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(10) William M. Tolles

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NAVAL POSTGRADUATE SCHOOL
Monterey, California

Rear Admiral T. F. Dedman, USN
Superintendent

Jack R. Borsting
Provost

The work reported herein was supported by various Department of Defense activities and the National Science Foundation.

This report was prepared by:

William M. Tolles
Dean of Research

Jack R. Borsting
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This publication contains the abstracts of dissertations, theses and research papers submitted during the period 1 Oct 77 - 31 Mar 78 by candidates for Masters and Doctors degrees at the Naval Postgraduate School, Monterey, CA.

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NAVAL POSTGRADUATE SCHOOL
Monterey, California

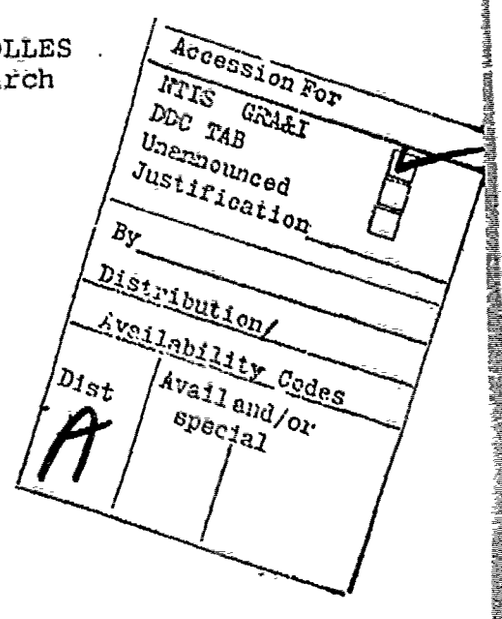
November 1978

At the Naval Postgraduate School most of the curricula in which advanced degrees are offered require the submission of an acceptable dissertation, thesis or research paper.

This publication contains abstracts of theses and research papers submitted for Electrical Engineer, Mechanical Engineer and Master of Science degrees during the period 1 October 1977 - 31 March 1978.

This compilation of theses is published in order that those interested in the fields represented may have an opportunity to become acquainted with the nature and substance of the student research that has been undertaken. Copies of these are obtainable by those wishing more detailed information. The procedures for doing so are described on the following page.

WILLIAM M. TOLLES
Dean of Research



NAVAL POSTGRADUATE SCHOOL
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Rear Admiral T. F. Dedman
Superintendent

Jack R. Borsting
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Naval Postgraduate School
(Attn: Research Administration, Code 012A)
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Singular Line Theory and Control Systems

Constantinos Spryros A. Cariniotakis
Lieutenant Commander, Greek Navy
B.S.E.E., United States Naval Postgraduate School, 1977
M.S.E.E., United States Naval Postgraduate School, 1977

The theory of singular lines on the Parameter Plane and in Parameter Space are derived, and applied to control systems design.

A method for design of compensation of linear feedback control systems using singular line theory is presented, and application of this design method for self-adaptive control systems is considered.

General design steps and required procedures for using this design method are summarized and examples are presented.

Electrical Engineer
March 1978

Advisor: George J. Thaler
Electrical Engineering
Department

Automatic Control of Ship Deceleration

George Kyriakos Flantinis
Lieutenant, Hellenic Navy
B.S., Naval Postgraduate School, 1976
M.S., Naval Postgraduate School, 1977

Various methods have been introduced for dynamic braking of ships. Depending on the prime mover and transmission system, dynamic braking is accomplished by electric power dissipation (in electric driven ships) or clutches and brakes, or air compression (in diesel engine propulsion systems).

In this study a gas turbine - electric drive combination is used as the means of propulsion; the usual method for dynamic braking is the electric power dissipation method using resistors.

This thesis is concerned with an investigation of different methods for dynamic braking in an attempt to find a way to decrease the size of the braking resistors needed and their associated equipment, or to eliminate the need for these by using another type of dynamic braking.

Electrical Engineer
March 1978

Advisor: George J. Thaler
Department of Electrical Engineering

An Adaptive Recursive Filter

Soon-Ju Ko
Lieutenant, Republic of Korea Navy
B.S.E.E., Seoul National University, 1975

An adaptive recursive digital filter is presented in which feedback and feed forward gains are adjusted adaptively to minimize a least square performance function on a sliding window averaging process for gradient calculations. A two-dimension version of the adaptive filter is developed and its performance compared with the optimal Wiener filter. The filter is shown to be effective in separating three diagonal trajectory streaks from a correlated noise plus a white noise background. Although the recursive adaptive filter approaches the optimal Wiener filter in performance, it does not require a priori statistical knowledge as does the Wiener filter to which it is compared. The results indicate that the recursive adaptive filter "learns" the statistics and adapts.

Electrical Engineer
December 1977

Advisor: Sydney R. Parker
Electrical Engineering
Department

INFRARED DETECTION OF SURFACE CHARGE AND CURRENT DISTRIBUTIONS

James David Selim
Captain, United States Marine Corps
B.S., Mathematics, University of Oklahoma, 1966
B.S.M.E., University of Oklahoma, 1967

A technique was devised using infrared detection of localized I^2R heating of conducting materials to determine the surface charge and current distributions on various objects. The measurement process is explained and comparisons between experimentally determined and actual charge and current distributions are presented.

Electrical Engineer
December 1977

Advisor: R. W. Burton
Electrical Engineering

Stress Analysis of Ceramic Turbine Blades by Finite Element Method - Part I

Lael Ray Easterling
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1968

The search for more efficient gas turbine engines has led to the proposal for the replacement of metal high temperatur components with ceramic components. Essential to this effort is the numerical analysis of proposed designs. This thesis report describes the model discretization of a proposed blade design, the development of pre- and post-processors for the ADINA finite element code and the initial stress analysis of the modeled blade.

Mechanical Engineer
Master of Science in
Mechanical Engineering
March 1978

Advisor: Gillis Cantin
Mechanical Engineering
Department

Marine Steam Condenser Design Using Numerical Optimization

Charles Michael Johnson
Lieutenant, United States Navy
B.S.E., University of South Florida, 1978

Two separate computer codes were coupled with a constrained function minimization code to produce automated marine condenser design and optimization programs of vastly different complexity. The first program, OPCODE1, was developed from the Heat Exchange Institute's Standards for Steam Surface Condensers (HEI). The second program, OPCODE2, was developed from the sophisticated ORCON1, a computer code produced by the Oak Ridge National Laboratory. CONMIN, the optimization program, was developed at the Ames Research Center.

OPCODE1 was well verified using main condenser input data of an aircraft carrier and a destroyer escort. Verification of OPCODE2, using main condenser data of an aircraft carrier, was less satisfactory due to the conservative nature of flooding effects on the outside film heat transfer coefficient used in ORCON1.

OPCODE1 is an excellent design tool for the conceptual design of a marine condenser. Optimized test cases run with OPCODE1 show that a condenser designed by the HEI method is nearly optimum with respect to volume.

Test cases with OPCODE2 show that enhancing the heat transfer on the shell-side by 80 percent yields a condenser with ten percent less volume than the unenhanced case.

Mechanical Engineer
December 1977

Thesis Advisors: Paul J. Marto
G. N. Vanderplaats
Mechanical Engineering Department

The Feasibility of the Jet-Flap Rotor as a Lift Generator for Vertical Takeoff and Landing Aircraft

John Charles Ball
Lieutenant, United States Navy
B.S.A.E., United States Naval Academy, 1971

The objectives of this study were first to determine the effectiveness of the jet-flap rotor relative to other lift generators, and second to examine the potential effectiveness of the jet-flap rotor in a tactical VTOL aircraft.

It was found that the jet-flap rotor has a high theoretical potential, but at present is the least-developed of the lift generators considered. The jet-flap rotor was found to be unattractive as a means of providing vertical lift, except when a long hover duration is necessary.

With regard to weight considerations alone, the jet-flap rotor was found to be inadvisable for use in a tactical VTOL aircraft. However, its benign downwash characteristics could make the jet-flap rotor advantageous if high downwash velocities and temperatures could not be tolerated.

Master of Science in
Aeronautical Engineering
December 1977

Advisor: M.F. Platzer
Department of
Aeronautics

User's Manual for ACSYNT - A Computer Program for Aircraft Synthesis

Arne Bredo Bruflat
Lieutenant Commander, United States Navy
B.S., University of Southern California, 1965

The computer program ACSYNT, a FORTRAN program for aircraft synthesis, developed by NASA Ames Research Center and modified for use at NPS was examined and a user's manual prepared for conceptual design studies and correlation with existing aircraft. Included is an example input for a V/STOL aircraft conceptual design, data preparation forms, and the computer program listing.

Master of Science in
Aeronautical Engineering
December 1977

Thesis Advisor: M. F. Platzer
Aeronautics
Department

Combustor Design and Operation for a Sub-Scale Turbojet Test Cell

Jerry Russell Charest
Lieutenant Commander, United States Navy
B.S., University of West Florida, 1973

A high pressure, water-cooled ramjet-type combustor capable of producing various amounts of particulates has been designed, constructed and operated in the sub-scale turbojet test cell.

The combustor can be utilized to perform further studies concerning the effects of engine operating characteristics and test cell design on particulate concentrations, and also the effects of fuel additives on the amount and composition of particulates emitted.

