns), and the fishing fleet.

Master of Arts in
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THE INVISIBLE BLOCKADE AND THE COVERT WAR:
U.S. RELATIONS WITH CHILE, 1970-1973

Bradd Crouch Hayes
Lieutenant, United States Navy
B.S., University of Utah, 1971

At a time when the options a President may follow in pursuing foreign policy seem to be diminishing, it is essential to study the consequences of past foreign policy decisions and programs to determine which were successful and remain viable. The course followed by the U.S. in dealing with Chile during Salvador Allende's administration (1970-1973) brought criticism to the President and State Department, and discredit to the intelligence community. America has repudiated the ideal John Kennedy espoused in his inaugural address: "We shall pay any price, bear any burden, meet any hardship, support any friend, oppose any foe, in order to assure the survival and success of liberty."

This thesis deals with U.S. relations with Chile during the tumultuous years of Allende's regime. It seeks to test the hypothesis that the U.S. government, in concert with U.S.-owned multinational corporations, pursued a course of action, publicly, economically and covertly, bent on discrediting, disrupting and dislodging Marxist forces in Chile.

Master of Arts in
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NATIONAL SECURITY AND U.S. NAVAL OCEAN POLICY

James Arling Hazlett
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The U.S. Navy is tasked with maintaining U.S. national security as it relates to the oceans. Therefore, it is imperative that the Navy develop a clear, concise naval ocean policy. In determining this policy, thirteen major issues are examined: the Law of the Sea, territorial seas, continental shelf, exclusive economic zone, semi-enclosed seas, historic water claims, archipelagic states, high seas, international straits, deep seabed, ocean resources and marine life, ocean pollution, and the Navy's ocean policy organization. Each area is looked at in terms of the present situation and constraints on the Navy. A proposed naval policy is offered for each issue. Recommendations are made for structuring the naval ocean policy organization to better handle interagency requests for naval positions and to keep pace with the Law of the Sea developments.

Master of Arts in
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ZIONISM AND SOUTHERN LEBANON:
A HISTORICAL PERSPECTIVE ON SIX DECADES OF CONTROVERSY

Frederic Charles Hof
Captain, United States Army
B.S.F.S. Georgetown University, 1969

Current events in southern Lebanon are connected to a territorial dispute that emerged over sixty years ago, when leading Zionists claimed the region. That claim, which was based upon the projected economic and security needs of the Jewish national home in Palestine, did not prevail in the course of post-World War I Anglo-French diplomacy. Since then the Zionist leaders of Palestine and Israel have tried to overcome the negative economic and security implications of the boundary settlement. Yet Zionist access to southern Lebanese water has been consistently blocked, and the frontier has proven vulnerable to raids and rocket attacks by hostile forces. It appears, however, that Israel has recently converted the border region from a long-standing liability into a current geopolitical asset. Recent Israeli policies in southern Lebanon have (1) aggravated sectarian tensions in Lebanon; (2) kept Syria tied down in a difficult stability operation; and (3) made Israel's northern settlements less vulnerable to land attacks by Palestinian commandos.

Master of Arts in
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MOSLEM FUNDAMENTALIST MOVEMENTS AND
THEIR IMPACT ON MIDDLE EASTERN POLITICS

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Most observers of the Arab world point out that Islam has and is currently playing a significant role in the region's political life. In particular, the more fanatical, religiously based political movements have and are determining the internal stability of the Middle East and consequently affect the United States' political and economic position in the world.

The success of the Iranian Islamic Revolution has dramatically underscored the United States' ignorance of the political impact of Islam. Not only has the revolution embarrassed the United States but it has also threatened the stability of those regimes which America currently depends upon economically and politically; specifically, Saudi Arabia and Egypt.

Given the political influence of Islam and the importance of Saudi Arabia to the United States, the question must be .

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asked concerning Saudi Arabia's ability to withstand the current wave of Islamic revolutionary activity.

Through an analysis of two previously politically influential Islamic Fundamentalist Movements in the Middle East the Moslem Brotherhood of Egypt and the Iranian Islamic Revolutionary Movement, as well as an in-depth analysis of Saudi Arabian society and politics, this thesis will prove that Saudi Arabia cannot withstand the strains presented by Islamic fundamentalist activity. Specifically, it will confirm that certain identifiable sociopolitical phenomena exist in Saudi Arabia today that were common to both Egypt and Iran and ultimately will lead to a change in relations between the United States and Saudi Arabia, if not a dramatic upheaval in Saudi Arabian society and internal politics.