Master of Science in
Aeronautical Engineering
March 1978

Advisor: D.W. Netzer
Department of
Aeronautics

Computer Studies of Aircraft Fuel Tank Response to Ballistic Penetrators

Richard Alexander Eason
Lieutenant, United States Navy
B.S., University of Texas at El Paso, 1969

A major goal of the hydraulic ram survivability program for aircraft fuel tanks is the development of an economical computer code which accurately predicts the pressure in the fluid, the response of the tank walls, and the crack damage to the tank due to a ballistic projectile. This study compares the tank wall response predicted by the recently modified SATANS code with the data from studies performed by California Research and Technology, Inc., the Naval Weapons Center, and the University of Dayton Research Institute. Good agreement among the results is obtained for this phase of the study. Additionally, a comparison of the predicted crack length in the entry wall of the tank using Fahrenkrog's criterion and SATANS' predicted circumferential stresses is made with actual crack lengths from a test performed by the University of Dayton Research Institute. The predicted crack lengths were in excellent agreement with the actual crack lengths.

Master of Science in
Aeronautical Engineering
March 1978

Advisor: R. E. Ball
Aeronautics Department

Preliminary Calculations For An ASW Airship

Richard Joseph Flanigan
Lieutenant, United States Navy
B.S., University of Maine, 1970

In this study, preliminary calculations are made to determine the approximate displacement and volume of a conventional, rigid airship for an ASW mission. The latest technologies in avionics, sensors, weapons, and materials are applied. The study is strongly mission oriented, in that the mission profile and the reasoning behind it, along with the necessary equipment to complete the mission, are carefully considered and then applied to airship size.

Master of Science in
Aeronautical Engineering
March 1978

Advisor: D. M. Layton
Department of
Aeronautics

Design and Construction of a Flight Monitor and Data Recorder

Dennis Leland Kane
Lieutenant, United States Navy
B.S.E.E., University of New Mexico, 1971

The design and preliminary testing of a microcomputer based flight monitor and data recorder, utilizing magnetic bubble memory, is reported. Component selection, software design and magnetic bubble storage system construction and testing are discussed. Difficulties encountered, both in software and bubble testing are reviewed, with results and remaining work summarized.

Magnetic bubble memory technology is reviewed and its potential as a reliable, dense, low cost, non-volatile recording medium is noted. It is proposed that the microprocessor be utilized as a flight monitoring as well as a recording device to detect and report imminent "extremis" situations. This research is continuing at the Naval Postgraduate School.

Master of Science
in Aeronautical Engineering
December 1977

Advisor: Uno R. Kodres
Computer Science
Department

Fatigue Crack Propagation Analysis of Aircraft Structures

Larry Don Newsome
Lieutenant, United States Navy
B.S., Morehead State University, 1969

This thesis is a comparative study of aircraft fatigue life calculations based upon crack propagation and upon cumulative damage. The stress concentration factor, which supplies sufficient geometric information for Miner's Law of cumulative damage, is found to not completely specify the geometry for the crack propagation approach. Effects on fatigue life of variations in initial crack length, plate width, hole size, and hole geometry for the same stress concentration factor have been investigated; also both ordered and random load histories were used to compare the two approaches.

Complete FORTRAN computer program input documentation for the IBM 360/67 system has been included as an appendix to enable this thesis to serve as a user's manual for CRACK'S II, an Air Force crack propagation program for aircraft fatigue damage.

Master of Science in
Aeronautical Engineering
March 1978

Advisor: G. H. Lindsey
Department of Aeronautics

EA-6B Mission Planning and Route Optimization Program

Paul Odell Jr.
Lieutenant, United States Navy
B.S., United States Naval Academy, 1970

The EA-6B Mission Planning and Route Optimization Program was created for use with the WANG 2200 computer syster by aircrewmen deployed on board aircraft carriers. It is an interactive computer program designed to increase the effectiveness and efficiency of the mission planning process, while reducing the time involved in this evolution. These goals are accomplished through the use of two schemes. First is an automation of the clerical planning tasks of retrieval, listing, and plotting of information. Second is an optimization routine designed to aid in the selection of the optimum EA-6B route of flight, when in a Modified Escort role.

Master of Science in
Aeronautical Engineering
March 1978

Advisor: H. A. Titus
Electrical Engineering
Department

Application of the ACSYNT Computer Program for Aircraft Design to V/STOL Aircraft

Brendan James O'Donnell
Lieutenant, United States Navy
A.B., College of the Holy Cross, 1971

The suitability of the ACSYNT computer program for aircraft design in assessing V/STOL aircraft performance was evaluated by testing it on three existing aircraft: the German VAK 191B, the British Harrier and the Russian YAK 36. During the evaluation, the extensive capabilities of the ACSYNT program were explored and changes to the program and the User's Manual were made or recommended. The application of ACSYNT to fields other than aircraft design was investigated and several areas where the program can be useful were identified.

Master of Science in
Aeronautical Engineering
March 1978

Advisor: M. F. Platzer
Department of
Aeronautics

Dynamic Analysis of a Carousel Remotely Piloted Vehicle Recovery System

Russell Norman Robinson
Captain, U.S. Army
B.S., Engineering, Pennsylvania Military College, 1969

A Carousel Remotely Piloted Vehicle (RPV) Recovery System consists of a vertical mast which supports a horizontal member that is free to rotate. The approaching RPV is caught by vertical cables suspended from the horizontal member and the kinetic energy of the RPV is dissipated through the motion of the recovery system. This thesis presents a simplified dynamic analysis to describe the motion of an RPV after impact with a recovery system simulating the carousel system. The equations of motion for the RPV were obtained from Lagrange's equations and modeled using the Continuous System Modeling Program on the IBM 360-67 computer at the W.R. Church Computer Center, NPS. The results showed that damping was required on motion of both the horizontal member and the suspended cables in order to prevent possible damage to the 150 pound RPV at an assumed 50 knot approach speed. A sensitivity analysis was performed by varying the system design parameters and the results are presented in the body of the thesis.

Master of Science in Aeronautical Engineering
December 1977

Advisor: Louis V. Schmidt
Department of Aeronautics

An Experimental Study to Determine the Reduction In Ultimate Bending Moment of a Composite Plate Due to an Internal Delamination

Robert Gary Sprigg
Lieutenant, United States Navy
B.S., United States Naval Academy, 1969

The purpose of this study was to determine experimentally the effects of internal delaminations in a graphite-epoxy composite plate on the plate's ultimate bending moment. The experiments were conducted using 4-inch by 7-inch specimens with a balanced $0 \pm 45\ 90$, 8-ply layup. The delaminations were created by inserting a thin teflon disc between two lamina during layup preparation. The location of the disc, i.e. delamination, was varied in each test, and two disc sizes were considered. The test results revealed that delaminations located near an outer surface resulted in a greater reduction in the ultimate moment than those located near the center of the layup. Furthermore, the reduction in ultimate bending moment was found to be independent of the disc size. The tendency for the internal de[illegible]inations to propagate at relatively low load levels was observed and recorded.

Master of Science in
Aeronautical Engineering
December 1977

Advisor: R. E. Ball
Department of
Aeronautics

Adaptation of the Improved Antiaircraft Artillery Simulation Computer Program (P001) for Use at the Naval Postgraduate School in Aircraft Combat Survivability Studies

Carl Frederick Swenson
Lieutenant Commander, United States Navy
B.S., Iowa State University, 1967

The Air Force Armament Laboratory Antiaircraft Artillery Simulation Computer Program (P001), as modified by Calspan Corporation, was adapted for use on the Naval Postgraduate School IBM 360/65 computer and a preprocessor program (PIP) for P001 was written to facilitate data input to P001 and to complement the P001 output.

The modifications required to convert the Calspan modified P001 from a Control Data Corporation computer program to an NPS IBM 360/65 computer program are described herein. In addition, aircraft characteristics and P001 scenario assumptions, as well as the various P001 Input Program (PIP) options and capabilities, are discussed.

A complete P001/PIP package and user's guide for an aircraft attrition study in the NPS Course AE 3251, Aircraft Combat Survivability, are presented.

Master of Science in Aeronautical Engineering
March 1978

Advisor: R. E. Ball
Department of Aeronautics

A Validation of Mathematical Models for Turbojet Test Cells

John Justin Walters
Lieutenant, United States Navy
B.S., Rensselaer Polytechnic Institute, 1971

Previously developed one-dimensional and two-dimensional computer models for predicting turbojet test cell performance were compared with data obtained from a subscale test cell for the purpose of model validation. Comparisons were made for a variety of configurations and flow rates. A modified one-dimensional model was found to reasonably predict the variation of augmentation ratio with engine flow rate, although predicted magnitudes were consistently too small. The model incorporated excessive drag losses and an inaccurate jet spreading parameter for large engine-augmentor spacings. The two-dimensional model accurately predicted experimental velocity profiles, but overpredicted pressure variations, except for low engine exit Mach numbers.

Master of Science in
Aeronautical Engineering
March 1978

Advisor: D. W. Netzer
Aeronautics
Department

Development of a Method for Measuring Velocity at the Exit of a Compressor Rotor Using Kulite Probes with Synchronized Sampling

Keith Allen Winters
Lieutenant, United States Navy
B.S., United States Naval Academy, 1969

Initial steps are reported in the development of a method for determining the instantaneous velocity vector at the exit of a compressor rotor using two Kulite pressure probes with synchronized sampling. A method to determine the yaw angle of the flow at any point in the reference frame of the rotor using a single cylindrical Kulite impact probe and an equivalent pneumatic probe is described. The method was verified in the steady flow of a free jet and applied in the unsteady flow field of the compressor. On-line calibration of the Kulite probe with reference to the pneumatic probe was essential to the success of the method. Results for the distribution of the yaw angle peripherally across the exit of chosen pairs of rotor blade passages, are given. The analytical approximation of impact probe characteristics, on which the method is based, and its application with experimental data are described.

Master of Science in
Aeronautical Engineering
March 1978

Advisor: Raymond P. Shreeve
Department of Aeronautics

Microstructural Response of Aluminum-Magnesium Alloys to Thermomechanical Processing

Charles Pierson Bingay
Lieutenant, United States Navy
B.A., University of Washington, 1969

Mechanisms of microstructural refinement in aluminum-magnesium alloys were investigated. Alloys containing from 15% to 19% magnesium were exposed to various processing schemes, and the resulting microstructures were examined. Isothermal forging resulted in some refinement depending on the temperature, strain and strain rate. However, all samples isothermally forged exhibited microstructures having relatively large amounts of the brittle intermetallic phase present. The addition of tertiary alloy elements resulted in little improvement in microstructure. Non-isothermal schemes resulted in the most promising microstructures. A process of high temperature soaking followed by deformation at relatively lower temperatures is concluded to be the most promising means for processing alloys with magnesium contents below 15% by weight.

Master of Science in Applied Science
December 1977

Advisor: Terry R. McNelley
Mechanical Engineering Department

Galvanic Aspects of Aluminum Sacrificial Anode Alloys in Seawater

Jon Richard Cummings
Lieutenant, United States Navy
B.S., University of Missouri, 1971

Galvanic aspects of aluminum sacrificial anode alloys in artificial seawater were investigated. Specifically, two mercury-bearing alloys and one tin-bearing alloy were studied. The polarization behavior of the aluminum sacrificial anode alloys coupled to HY-80 steel is discussed. Current versus time curves were obtained for aluminum/steel galvanic couples immersed in artificial seawater for specific intervals. Scanning electron microscopy was used to characterize the anode dissolution patterns and the corriosion mechanisms. A correlation is made between the dissolution morphologies exhibited by each anode alloy and the polarization and galvanic current data.

Master of Science in
Applied Science
December 1977

Advisor: Jeff Perkins
Department of
Mechanical Engineering

A Multimicroprocessing Approach to the AEGIS Combat System

Ralph Gayler
Lieutenant, United States Navy
B.A., California State College at Long Beach, 1970

If AEGIS is to be the "Shield of the Fleet", a vigorous product improvement program need be prosecuted to keep such a complex combat system abreast of the threat and technology. In December of 1976, a committee comprising seventeen Navy and ten Army organizations indicated that the architectures of the AEGIS digital computers were deficient in terms of those characteristics desirable for "real-time" applications when compared to commercially available architectures. Since AEGIS is heavily dependent upon immature computer architectures, an electronic data processing (EDP) update would appear to be appropriate. Research was conducted to determine the nature of multiprocessor organization and the conditions which precipitated the current revolution in microelectronics. An overview of the AEGIS Weapon System is presented. The report is concluded with proposed designs which will upgrade AEGIS EDP configuration with distributed multimicroprocessing schemes.

Master of Science in
Applied Science
December 1977

Advisor: Uno R. Kodres
Computer Science
Department

Non-Line-of-Sight Electro-Optic Laser Communications in the Middle Ultraviolet

Dennis Michael Junge
Lieutenant, United States Navy

A Monte Carlo computer simulation was developed to model hypothesized electro-optic laser communication systems operating in the middle ultraviolet region of the spectrum called the solar blind. By assuming various source, propagation, and detector characteristics as well as certain performance parameters it is possible to predict the effective ranges and operating characteristics of such a system.

Master of Science in
Applied Science
December 1977

Thesis Advisor: W. M. Tolles
Physics and Chemistry
Department

The Microstructural, Mechanical and Ballistic Characterization of Ultra-High Carbon Steel

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

Douglas Robert Hamilton
Captain, Canadian Forces
B.Eng., Royal Military College, 1966

This research is part of a continuing program being conducted at the Naval Postgraduate School concerning the possible application of extensively warm-worked ultra-high carbon steel as an armor material. Mechanical and ballistic impact properties of the material were characterized after a variety of heat treatments. These properties, as influenced by heat treatment, were correlated to the microstructural changes observed. It was found that extensively warm-worked material exhibited a very fine microstructure consisting of a spheroidal carbide particulate dispersion in a fine ferrite matrix. This material proved to be extremely tough and exhibited ballistic resistance properties comparable to current armors. Heat treatment of this material produced very high hardness and strength but caused grain growth which led to poorer ballistic resistance compared to the as-rolled material. This decrease in ballistic resistance was caused primarily by an upward shift in the ductile-to-brittle transition temperature of the material.

Master of Science in
Applied Science
Master of Science in
Mechanical Engineering
December 1977

Advisor: Terry R. McNelley
Mechanical Engineering
Department

A MICROCOMPUTER BASED PLASMA DISPLAY SYSTEM

Ordale Paul Babin, Jr.
Lieutenant, United States Navy
B.S. Applied Physics, Louisiana Polytechnic University, 1970

and

Ronald Ray Seaman
Captain, United States Marine Corps
B.S. Mech. Eng., University of New Mexico, 1970

An overview of plasma display technology and operation is presented. Advantages and disadvantages of plasma graphics are explored. Some applications that are particularly appropriate for a plasma display are listed. Hardware and software developed to interface the AN/UYQ-10 plasma display with an Intellec Microcomputer Development System are discussed.

Master of Science in
Computer Science
March 1978

Advisor: Uno R. Kodres
Computer Science
Department

The Implementation of an Operating System for a Shared Microcomputer Environment

Stephen J. Carro
Lieutenant, United States Navy
B.S., United States Naval Academy, 1971

and

Barry L. Knouse
B.S., Pennsylvania State University, 1972

An implementation of a multiuser timeshared operating system for the Sycor 440 Clustered Terminal Processing System is described. Utilizing an 8080 microprocessor, this system provides a virtual operating environment consisting of a console device, eight floppy disk drives, and up to 32 virtual floppy disk images on a five megabyte movable-head disk. In addition, a Centronix serial printer is incorporated into the system as a dedicated device for any one of up to four concurrent users. The operating system supports utility programs including an editor, assembler, and debugger which facilitate microcomputer program development at the Naval Postgraduate School.

Master of Science in Computer Science
September, 1977

Advisor: Gary A. Kildall
Computer Science
Department

CMS Histogram, Density Estimation and Probability Plotting Routines, with an Application to the Analysis of the Output of a Simulation of a correlated Queue

Georgios Ioannis Danicas
Major, Hellenic Army
B.S., Military Academy of Greece, 1963

The object of this thesis has been twofold. The first object was to develop FORTRAN versions of several existing APL programs which were designed to analyze univariate data. In particular the programs were designed to test for exponentiality and normality of the data and, by sectioning or jackinfing, obtain estimates of sampling variances of sample moments. The second object of the thesis was to use these programs in a simulation study of first-come first-served queues in which the service teims and the inter-arrival times are exponentially distributed but dependent. The dependence is introduced by using the mixed moving average autoregresive structure (EARMA (p, q)) for exponential sequences introduced by Lewis and co-workers. Four models of correlated queues are introduced, giving autocorrelated and cross-correlated service and arrival times in various degrees. The simulation study gives a quantitative idea of the effect of correlation on the mean waiting time and the distribution of the waiting time.

Master of Science in
Computer Science and
Operations Research
December 1977

Advisor: P. A. W. Lewis
Operations Research
Department

Implementation of a User Interface with the Vector General Graphics Display System

David C. Endicott
Lieutenant, United States Navy
B.S., United States Naval Academy, 1972

and

Nathan P. Martino
Lieutenant, United States Navy
A.B., University of California, Berkeley, 1971

The development and implementation of refresh graphics software for the Vector General Display System on a PDP-11 minicomputer is discussed. Modification and expansion of existing software routines, along with additional software design and development is presented. As an addition to the existing C programming language, a version of BASIC was implemented as a second language capable of utilizing the Vector General software. The unsuccessful implementation of a version of FORTRAN with the display system software and the problems involved are discussed. Conclusions and recommendations are offered, and a detailed user's manual is appended.

Master of Science in
Computer Science
December, 1977

Advisor: George A. Kahe
Computer Science
Department

A Study of the System Development Process

Gabriel Oswaldo Flores-Prado
Lieutenant Commander, Venezuelan Navy
B.S., Naval Postgraduate School, 1977

Management information is of critical importance in modern decision making. The role of the computer in this process is rapidly expanding, creating challenging goals for data processing specialists and functional area specialists alike. A totally integrated computer based management information system (MIS) requires long term planning and design efforts coupled with detailed analysis of information system requirements. The MIS development generally follows a master plan; this master plan contains three major phases: MIS Analysis, MIS Design, and MIS Implementation. The different phases through which the master plan evolves are known as the system development process. This thesis describes the development of the master plan.