CANADIAN BICULTURAL NATIONALISM:
IMPLICATIONS FOR NATO AND
NORTH AMERICAN DEFENSE

Phillip Joseph Keuhlen
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The "Trudeau Doctrine" refers to the reordering of Canadian defense priorities which emphasized domestic determinants in the formulation of defense policy in the early 1970s. Contemporary analyses of Canadian affairs share a consensus that the doctrine failed, was abandoned, and replaced, by 1976, by Canada's traditional foreign policy.

This thesis examines the development of Canadian bicultural nationalism prior to 1968 and re-examines the formulation of Canadian defense policy between 1968-1978. The "Trudeau Doctrine" is shown to be a successful continuation of Prime Minister Trudeau's basic political aims: suppression of politicized bicultural nationalism and development of national unity. Inconsistencies in the conventional interpretation of Canadian affairs and the consistent operation of the "Trudeau Doctrine" in defense policy formulation between 1968 and 1978 are demonstrated. The implications of continued operation of the "Trudeau Doctrine" for NATO and North American defense are assessed.

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THE 'OPERATIONAL CODE' BELIEF SYSTEM OF HUA GUOFENG;
CHAIRMAN OF THE COMMUNIST PARTY AND PREMIER OF THE
STATE COUNCIL, PEOPLES REPUBLIC OF CHINA

Terence P. Labrecque
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B.A., University of Colorado, 1972

The objective of this thesis is to identify and define the operational code of Hua Guofeng. Insight into his estimates of situations and a greater understanding of the norms, standards and guidelines which influence his choice of strategy and tactics is gained. The code is constructed from 94 open source, English translations of Hua's speeches and writings. Findings: 1. Hua views the international system as conflictual and protracted. Superpower hegemony is the primary source of this conflict. Third World unity is required to create world peace. 2. Hua views conflict as zero-sum in nature yet, believes it is necessary for the realization of goals. 3. Hua believes in the predictability and irresistibility of historical development. The role of a leader is to actively guide history in a direction favorable to his people. 5. A highly structured framework is a prerequisite for establishing and achieving goals. 6. Hua

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advocates thorough preparation prior to any undertaking. 7. Goals are pursued incrementally according to plan. 8. Hua possesses a keen understanding of the nature of power and refrains from acting without adequate strength. 9. Hua's operational code has been consistent over time.

THE ROLE OF THE NUCLEAR POWER ISSUE
IN THE ANALYSIS OF CONTEMPORARY INTERNATIONAL RELATIONS

Ted Allen Lloyd, Jr.
Major, United States Air Force
M.A., University of Northern Colorado, 1976
B.A., Gettysburg College, 1965

Political analysis must keep pace with rapidly changing, even more complex international relations. This thesis suggests that a systematic study of the nuclear energy issue is one logical choice for comprehensive international political analysis. Nuclear power policies and debates are examined for their ability to reflect current international trends of conflict and cooperation. Nuclear-related events trigger responses over a wide range of issues, permitting an analyst to observe the various courses of national foreign policy in action. As one observes how nations interact in response to nuclear events, patterns are revealed, thus increasing one's knowledge of contemporary international relations. A paradigm is offered to systematize the analysis of nuclear-related events. A nuclear perspective is illustrated by examining worldwide trends on a global scale, European trends on a continental scale, and French foreign and domestic policies on

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a national scale. The nuclear power perspective serves as a valuable analytical tool with which to chart and interpret trends and events.

A CYBERNETIC CHARACTERIZATION
OF THE FLEET OCEAN SURVEILLANCE INFORMATION
FACILITY AT ROTA, SPAIN

Rod Guy Lyman
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B.S., Xavier University, 1971

A functional description of the Fleet Ocean Surveillance Information Facility at Rota, Spain, is developed with particular emphasis on the flow of ocean surveillance data and control information within the node. Several possible models are reviewed, observations taken at the node reported, and a new model developed. Some conclusions relative to the character and stability of the node are drawn, and some directions for further research are suggested.