Master of Science in
Computer Science
December 1977

Advisor: N. Schneidewind
Computer Science
Department

Multicriteria Integer Zero-One Programming:

A Tree-Search Type Algorithm

Aggelos Konstantinou Simopoulos
Major, Hellenic Army
B.S., Military Academy of Greece, 1959
M.S., Technical University of Athenes, 1965

An algorithm for zero-one integer programming problems with more than one objective functions is developed, implemented and tested. For a multiobjective problem the notion of optimality must be replaced with that of efficiency. A solution is said to be efficient if (1) it satisfies the constraints and (2) no other solution satisfying them scores as well with respect to all objective functions and better with respect to at least one of them. In the presented algorithm, the problem variables are partitioned into two sets; those whose coefficients in the objective functions are all of the same sign, and the remainder. A tree search implicit enumeration algorithm based on this partition is developed and computational results are presented.

Master of Science in
Computer Science and
Master of Science in
Operations Research
December 1977

Advisor: S. T. Holl
Computer Science
Department

DESIGN OF TWO HIGH GAIN, LOW PROFILE HELICAL ANTENNAS FOR OPERATION AT 918 MHz

John Francis Boulary
Captain, United States Marine Corps
B.S.I.E., California State Polytechnic University, 1971

Two helical antennas were designed, fabricated and tested to permit tanks or tracked vehicles to function with a high gain, low profile antenna field pattern for a telemetry system operating at 918 MHz. The electrical properties of the helical antennas were compared to the system's dipole antennas in an attempt to enhance the operating performance of the RMS II/SCORE system. Field measurements were made under the controlled conditions of an antenna field pattern range and while the RMS II system was operational. Antenna properties of gain, beamwidth and efficiency as well as physical size and installation locations were considered for possible inclusion of helical antennas in the telemetry system.

Master of Science in
Electrical Engineering
December 1977

Advisor: G. M. Baycura
Electrical
Engineering

Proposal for a Real Time Automated
Close Coastal and Harbor Navigation System

Timothy M. Grabski
Lieutenant, United States Navy

This thesis is a proposal for an automated, real time navigation system which will be used in a close coastal and harbor navigation environment. Special consideration was given to designing the system in such a manner that the present system of navigation would be retained – no personnel would be either added or removed from the ship's complement, all logs and records would be retained in their current form, and the piloting routine would not be changed. When the system is functioning as designed, real time navigational data will be generated which will be verified by the slower manual plotting method. Should mechanical failure occur, the manual plot already being maintained will take over.

The system design calls for installation of a commercially available desk-top microcomputer with CRT display devices located in remote locations for dissemination of data. The cost of the complete system is less than $4000, and repair is effected by replacement of modules drawn from onboard spares. Considerable flexibility is retained for later changes and additions to the system should such be desirable.

Master of Science in
Electrical Engineering
December 1977

Thesis Advisor: G.D. Ewing
Electrical Engineering
Department

The Effects of Multipath Propagation on the Range Measurement System at Fort Hunter Liggett

Hans Sturhan
Lieutenant Commander, Federal German Navy
B.S.E.E., Naval Postgraduate School, 1976

Walter P. Havenstein
Captain, United States Marine Corps
B.S.A.E., United States Naval Academy, 1971

Instrumentation was developed for investigating the radio frequency link between the A station and the B unit in the Range Measurement System. Propagation effects were characterized using a multipath simulation in a laboratory environment. Field experiments were conducted to investigate the presence of a multipath environment at Ft. Hunter Liggett. The effects of varying the ambient temperature on the A station and the B unit were measured.

Master of Science in
Electrical Engineering
December 1977

Advisors: C. H. Rothauge
M. L. Wilcox
Electrical Engineering
Department

AN INVESTIGATION OF THE POSSIBLE USES OF THE NORMAL MODE HELICAL ANTENNA IN THE TACTICAL ARMY

Michael Dean Vennum
Captain, United States Army
B. S., United States Military Academy, June 1968

This paper briefly discusses the need for electrically short antennas in the combat maneuver units of the modern field army. A brief history of the work done in the field of helical antennas is presented. An approximate mathematical development is presented which describes the radiation fields of the thin normal mode helical antenna. From the radiation fields, the equations for the polarization ratio and the radiation resistance are developed. A possible design for a tactical VHF - FM antenna to cover the frequency range 30-76 MHZ is presented. The design technique is discussed in detail and a calculator program for computing the input impedance is given. The results of experimental testing are presented and recommendations for improvement are given.

Master of Science in Electrical Engineering
March 1978

Advisor: Orestes M. Baycura
Electrical Engineering
Science and Engineering

Single Hydrophone Technique for Obtaining Spectral Source Levels of Marine Mammals in Coastal Waters

Richard M. Bostian
Lieutenant Commander, United States Navy
B.S., University of Florida, 1967

During the annual Gray Whale migration from the Aleutians to Baja California, the mammals travel in coastal waters, thereby presenting an opportunity for the study of their sound spectral and source levels and vocabulary. However, such measurements are distorted by surface and bottom reverberation. Using the theory of rough surface scattering, knowledge of the bottom impedance, and correlation techniques, it is possible to decompose the shallow water reverberation into the contributions from different paths. From this, the range, depth and the deverberated spectral source levels of the sound of the mammal can be determined by use of only one hydrophone rather than the conventional three or four. The theory, deverberation programming, and experimental results are presented for a model of the whale's pulsed radiation in a laboratory model coastal environment.

Master of Science in Engineering Acoustics
December 1977

Advisor: Herman Medwin
Physics and Chemistry Department

Experimental Investigation of the Effects of Fluid Loading on Flexural Waves in Plates

James Laing Jarvis
Lieutenant, United States Navy
B.S.B.A., University of Florida, 1968

An experimental investigation was conducted of the effects of fluid loading on axially symmetric flexural waves in a circular aluminum plate 25 in. in diameter and 5/16 in. thick. Measurements were made of the flexural wavelength and natural frequencies with the plate in air, and with water loading on one side, over a frequency range from 20 kHz to 80 kHz. The critical (coincidence) frequency, that frequency at which the speed of the flexural wave equals the speed of sound in water, occurs at approximately 45 kHz. The measured flexural-wave speeds with air loading are in good agreement with theory. With water loading, the wave speed decreases, the amount of decrease increasing to approximately 14 percent below the in-air value just below the critical frequency. At the critical frequency, the wave speed appears to jump to values nearly equal to the unloaded values. Radiation patterns were obtained and when edge effects are eliminated, are in qualitative agreement with theoretical predictions for an infinite fluid-loaded plate.

Master of Science
in Engineering Acoustics
December 1977

Advisor: O. B. Wilson
Physics & Chemistry
Department

Sound Transmission from a Tapered Fluid Layer into a Fast Bottom

Gregory Bertman Netzorg
Lieutenant, United States Navy
B.S., Oregon State University, 1970

Acoustic energy transfer from a tapered fluid layer into a fast bottom was investigated experimentally using fresh water and a saline solution separated by a sheet of 0.5 mil mylar. A 150 kHz pulsed signal was excited in the upper layer and a receiver in the lower fluid layer was used to determine the acoustic field. Measurements were made for taper angles of 1.52°, 2.51°, and 4.41° and for ρc ratios of 0.745 and 0.836. Beams were observed in the lower layer, beginning at points where the depth of the tapered layer equals a cutoff depth for a normal mode. The experimental beam patterns agree well with the theoretical predictions for angles from grazing to the angle where the maximum pressure amplitude is reached. For greater angles, experiment and theory significantly diverge.

Master of Science in
Engineering Acoustics
December 1977

Advisor: J. V. Sanders
Physics and Chemistry
Department

Signal Enhancement of Specularly Scattered Underwater Sound

Robert Bishop Shields, Jr.
Lieutenant, United States Navy
B.S., U.S. Naval Academy, 1972

The wind driven surface of a model ocean was used to study the simultaneous amplitude fluctuations of 31 specularly scattered harmonic components from 5 kHz - 150 kHz. The temporal variations of the scattered components show maxima and minima whose anticorrelation depends on the sound frequency ratio. Significant signal enhancement can be obtained through timely frequency switching between a base frequency and its second harmonic. This gain is found to depend on the effective surface roughness, $g^{\frac{1}{2}} = \frac{4\pi\sigma}{\lambda} \cos\theta$ (where σ = RMS wave height and θ = angle of incidence), the duration of the experiment, and the switching threshold. For example, for a switching threshold 3 dB below the mean amplitude of the base frequency, the gain is about 5 dB at $g^{\frac{1}{2}} = 0.25$ and approximately 3 dB for $1 \leq g^{\frac{1}{2}} \leq 2$. This was the average gain observed for runs lasting for five ocean surface wave periods. Using only the coherent component of the signals provides greater gain for the higher roughnesses ($1.35 \leq g^{\frac{1}{2}} \leq 2.0$).

Master of Science in
Engineering Acoustics
December 1977

Thesis Advisor: H. Medwin
Physics Department

Total Contractor Logistics Support:

A New Concept in Naval Aviation

Antonio Apap
Commander, United States Navy
B.S., University of West Florida, 1970
M.B.A., Texas A & I University, 1976

This thesis investigates a new concept in Naval Aviation: total contractor logistics support. The Federal Government's policy of relying on the private sector for goods and services, as promulgated in OMB Circular No. A-76, is examined in depth. The history and present experiences of the military services concerning contractor aviation logistics support are outlined and discussed. The Navy's T-44A program, including the acquisition, total logistics support contract, and the Navy's experience with this first "turn key" operation of aircraft, is discussed in depth. Finally, the major advantages and disadvantages of total contractor support in Naval Aviation are explained and analyzed.