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THE CIRCASSIANS IN JORDAN

Bruce Douglas Mackey
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This thesis examines the political, economic and cultural position of the Circassian minority in Jordan. Although the Circassian minority constitutes only about 1% of the population it occupies a disproportionately influential political and economic position. This thesis provides a brief historical background of the Circassians prior to their migration to Transjordan, outlines the means by which the Circassians reached their high status in Jordanian society, the methods by which they have maintained this position, and offers a projection as to the future of the Circassians in Jordan.

The hypothesis of this study is that the Circassian minority in Jordan occupy this high political, economic and social position as a result of their loyalty to the Hashemite monarchy. This loyalty to an existing regime is a unique cultural characteristic of the Circassians which has developed as a result of their history. In the past it was chiefly expressed in military terms but in the past thirty years the Circassians have also supported the Hasemite monarchy economically and politically.

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JAPANESE NATIONAL INTERESTS AND THE
SINO-JAPANESE PEACE AND FRIENDSHIP TREATY

Joseph Michael Mazzafro
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B.S., Saint Joseph's College, 1968

The signing of the Treaty of Peace and Friendship opened a new era in Japanese foreign policy. By improving relations with Peking, Tokyo gained the latitude of action necessary to play a central role in creating a pattern of regional stability compatible with Japan's national interests in security, prosperity, and prestige. The decision to sign the treaty underscores the determining influence these traditional national interests have on contemporary Japanese foreign policy, and it highlights the dichotomy between Japan's culturally induced xenophobic proclivities and its economic needs for greater access to foreign raw materials. Reflecting Japan's departure from its post World War II international reticence, the Peace and Friendship Treaty, as a function of national interests, is a useful analytical tool for assessing the impact of a more vigorous Japanese foreign policy on the Sino-Soviet dispute, the application of the Nixon Doctrine, the stability of Southeast Asia, the reunification of Korea, the future of Taiwan, and the allocation of resource rights in the East China Sea.

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GUERRILLA WARFARE IN NAMIBIA AND
ASSOCIATED IMPLICATIONS FOR EXTERNAL MILITARY INVOLVEMENT

Michael Shannon McCrary
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B.S., United States Naval Academy, 1967

There have been few unclassified attempts within the United States, if any, to document the guerrilla war in Namibia in its totality. This work presents a summary and analysis of that struggle through December, 1978, focusing on all aspects of the military and civil insurgency/counter-insurgency situations. Additionally, Namibia's history, its present social, economic, and political conditions, and the militant attitudes of the various actors involved are examined from the standpoint of tendencies and factors which could stimulate violent conflict in the future. Salient aspects of these discussions are integrated to form several plausible political-military scenarios which include potentials for near and long term violence and for the involvement of external actors in that violence.

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Namibia and the conflict surrounding its pending independence play a primary role in the current and future stability of southern Africa. This research is an attempt to provide policy makers with additional perspective in regard to the pursuit of that stability.

A SENSITIVITY ANALYSIS OF NAVIGATIONAL ERROR
IN OVER THE HORIZON TARGETING

Paul Albert McNulty
Lieutenant Commander, United States Navy
B.S., Duquesne University, 1968

The deployment of long-range cruise missiles in U.S. Navy ships has necessitated the development of a new targeting procedure. This technique, called Over the Horizon-Targeting, can be accomplished in different ways, but scenarios using passive sensors offer many advantages, since the enemy receives no pre-launch warning of the impending attack. This thesis uses a program written for the Texas Instruments Model 59 Programmable Calculator to generate passive targeting solutions from bearings-only inputs; then develops a procedure for evaluating the effect of navigational errors on the size of the predicted target area. Although each scenario must be considered individually, indications are that targeting solutions at extended ranges [i.e., greater than 60 nautical miles] are dominated by sensor error, while targeting solutions at shorter ranges [i.e., 20 to 60 nautical miles] are dominated by navigational error. A wide range of scenarios are evaluated and the results are presented graphically.

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JAPANESE OIL DEPENDENCE

Charles Alfred Meyer, Jr.
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B.S., U.S.A.F. Academy, 1973

This thesis is an examination of Japan's response to the oil crisis of 1973. Intermediate measures to cope with rising prices and restrictions on supplies of oil and petroleum products were marginally effective, but inadequate as bases for long term policies.

It will be shown that Japan has available to it five major areas of alternate petroleum sources. The conclusion emerges that no other area except the Middle East has sufficient available supplies to meet Japan's needs.

The next section undertakes an estimate of alternate sources of energy which might become available to Japan as oil substitutes. Again, the conclusion is inescapable that Japan will remain dependent on Mideast supplies for the foreseeable future and will, therefore, be constrained to make such modifications and improvements in economic and diplomatic procedures as to obtain maximum benefit at least cost to meet her economic and security needs.

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TOWARD INDEPENDENCE:
A SURVEY OF THE DETERMINANTS OF TURKEY'S FOREIGN POLICY

Jerry Wayne Milam
Captain, United States Air Force
B.A., Texas Technological College, 1969

In recent years Turkey has exhibited a definite shift in her foreign policy away from her previously narrow Western orientation toward a new multilateral and more independent stance. Events surrounding and foreign reaction to the Cyprus crises of 1964 and 1974 stand out as being instrumental in initiating Turkey's search for a more balanced foreign policy. However, there were and are other very potent factors affecting this new orientation. This study represents an analysis of the determinants of Turkish foreign policy, especially since World War II. Changes and trends in Turkey's political, social and economic life which impacted upon her foreign policy are examined within the context of changes within the international system. After identifying the determinants of Turkey's foreign policies, both past and present, various options for new directions in her foreign policy are examined. Finally, a forecast for the future of Turkey's international relations and policies is offered.

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THE LEGAL IMPLICATIONS OF A PALESTINIAN HOMELAND

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A.B., Wheeling College, 1967

This thesis is based on the presumption that a Palestinian Homeland exists. As such, it reviews some of the key legal documents which have formed the political and historical background of Palestine from the Balfour Declaration of 1917 to the present day. These documents are reviewed in light of basic principles of international law as viewed by European and American jurists and scholars relative to questions of sovereignty, title to territory and the implication of recognition by third states. Finally, this thesis briefly analyzes some of the immediate effects of Palestinian statehood.

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THE BELGIAN NAVY

Thomas R. Mooney
Lieutenant Commander, United States Navy
B.A., Park College

The United States Navy no longer possesses the number of ships required to execute all its responsibilities under existing military security agreements. Therefore, the assets and capabilities of America's smaller naval allies could weigh heavily in the balance determining the success or failure of an East-West confrontation. Unfortunately, the bulk of knowledge comprising Western naval literature lacks the detailed information on small navies which is necessary to evaluate their ability to make a meaningful contribution to NATO. Through a descriptive analysis of the Belgian Navy, this paper attempts to show that a small navy can make a significant contribution to the allied naval effort. In addition, this thesis is submitted as a contribution to the body of Western naval literature by presenting in English a comprehensive description of the Belgian Navy heretofore available only in Dutch and French language sources.

Master of Arts in
National Security Affairs
March 1979

Advisor: D. P. Burke
National Security
Affairs Department

THE PHILOSOPHY OF FORCE IN FOREIGN POLICY:
A THEORY OF THE JUST WAR

Robert Bennett Needham
Lieutenant Commander, Chaplain Corps, United States Navy
B.S., Reed College, 1962
M. Div., Westminster Theological Seminary, 1966

The historical background of United States foreign policy highlights its erosion from a confident proponent of the American national interest to one of uncertainty and indecision. This has paralleled a similar decay in other public institutions, including the educational, the military, the economic, the ecclesiastical and the political.

The fundamental cause of these tragic symptoms has two facets; the rejection of a Biblical-theological foundation for the public philosophy, and its replacement with secular humanism.

Our growing difficulties with strategic nuclear deterrence and an increasingly aggressive Russian adventurism, and the loss of our leadership momentum in the international system will not be solved by new technology, weapons or new sociological methodologies. Only a return to a responsible metaphysics, to those truths which provided the basis for America's rise to greatness, will work.