Master of Science in Management
December 1977

Advisor: J. W. Creighton
Co-Advisor: J. P. Mulligan
Dept. of Administrative Sciences

Acquisition Management of Peculiar Ground Support Equipment

Rodney Donald Beran
Naval Weapons Center, China Lake, California
B.S. E.E., University of Wisconsin, 1964

Paul Roger Decker
Naval Weapons Center, China Lake, California
B.A. Physics, San Jose State University, 1966
M.A. Physics, University of Wisconsin, 1963

The methods used by the Naval Air Systems Command (NAVAIR) in the acquisition of Peculiar Ground Support Equipment (PGSE) was the object of a study which reviewed policy, procedures and management techniques. Particular emphasis was placed on a review of the managerial innovations being employed by the F-18 project, e.g., funds control by the Assistant Project Manager for Logistics and phased support.

The study made several observations as to the potential for success of the F-18 project's new methods. Additionally, the authors recommended several changes to the NAVAIR management structure for long-term improvement in PGSE acquisition, the most significant of which involves the transfer of the Ground Support Equipment Division (NAVAIR-534) to the Logistics/Fleet Support Group (NAVAIR-04).

Master of Science in Management
December 1977

Advisor: J. W. Creighton
Co-Advisor: J. B. Hall

The Small Business in Government Procurement: Some Problems and Causes

Robert Kabel Bonner
B.S.E.E., University of California, Berkeley, 1964
M.S.E.E., University of California, Berkeley, 1967

It is the declared policy of the Congress that small business shall be assisted and its interests protected to preserve free competitive enterprise. Specifically, it shall receive a "fair proportion" of government contracts. Whether the "fair proportion" policy is effectively executed is moot; however, there are forces within the procurement process which work to the greater detriment of small business. Implicitly, then, small business could benefit more from government procurement than it does.

This paper examines several definitions of "small business," and discusses a number of characteristics which differentiate the small firm from the large. Economic, social and cultural contributions of small business are presented. Small business policy is presented in terms of the committee structure and legislative acts of the Congress. Utilization of the government contract to achieve socio-economic goals is described. Finally, a few problems that small business encounters are discussed in terms of their impact and causes.

Master of Science in Management
December 1977

Thesis Advisor: J.W. Creighton
Administrative Sciences Department

The U. S. All Volunteer Army: A Societal Commentary to its Evolution and its Future

Philip E. Bunyan
Major, Australian Army
B. Comm., University of New South Wales, 1974

Does the armed forces of America reflect the rest of American society? This study indicates that the formation of the U.S. all-volunteer service was a direct result of societal pressures which commenced prior to the Vietnam conflict. The basis for an all-volunteer force is to be found in the general decline of mass armies in association with the question of legitimacy. The Vietnam conflict became the finale to the U.S's decline process. The military has attempted to appease a number of current social trends, such as service conditions, women in the services, and the isolation syndrome; however, emerging societal pressures remain unnoticed. The all-volunteer service is here to stay; however, its quantity and quality will rely upon the ability of the military to recognize and adjust to emerging societal pressures. Emerging societal pressures have been identified and possible solutions have been recommended including a detailed examination and possible adoption of a British regimental type organization. In conclusion, a seven step flow procedure is recommended to ensure that alienation between the military and the society it protects is minimal.

Master of Science in Management
December 1977

Advisor: J. W. Creighton
Administrative Sciences Department

Cruise Missile:
An Examination of Development Decisions and Management

Thomas Joseph Canfield
Lieutenant Commander, United States Naval Reserve
B.A., Pennsylvania State University, 1963
M.A., Northeastern University, 1974

and

Raymond A. Kellett Jr.
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1968

This thesis examines the decision making process which led to the development of the cruise missile. Development philosophies and management methods are addressed as well as an analysis of the events external to the development programs which impacted on the development of cruise missiles. An historical time line is established by fiscal year.

Master of Science in Management
March 1978

Advisor: A. C. Crosby
Department of
Administrative Sciences

Acquisition and Allocation of Aerial Target Systems

Michael Edward Chandler
Lieutenant, United States Navy
B.S., Auburn University, 1971

and

John Siembieda
Commander, United States Navy
B.S., University of Pennsylvania, 1959
B.S., Naval Postgraduate School, 1966

This report presents background information and data which describe the acquisition and allocation system for powered aerial target systems in the U.S. Navy. That basic foundation is used to formulate and test an optimization model which describes the targets program. The model, which is the result of the application of linear programming techniques to the optimization problem, is useful to targets program managers in determining a cost-effective acquisition and allocation plan for target systems. Projected data inputs are introduced into the model to obtain an optimal strategy for fiscal year 1981 which is illustrative of the applied use of the computer-assisted mathematical model to an actual management problem.

Master of Science in Management
March 1978

Thesis Advisor: W.M. Raike
Operations Research Department

An Analysis of the Management of Reliability and Maintainability in the Navy F-18 Program

Gary Newton Cook
Lieutenant Commander, United States Navy
B.B.A., Texas A&I University, 1973

and

Robert Wayne Russell
Lieutenant, United States Navy
B.S., Purdue University, 1971
M.S., Naval Postgraduate School, 1977

The F-18 Program is the first aircraft acquisition in which the principles of the Navy's "New Look" in reliability and maintainability (R&M) have been applied. A prime objective of the program is to develop an aircraft which will significantly improve fleet readiness and reduce life cycle costs. R&M have been recognized as the key to achieving this objective. The Navy has included an Awards Payment Plan in the incentive contract which provides a substantial profit potential to the contractor for cost-effectively exceeding minimum contract R&M requirements as well as for efficient program management in accomplishing program milestones. The contractor has responded with innovative development and testing programs to achieve the program objectives. This thesis describes and analyzes the management of R&M in the F-18 development and compares the predicted results with current fleet aircraft.

Master of Science in Management
March 1978

Thesis Advisor: M.B Kline
Administrative Sciences Department

Collective Action in the Armed Forces of the United States

John B. Creel, Jr.
Major, United States Marine Corps
Bachelor of Science, The Citadel, 1964

A growing need among service personnel to take collective action to protect their social and economic status appears to have developed during the last decade. Past studies of this phenomenon have been, for the most part, limited to examining one means by which collective action can be achieved -- military unions. This paper takes a broader look at collective action in the military by examining the two basic types of military collective action groups -- military associations and military unions. Social, economic, legal, and attitudinal factors which will determine the direction and shape the means of military collective action are considered. It is concluded that military associations and military unions are both capable of effectively fulfilling the collective action needs of military personnel -- each having unique advantages and disadvantages. Circumstances appear to mitigate against military unionism at this time (e.g., the present national mood against military unions). Therefore, military associations appear to be a more viable alternative for collective action.

Master of Science in Management
March 1978

Advisor: J.D. Senger
Department of Administrative Science

A Comparison Between the Royal Navy and the United States Navy of the System Acquisition Process and Project Control

Gregor Gordon Ashley Cumming
Lieutenant-Commander, Royal Navy
M.A., Cambridge University, England, 1969

This thesis explores the process of major systems acquisition in Britain and the United States. It describes the process of initiation and development of systems from the management view-point, and also the methods used by each government for control of the project and the contractor. The differences between the systems of the two countries are highlighted.

Many differences are described, some of which are attributable to the georgraphic size or the resources of each country. Others are attributable to the fact that there are more than one way of operating efficiently, and finally, it is concluded that there are differences in which one country would benefit by heeding the practices of the other.

Master of Science in Management
December 1977

Advisor: M. B. Kline
Administrative Science Department

Cost Effectiveness Analysis of the FFG-7 Combat System Land Based Test Site

Lucian Charles Evans
Commander, United States Navy
B.S., U.S. Naval Academy, 1959

and

Henry Frederick Dalton
Lieutenant Commander, United States Navy
B.S., U.S. Naval Academy, 1963

The use of land based test sites has proved to be an effective means of reducing risk in the development of ship systems at the front end of the acquisition. The Combat System Land Based Test Site (CSLBTS) was used in the FFG-7 Guided Missile Frigate program to demonstrate the integration and effectiveness of the combat system prior to the production decision for the follow ships of the class. This thesis is an after-the-fact economic analysis of the FFG-7 CSLBTS, which showed it to have been cost effective. The analysis section of the thesis can be used as a model for use in conducting similar analyses in future ship acquisitions.

Master of Science in Management
March 1978

Thesis Advisor: M.G. Sovereign
Operations Research Department

Evolution and Implementation of Office of Management and Budget Circular A-109

Donald Leslie Finch
Lieutenant Commander, United States Navy
B.S.E.E., Purdue University, 1965
M.S.A.E., Naval Postgraduate School, 1977

This thesis investigates the evolution and implementation of Office of Management and Budget Circular A-109, "Major System Acquisitions". The presentation begins with background material illustrating the evolution of acquisition principles incorporated in Circular A-109, particularly the recommendations contained in the Commission on Government Procurement. The policies of Circular A-109 to be followed by executive branch agencies in the acquisition of Major Systems are analyzed in detail as to content and interpretation.

Three areas of major change to the Department of Defense and the Department of the Navy acquisition policies and procedures as a result of the implementation of Circular A-109 are presented. The Navy's Shipboard Intermediate Range Combat System Program is examined as one of the first full-scale attempts to implement the Circular A-109 policies. Lessons learned from the initial implementation of Circular A-109 are described in the form of improvements to Major System Acquisition.

Master of Science in Management
December 1977

Advisor: M. B. Kline
Dept. of Administrative Sciences

The Importance of Socio-Economic Factors in Recruiting and Sustaining the All-Volunteer Force

Stephen G. Foti
Lieutenant, United States Navy
B.S., United States Naval Academy, 1972

This thesis investigates the importance of socio-economic factors in recruiting and sustaining the All-Volunteer Force. It reviews previous research which explored the inherent factors of the recruiting effort in attaining enlistment standards. It considers the problem areas and goals of attracting and recruiting sufficient numbers of qualified enlisted personnel to fulfill the manning level requirements needed to satisfy military operations and missions. In addition, a brief history of military manpower procurement from a draft environment to the transition of volunteerism is included.

The concepts of enlistment standards, factors influencing enlistment, and incentives enhancing enlistment are also discussed. This report concludes with recommendations concerning proposed changes to ensure the viability of the recruiting effort in sustaining the All-Volunteer Force concept.

Master of Science
in Management
March 1978

Advisor: J. W. Creighton
Administrative Sciences
Department

Test and Evaluation for an
Air-Launched Guided Missile Program

Kennerly Wendell Funk
Naval Weapons Center, China Lake, California
B.S.,M.E., California State University, Fresno, CA, 1964
M.S.,G.E., University of California at Los Angeles, CA, 1967

Richard Loraine
Naval Weapons Center, China Lake, California
B.S. Ind. Mgt., Washington University, St. Louis, MO, 1964

This thesis evaluates the Navy's test and evaluation (T&E) process for air-launched guided missiles, identifies T&E management problems, and proposes utilization of a particular test program strategy. Many changes have been made to improve the T&E process, but some of these have resulted in costly inefficiencies. Contributing problems include: the operational test agencies do not participate adequately in early test planning, excess duplication exists in testing done by major participants in the Navy air-launched guided missile T&E process, lack of definition of a mission profile leads to improper and inadequate testing of air-launched guided missiles, and numerous other T&E management problems.

The utilization of an Integrated Test Program approach for air-launched guided missile T&E is proposed. Test data from contractor demonstration tests, limited TECHEVAL, and OPEVAL would be pooled to confirm compliance with specification requirements and verify operational effectiveness and suitability. Test assets and other resources would be conserved and overall T&E schedule improved.

Master of Science in
Management
December 1977

Advisor: M. B. Kline
Dept. of Administrative Sciences

Solar Energy for the Naval Shore Establishment

Bruce Burgee Geibel
Lieutenant Commander, Civil Engineer Corps, United States Navy
Bachelor of Architecture
Clemson University, 1965

This thesis discusses the background and extent of the current national energy crisis, and reviews the alternative energy sources available to the United States Navy other than conventional fossil fuels. An in-depth analysis is made of the advantages, disadvantages and techniques of one of these alternatives, solar energy conversion. The National Solar Energy Program is reviewed, as is the role of the Department of Defense and the United States Navy in this program. Methods of "retrofitting" existing Navy facilities with solar energy systems are discussed, as are new construction techniques. The thesis further contains techniques for life-cycle costing of alternative solar energy systems, which includes computer model programs such as BASIC Language, F-Chart calculations, and SOLCOST calculations. The thesis concludes with suggestions for establishing a viable solar energy program on an activity or individual basis. A comprehensive reference list and bibliography is provided to identify where technical and engineering details can be found.

Master of Science in
Management
December 1977

Advisors: J. W. Creighton
J. C. Tibbitts
Department of
Administrative Sciences

An Economic Analysis of Life Cycle Military Manpower Maintenance and Training Requirements in Avionics Minicomputer and Microcomputer Systems

Dennis Harry Genovese
Lieutenant, Junior Grade, United States Navy
B.S., University of Oklahoma, 1974

The dramatic advances within the electronics industry over the last few decades have brought about several equally effective computer design alternatives for use in military avionics systems. This report is an attempt to examine the maintenance personnel and training Life Cycle Costs associated with three of these alternatives; (1) Consolidated Mission Computer, (2) Federated Homogeneous Computer System, and (3) Federated Heterogeneous Computer System. The computations indicate that the Federated Homogeneous System is the most cost effective alternative.

This report is intended as an input to the research being conducted by LCDR James Buttinger and Associate Professor Uno Kodres for the Naval Weapons Center, China Lake, titled "A Study of Alternatives for VSTOL Computer Systems."

Master of Science in Management
March 1978

Advisor: J. D. Buttinger
Administrative Sciences Department

ZERO BASE BUDGETING - A COMPARATIVE ANALYSIS

Richard Howard Gunderson
Lieutenant-Commander, United States Navy
B.A., University of Washington, 1968

Zero base budgeting is neither a new concept nor one founded in the traditions of private and public budget systems. It is, instead, the latest in a long series of budget reform movements bent upon rationalizing an otherwise incremental process. No longer a theoretical construct in search of an application, successful instances of zero base budgeting are more frequently being encountered in state government as well as private enterprise. Implementation in the federal sector, however, poses new difficulties which must be recognized lest zero base budgeting follow the course of previous reforms. By examining the budget reform movement as well as current zero base applications, this thesis attempts to identify those difficulties, offer possible solutions, and in so doing, outline an approach to federal implementation.

Master of Science in Management
December 1977

Advisor: Al C. Crosby
Administrative Sciences Department

Cost Effective Training for Navy Senior Petty Officers

Francis K. Holian
Lieutenant Commander, United States Navy
B. S., U. S. Naval Academy, 1968

This thesis looks at cost differences for training Navy senior petty officers (E-8 - E-9). It explores the role of these petty officers, investigates the types of professional training that should be provided to these individuals, and proposes criteria for assessing the cost effectiveness of such training. This study also identifies alternative means of providing such training, analyzes them in terms of the cost effective criteria and recommends a best course of action for the Navy to pursue.

Master of Science in Management
December 1977

Advisor: LCDR Ray Forbes
Administrative Sciences Dept

Enhancement of Executive Potential

David Blais Howe
Lieutenant, United States Navy
B.S., United States Naval Academy, 1971

Glenn R. Deacon
Lieutenant, United States Navy
B.S.E.E., University of New Mexico, 1971
M.S.E.E., Naval Postgraduate School, 1976

This thesis contains an examination of previous works in the area of executive ascendancy and provides commentary on the various concepts proposed in those works. The authors' ideas as to how aspiring individuals can enhance their potential to reach executive stature follows. Whereas most previous works deal with only a few concepts of executive ascendancy, this work is presented with a view toward the overall concept as a multifaceted effort which must take place within a dynamic environment.

Master of Science in
Management
March 1978

Thesis Advisor: J.W. Creighton
Administrative Sciences
Department

V/STOL A Avionics Acquisition Strategy

Marshall Neil Jackson
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1963

and

Edward Brigham Hontz
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1967

The transition to V/STOL aircraft has been proposed as the direction of naval aviation in the post 1990 time frame. This thesis examines the acquisition strategy for the development of the avionics for the V/STOL A aircraft. Prior to reviewing the program's baseline acquisition strategy the various program constraints are discussed. These include policy dictates, nature of the V/STOL requirement, systems engineering principles, and the major weapons systems acquisition process.

Alternatives available to the program manager for the various aspects of the baseline acquisition strategy are developed and analyzed. The major items of discussion in this section include project organization, technological advancement, major participants' task breakdown, and the timing of the several phases of the development.

Master of Science in Management
December 1977 & March 1978

Advisor: L. Darbyshire
Administrative Science Department

Life Cycle Cost Analysis in Building Design

Kenneth C. Kelley
Lieutenant Commander, Civil Engineer Corps, U. S. Navy
Bachelor of Architecture
University of Illinois, 1963

Life cycle cost analysis has been a part of good architectural design for many years. It has received even greater attention as the energy crisis makes it more clear that architects and owners must plan with greater emphasis on life cycle cost (LCC) versus initial construction cost. This thesis investigates the formulas and procedures currently used and illustrates life cycle cost analysis as applied to building operating cost savings, maintenance cost savings, and savings on replacement of building components and systems. Included is a discussion of the Economic Building Performance Model now used by the Western Division Naval Facilities Engineering Command, and current federal agency efforts to apply LCC concepts to building design.

Master of Science in Management
December 1977

Advisor: J. C. Tibbitts
CDR, CEC, USN

Statistical Analysis of the Relationship
Between the Defense Burden and the Economic
Growth of the Republic of Korea

Yong Chan Kim
Lieutenant Colonel, Republic of Korea Air Force
B.S., Republic of Korea Air Force Academy, 1963
M.B.A., Graduate School of Business Administration,
Korea University, Seoul, Korea, 1969

This study concerns the relationship between defense expenditures and economic growth between 1961 and 1976 in the Republic of Korea. The chief emphasis is on statistical and economic analysis of the relationships between the defense burden (defense expenditures as a percent of GNP) and the GNP growth rate (rate of change in 1970 constant value of GNP). Also considered is the effects of investment rates, foreign aid receipts, and other economic variables concerning this relationship.