Master of Arts in
National Security Affairs
March 1979

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PEACEFUL COEXISTENCE AND DETENTE:
THE SOVIET QUEST FOR SECURITY IN THE POST-WAR ERA

Paul John Ryan
Lieutenant, United States Navy
B.S., United States Naval Academy, 1973

The cyclical nature of Soviet interest in peaceful coexistence and detente is demonstrated by the 1955 Geneva summit, the 1959 "spirit of Camp David," the 1963 Moscow accords, the detente of the SALT I period, and the renewed Soviet interest in detente as a prelude to the signing of the SALT II agreement. The Soviet Union's continual return to detente with the West results from the confluence of such factors as: the strategic balance, concerns for European security, the Sino-Soviet conflict, economic problems, and bureaucratic politics. Two common elements thread their way through each of the detente periods: Soviet security concerns and opportunism. Each period of detente countered a number of threats to Soviet security, lessened the free world's perception of the Soviet threat, allowed Soviet access to western technology, and permitted the Soviet Union to improve her "image" through peace propaganda. U.S. policymakers must be aware of the factors influencing the Soviet Union to pursue a policy of detente, and manipulate them as needed.

Master of Arts in
National Security Affairs
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TRENDS IN SOVIET FRONTAL AVIATION, 1970-1978

Thomas N. Sampson, II
Lieutenant, United States Navy
B.S., Virginia Polytechnic Institute and State University

During the years 1970-1978, Frontal Aviation Regiments have undergone a dramatic modernization effort which has resulted in a larger and more capable force. This modernization has been accomplished through establishing new regiments and re-equipping existing units with modern, third-generation aircraft, and has affected all Counter Air, Ground Attack, Reconnaissance and Helicopter Regiments. Additionally, it has been widespread over all areas where Frontal Aviation is deployed.

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National Security Affairs
March 1979

Advisor: D. C. Daniel
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DEVELOPMENT AND EVALUATION OF
CROSS-IMPACT ANALYSIS AS A
CRISIS DECISION-AID

Ralph L. Schindler
Lieutenant, United States Navy
B.S., United States Naval Academy, 1974

This thesis reviews the decision-making dilemma caused by information uncertainty and ambiguity produced during crisis situations. Several cross-impact analysis techniques are reviewed and evaluated as possible crisis decision-aids. Cross-event analysis is selected and extended for demonstration in a hypothetical crisis situation involving South Asia. The selected technique is operationalized and employed in a controlled environment to assess policy response options to the hypothetical crisis. The thesis then assesses the technique's conceptual limitations, and evaluates its utility as a potential crisis decision-aiding methodology.

Master of Arts
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June 1979

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THE IMPACT OF THE EVANGELICAL MOVEMENT
ON UNITED STATES POLICY TOWARD ISRAEL

Robert Joseph Schultz, Civilian
B.S., St. John's University in Jamaica, New York, 1968

This thesis analyzes the impact that the growing Evangelical Movement will have upon U.S. policy toward Israel. The importance of this subject cannot be overemphasized. Examination of similar movements in the past have demonstrated profound shifts in the socio-political sphere as a result. Abolition of slavery, child labor laws, and woman suffrage were the results of such movements in the 16th and 17th centuries. What is significant in today's movement is that Israel exists as a nation. Repeatedly, the Bible has forecasted the "gathering in of the dispersed Jews throughout the world." What was once accepted by faith is now a reality. Previous movements believed that Israel would one day exist in Palestine. In view of the alarming weakening of the Jewish lobby and/or growth of a strong Arab lobby and shifting world opinion toward Israel, there does exist a potential ally of approximately 75 million evangelicals who ardently support Israel. Many of the evangelical leaders are spiritually and

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National Security Affairs
June 1979

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politically active and are attempting to mobilize this new-old force in order to influence any future political policies and/or decisions affecting the Middle East relative to Israel.

THE PATTERN OF SOVIET PENETRATION IN AFRICA

Richard Paul Shields
Lieutenant, United States Navy
B.S., Bemidji State College, 1971

The thesis examined the Soviet involvement in Africa during the past two decades. Most analyses of Soviet actions have offered a reactive and opportunistic explanation for Soviet policy direction in Africa, while other studies have stressed that there has been a dramatic change only as a result of the Soviet and Cuban interventions in Angola and Ethiopia. From the evidence presented, the above descriptions and conclusions do not accurately reflect Soviet policy in Africa. The Soviet leadership, from Lenin to Brezhnev, has consistently followed a pattern of developing a regional strategy to achieve hegemony in a given region, the latest example being the Soviets having a "coherent strategy" for the African continent. The Soviets do not have documented plans per se, but they have focused on the militarily and economically important nations of Africa. In fact, the Soviets have pursued these goals for many years, long before the Angolan crisis of 1975.

Master of Arts in
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March 1979

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NAMIBIA 1979: ANOTHER ANGOLA?

David Malcolm Stone
Lieutenant, United States Navy
B.S., United States Naval Academy, 1974

The struggle for majority rule in southern Africa is a subject of great concern today. It is truly an area of Great Power involvement as evidenced by the recent events in Angola and Mozambique. The transition of Namibia from a territory illegally occupied by South Africa to an independent nation is a critical issue. The question of whether its independence will come through a peaceful UN sponsored plan or through the "armed struggle" of the liberation group SWAPO is yet to be determined. This thesis examines the complex factors involved in Namibia's transition process. The roles of the various actors are described and the similarities to the Angola crisis of 1975 analyzed. Particular attention is paid to recent Soviet/Cuban activities in the region. Finally, the possible scenarios for Namibia's transition process are developed and the role of the U.S. in this critical area scrutinized.

Master of Arts in
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March 1979

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POLITICAL POWER OF THE OVERSEAS CHINESE
IN WEST MALAYSIA, 1965-1978

Ronald G. S. Tom
Captain, United States Army
B.A., University of San Francisco, 1969

This thesis deals with Chinese political power in the Federation of Malaysia since the expulsion of Singapore (with its large Chinese population) from the federation in 1965. In determining the extent of Chinese political power in Malaysia, an examination of two significant areas was essential. First, the racial conflict and violence between the Malays and non-Malays (mainly the Chinese) were major problems which shook the very foundation of the political, economic and social structures of Malaysia. Second, the results of the last three Malaysian Parliamentary and State Legislative Assembly General Elections were analyzed and interpreted to gain a clearer picture of the Malaysian political scene. Finally, a projection of the future political prospects for Malaysia was offered.

Master of Arts in
National Security Affairs
June 1979

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THE ASCENDANCE OF IRAN: A STUDY OF THE
EMERGENCE OF AN ASSERTIVE IRANIAN FOREIGN POLICY
AND ITS IMPACT ON IRANIAN-SOVIET RELATIONS

James Harlon Williams
Captain, United States Army
B.A., Texas Tech University, 1969

In the wake of the British withdrawal from the Persian Gulf and the third Indo-Pakistani war, Iran's leadership revised its foreign policy with the intent both of succeeding Britain as the policeman of the Persian Gulf as well as committing the country to a more active role in regional affairs. Iran's Dhofar expedition in 1973 and support for the Kurdish rebellion in Iraq in 1974 posed a challenge to Soviet interests in the region. Soviet concern was exacerbated further by the scope of Iran's post-74 arms purchases, by the success of its petro-dollar campaign to reduce Soviet influence on the sub-continent and in the Horn of Africa, and by Sino-Persian support for Muslim insurgents in Afghanistan. When the Iranian revolution erupted in 1978, Moscow was initially content to remain on the sidelines. The Kremlin is now actively attempting to improve its ties with the Iranian left, however, in the hope of influencing the policies of a post-Khomeini government.

Master of Arts in
National Security Affairs
June 1979

Advisor: R. Magnus
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THE ASSOCIATION OF SOUTHEAST ASIAN NATIONS (ASEAN)-
AN INQUIRY INTO THE PROBLEMS OF REGIONAL ORGANIZATION
AND FUTURE DEVELOPMENT IN SOUTHEAST ASIA

Richard Lee Wright
Lieutenant, United States Navy
B.S., United States Naval Academy, 1973

The Association of Southeast Asian Nations (ASEAN) is a loosely structured regional organization composed of five nations: Indonesia, Malaysia, Singapore, Thailand and the Philippines. It has been proposed as a suitable successor to the American presence in Southeast Asia, to provide stability in an area with a legacy of internal turmoil and external conflict. In its current role, ASEAN serves as a means for approaching certain political, economic and security issues in a regional context. However, it is plagued by internal conflicts based on ethnic differences and the inability of its leaders to put regional priorities ahead of national interests. In the next twenty years external pressures from the surrounding political, economic and sociological environments will exacerbate ASEAN's problems. The grouping will prove unable to sustain a stabilizing role in Southeast Asia without considerable American and Japanese financial and political assistance.

Master of Arts in
National Security Affairs
December 1978

Advisor: Boyd Huff
National Security
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