Master of Science in
Management
December 1977

Advisor: J. D. Buttinger
Department of
Administrative Sciences

CGN 41:
A Case Study of Ship Procurement

David J. Klinkhamer
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1966

Derry T. Pence
Lieutenant, United States Navy
B.S., University of Arizona, 1970

This thesis presents, in a case study format, the conflict between Newport News Shipbuilding and Drydock Company and the Navy over the execution of the option to build the CGN-41. In the case, the reader is taken from the time of the signing of the original contract in 1971 through the events leading to the negotiated settlement reached by Mr. Gordon Rule.

Emphasis is placed on Newport News' contention that this option was invalid, the events leading to a work stoppage by Newport News and a Federal District Court's order for both parties to negotiate in good faith, and finally the events leading to Mr. Rule's appointment and the validity of the agreement by him with Newport News. Additional information is provided as Technical Notes to the case, which include: Shipbuilding in the U. S., Newport News, Ship Procurement and Claims Procedures. A Teaching Note is provided to assist in application of the case to a Ship Acquisition Management course.

Master of Science in Management
March 1978

Advisor: S. M. Dean
Dept. of Administrative Sciences

Analysis of Organizational Aviation Maintenance Training Within the United States Marine Corps

Coleman Daniel Kuhn Jr.
Major, United States Marine Corps
B.S., University of Wisconsin, 1966

A systems analysis of the Marine Corps' organizational aviation maintenance training program was conducted. A survey, using a research interview and questionnaire, covered a total of ten Marine squadrons in two of the three active Marine Aircraft Wings to identify the existing state of individual aviation maintenance training that is currently performed at the squadron level. Responses were analyzed with appropriate nonparametric tests, aggregated, and compared to common elements of the individual training programs from the other services. Conclusions identified the existing state of aviation maintenance training relative to an emphasis on unit training. It was recommended that a serious review of individual training be conducted and, that modifications to positive programs of the other services be considered as possible improvements to the current Marine Corps individual training program.

Master of Science in Management
December 1977

Advisor: James K. Arima
Administrative Science Department

Ordering and Handling Materials for Major Public Works Department Jobs

Joseph David Kunz
Commander, Civil Engineer Corps
United States Navy
B. ARCH., University of Texas, 1960

This thesis examines the procedures for obtaining materials for major jobs on real propcrty facilities by the Public Works Department at a Naval Shore Activity. A detailed description is provided of the current procedures at the Naval Postgraduate School, Monterey, California, for identifying, ordering, monitoring, receiving, storing and retrieving the needed items. Discussion is focused on those methods which are considered inefficient and on alternative methods to supplant them. The thesis concludes that the efficiency of the current procedures can be significantly improved and makes specific recommendations to effect the improvements. A summary of all recommendations is provided in the concluding chapter.

Master of Science in Management
December 1977

Advisor: J. W. Creighton
Co-Advisor: A. W. McMasters
Administrative Sciences
Department

A Study of the Selection of an Information Flow and Analysis System for Naval Underwater Systems Center

Gordon Calvert Lannou, Jr.
Lieutenant, United States Navy
B.S.E.E., University of Texas, 1972

The Naval Underwater Systems Center (NUSC) located in New London, Connecticut, has a need for an Information Flow and Analysis System (IFAS) for the Sonar Operational Training and Assessment Program (SOTAP). The study addresses the requirements for sonar operational programs. It discusses basic differences between weapons and information systems, and proposes a systems approach for the acquisition of a basic management information system. It presents the information system alternatives available to the SOTAP management and describes the existing information system, Personnel Training and Evaluation Program (PTEP). It discusses PTEP's FY 78 incorporation into the Navy's Versatile Training System (VTS) and how PTEP may be expanded and changed under VTS to include the sonar rating aboard Fleet Ballistic Missile (FBM) submarines with the end goal of improving ultimate user (sonar technicians) knowledge and performance of sonar weapons systems.

Master of Science in Management
March 1978

Thesis Advisor: J.W. Creighton
Administrative Sciences Department

An Analysis of Navy Construction Contract Change Order Audits

Deane Edward Leidholt
Lieutenant, Civil Engineer Corps, United States Navy
B. Arch., Montana State University, 1970

Paragraph 3-801 of the Armed Service Procurement Regulation requires that an advisory audit be performed for all one-source negotiated procurement actions exceeding $100,000. This study examines the current usability of these advisory audits in the negotiation of Navy construction contract change orders. A survey was conducted to determine how audits are currently used and to solicit suggestions on how current procedures might be improved. Analysis of the response identified five recommendations for consideration by policy-making managers in the Navy construction contract administration organization. These five recommendations are (1) to recognize different group backgrounds and experience levels in the formulation of audit guidance, (2) to prepare a comprehensive informational reference, (3) to implement audit training and education, (4) to increase contractor awareness of informational responsibilities, and (5) to require direct communication between contract administrators and auditors.

Master of Science in Management
December 1977

Thesis Advisor: J.W. Creighton
Administrative Sciences

Standardization of Nuclear, Biological, and Chemical (NBC) Defense within the Fleet Marine Force (FMF)

Carl R. McClain
Major, United States Marine Corps
B.S., Northern Arizona University, 1965

Gregory S. Kuzniewski
Captain, United States Marine Corps
B.S., Villanova University, 1967

This thesis summarizes the history of NBC warfare and the NBC threat and policies exhibited by today's world powers. It analyzes the structure of NBC defense policies, training and operations within the U.S. Marine Corps. It presents a standardization proposal designed to remedy the existing incongruities and establish a viable NBC defense program for the Fleet Marine Force.

Master of Science in Management
September 1977
December 1977

Advisor: LCDR J. D. Buttinger
Department of Administrative Science

A Life Cycle Cost Study of Contractor Versus Organic Support of Aircraft Programs

John Joseph McMenamin, Jr.
Lieutenant Colonel, United States Marine Corps
B.S., Auburn University, 1974

This thesis conducts a cost comparison between contractor and organic support for the CH-53 Aircraft in two major operating cost areas, training and aircraft overhaul. A life cycle cost approach is used and cost differentials are found for the twenty year life expectancy of the CH-53 system. The intent of the study was not to criticize or change the existing system, but rather to provide cost data and planning insight for future aircraft systems.

Master of Science in Management
December 1977

Advisor: J. D. Buttinger
Department of Administrative Sciences

THE CHANGING ROLE OF NAVY RESEARCH AND DEVELOPMENT LABORATORIES IN SYSTEMS ACQUISITION

Richard G. Moe
Civil Service, United States Navy
B.S.M.E., North Dakota State University, 1962

The role of the Navy Research and Development Laboratories has, historically, lacked precise definition. Budgetary pressures result in a continuing assessment of the in-house laboratory asset requirements. Recent improvements in mission and role assignments and laboratory resource management should be expanded and focused to guide any contemplated changes in the size or the make-up of the laboratory system.

This study attempts to (1) summarize the laboratory missions and goals; (2) describe the NAVMAT laboratory resources and capabilities; (3) summarize the various studies on the laboratory system; (4) examine new and evolving weapons acquisition policy for impact on the laboratory system; and (5) suggest management techniques for organizational change.

Master of Science in Management
December 1977

Advisor: J. W. Creighton
Department of
Administrative Sciences

Co-Advisor: R. M. Hillyer
Naval Weapons Center

Income Redistribution: An Alternative Approach To Military Pensions

Peter Edward O'Connor
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1965

Proposals have been made both within Congress and the Executive Branch to alter the structure of the military non-disability retirement system. The advocates of change, for differing reasons, view with alarm the rapidly increasing cost of military retirement. Each suggests an alternative by which the government will be able to control the growth in military retirement costs. However, these proposals require a reduction in the value of the annuity to be paid to future retirees. An income redistribution alternative is presented which would reduce the annual cost while retaining for future retirees a present value of retirement income equal to or exceeding that provided by the existing retirement system. It was concluded that the complexity and political sensitivity of the military retirement issue precludes change in other than an incremental or indirect manner.

Master of Science in Management
December 1977

Advisor: LCDR G.F. Owens, SC, USN
Administrative Sciences Department

Inventory Migration from the Naval Electronic Systems Command to the Ships Parts Control Center

Alan J. Pettersen
Lieutenant, Supply Corps, United States Navy
B.S., University of Minnesota, 1969

Michael W. Casey
Lieutenant, Supply Corps, United States Navy
B.S., U.S. Naval Academy, 1970

The Chief of Naval Material has recently reemphasized transfer of inventory management from Hardware Systems Commands to the Naval Supply Systems Command. This study of the various aspects of the stock transfer process was requested by the Naval Electronic Systems Command (NAVELEX) as an asset in identifying which of their items should be transferred to the Ships Parts Control Center (SPCC). The approach taken was to first determine and evaluate the methods of inventory management used by NAVELEX and SPCC. The second step was to conduct a computer analysis of demand data of items managed by NAVELEX to see if any criteria would be suggested to provide guidelines for transferring an item. While no criteria were developed within the time frame of this research, the comparison of the methods of inventory management suggests that a majority of items should be transferred to SPCC.

Master of Science in Management
March 1978

Advisor: Alan W. McMasters
Administrative Science Department

An Investigation of the Effectiveness, Selection and Evaluation of Navy Exploratory Development Programs

Dennis L. Potts
Naval Weapons Center
Department of Defense
B.S.M.E., University of Nevada, 1969
M.S.M.E., University of Nevada, 1971

An investigation is made of the Navy Exploratory Development Program; its newly revamped management system, its organization and underlying rationale. The investigation then addresses the processes of program selection, review and evaluation as applied to technology base programs, followed by an overview of a methodology called "Evaluation Research" as it applies to goal-oriented programs. The paper is directed toward determining the effectiveness of technology base programs, with a major emphasis on the changing structure of the Exploratory Development Program within the Department of the Navy.

Master of Science in Management
December 1977

Advisor: J. W. Creighton
Administrative Sciences Department

Co-Advisor: A. C. Crosby
Administrative Sciences Department

Determining Discount Rate in Iran and
Its Role in Resource Allocation

Gholamhossein Radfar
Lieutenant Commander, Imperial Iranian Navy
B.S., Imperial Iranian Military Academy, 1967

Definitions, concepts, the rules for investment decision, and the method to compute the rate of return and the social discount rate are presented. By taking the historical data in industrial, services and agriculture sector in Iran the rate of return as an indicator of the social discount rate is computed. Then the role of the social discount rate in resource allocation and its role in economic growth and public sector investment are presented.

Master of Science in Management
December 1977

Advisor: J. D. Buttinger
Department of
Administrative Sciences

Mid-Career Patterns in the Navy's Civilian Professional Work Force

Jerry Woodrow Reshew

A survey of mid-level professional civil service Navy employees disclosed manifestations of frustration exist in sixty percent of the respondents. This characteristic relates to the mid-career and mid-life crisis identified by researchers and directly affects the fabric of which organizations are woven. Certain organizational identification is described and age groupings within the population are correlated with existing theories.

Removal of the element of frustration from the perceived career patterns has a benefit which can be measured and the affect on the organization is material. A long term educational experience is suggested as a device for allowing introspection and revitalization of the employee, thereby creating a challenge which has rewards to the organization and the employee. A cost/benefit analysis is presented.

Master of Science in Management
March 1978

Advisors: C. B. Derr
R. A. McGonigal
Administrative Sciences Department

Perceptions of United States Coast Guard
Women Concerning Their Integration
Into Active Service

Terry William Sinclair
Lieutenant Commander, United States Coast Guard
B.S., United States Coast Guard Academy, 1967

This thesis is a report on current perceptions of problems of women integrating into the ranks of the U. S. Coast Guard as seen by those woemn and their male co-workers. A questionnaire was developed to survey all Coast Guard women for their opinions. An equal size sample of opinions of Coast Guard men was drawn for comparitive purposes. The results of these surveys are presented as statistical information and quotations of opinions of the responcees. The information presented may be of use to managerial and supervisory personnel at all levels of the Coast Guard.

Master of Science in
Management
December 1977

Advisor: Richard A. McGonigal
Department of
Administrative Sciences

Jacob A. Stockfisch

and the

Social Discount Rate Revisited

Larry Joe Stamper
Captain, United States Marine Corps Reserve
B.S., Oklahoma State University, 1968

This paper attempts to update the work done by Jacob A. Stockfisch on the social discount rate and published in 1969. Because of the widespread use of a discount rate quite close to his and because of the economic turbulence occurring subsequent to his periods of measurement, it seeks to examine the validity of his results when using current computed rates of return and current inflation index deflators.

Master of Science in Management
December 1977

Advisor: LCDR J. D. Buttinger
Department of Administrative Sciences

Technology Transfer -

a Look at the Federal Sector

David Richard Timmons
Lieutenant Commander, United States Navy
B.S.B.A., University of Minnesota 1966

An important resource in the search for solutions to serious issues confronting the United States is the science and technology which result from Federally funded research and development. To obtain the optimum return on this significant investment requires that the resultant technology be adapted for secondary utilization and/or be transferred to primary and secondary users. This paper describes the magnitude and scope of Federally sponsored research and development and describes the major Federal technology transfer efforts. While present technology transfer efforts, mostly passive, are necessary, the need for more active methods is pointed out. The Federal government is seeking ways to improve its technology transfer effort. General agreement on the following actions appears to exist: stronger support by Federal research and development management, and increased commitment of personnel and funding to the Federal technology transfer effort.

Master of Science in Management
March 1978

Advisor: J. W. Creighton
Department of Administrative Sciences

Constraints Influencing Measurement of the Utilization of Unrestricted Line Officer Financial Management Subspecialists

by

William Barclay Tirrell
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1968

The ability to measure the utilization of Unrestricted Line Officer Financial Management Subspecialists is a function of knowing what is being measured and the constraints that must be accounted for to get an accurate result.

One of a number of possible equations usable as a measuring device is presented along with discussion of several constraints viewed as impacting on the measurement. Where possible, quantitative data has been presented to demonstrate the impact.

Finally, several means are presented for controlling the constraints or at least accounting for them in the analysis of utilization.

Master of Science in Management
March 1978

Advisor: Lynn Paringer
Administrative Science Department

The AGOR-21 Class Oceanographic Research Ships: An Acquisition Analysis

Cary G. Van Haaren
Lieutenant Commander, Supply Corps, United States Navy
B.S., United States Naval Academy, 1965

The use of commercial "off the shelf" products, commercial standards and business practices to meet Defense material needs is receiving increasing attention. Defense acquisition policy-makers believe that using commercial products and standards is one way to reduce acquisition costs while still meeting mission needs.

This thesis is a history and analysis of a successful ship acquisition program which utilized commercial standards and practices. Two current ship acquisition programs using the same concept are briefly described. The intent is to illustrate the development of the acquisition concept and the project manager's strategy as well as describe the planning and execution of the program. Significant management problems were encountered due to use of commercial standards and practices. Emphasis is given to their solution. Contractor and ship operator evaluations of the program are provided. Several recommendations are made concerning use of commercial standards and practices for future acquisition programs.

Master of Science in Management
March 1978

Advisor: J. W. Creighton
Administrative Sciences Department

Improving Equipment Readiness in the Marine Corps

William Henry Westhoff
Major, United States Marine Corps
B.S., St. Francis College, 1961

Equipment readiness is an essential component in maintaining the Marine Corps as this country's "Force in Readiness." This thesis used a survey of the logistic system operators to identify the four major improvement goals of command interest, improved training, better use of personnel and a revised stockage criteria to enhance Fleet Marine Forces equipment readiness. Managerial techniques, such as management by objectives, process analysis and variable stockage criteria, are presented as possible means of attaining the goals identified in the survey.

Master of Science in Management
December 1977

Thesis Advisor: A.W. McMasters
Administrative Sciences Department

A NUMERICAL ANALYSIS OF ERRORS IN A BOMBING SYSTEM

Ronald Chambless
Captain, United States Marine Corps
B.S.E., Arkansas State University 1971

An analysis based primarily on computations is conducted to determine errors in a bombing system similar to that currently under test and development by the Marine Corps.

There are many parameters in the system determining point of impact. Included are point of release and velocity at that point, air density, the mass and drag coefficient of the bomb, its cross sectional area, and the wind structure. Most values are not known with the desired accuracy but are estimated, say, from radar measurements, for position.

This study estimates as much as possible the error in predicting the point of impact as a consequence of such factors as random uncorrelated noise in the radar measurements, errors in estimating density, errors in the wind structure, and errors due to initial conditions.

Master of Science with major in Mathematics
March 1978

Advisor: Frank D. Faulkner
Mathematics
Department

Shock Induced Structural Response

Jose Gonzalo Gallo
Lieutenant, Peruvian Navy

An infinitely long, ring-stiffened, submerged, elastic cylinder having uniformly spaced elastic bulkheads is the structure considered. Loading is applied by a plane acoustic shock wave with front parallel to the cylinder axis. Dynamic pressure in the fluid is resolved into a free-field incident part and a scattered part. Structural response and scattered pressure in the surrounding fluid are found using finite element modeling of structure and fluid. Introduction of Fourier series makes the fluid region mathematically two-dimensional. A radiation, or non-reflecting, condition at the outer boundary of the fluid region is shown to give good results. A parametric study is made of effects of shock pulse rise time and duration on structural response. Results are presented as combinations of shock pressure and submergence pressure just sufficient to induce structural failure.

Master of Science in
Mechanical Engineering and
Mechanical Engineer
March 1978

Advisor: R. E. Newton
Department of Mechanical Engineering

Effects of Thermo-Mechanical Processing on Aluminum-Magnesium Alloys Containing High Weight Percentage Magnesium

Terry Lee Glover
Lieutenant, United States Navy
B.S., United States Naval Academy, 1968

Cast ingots of three Al-Mg alloys, containing 7% Mg, 15% Mg, and 19% Mg, were obtained from Kaiser Aluminum and Chemical Corporation Center for Technology. Billets were machined from these castings and upset forged at .9% of either the solvus or eutectic temperature, as appropriate, to a true strain of 1.5. These alloys were then evaluated by compressive stress-strain testing at various temperatures and strain rates to determine both the ambient and elevated temperature characteristics. Due to the inability to produce very fine second phase particles by upset forging, the 15% and 19% Mg alloys were high in strength but brittle at room temperature. However, refinement of the second phase particles during compression testing led to superplastic behavior at elevated temperature, with a strain rate sensitivity coefficient of .43 being achieved in the 19% Mg alloy. It was further observed that the addition of Mg increased strain rate sensitivity in these Al-Mg alloys at all temperatures, especially at elevated temperatures.

Master of Science in
Mechanical Engineering
December 1977

Thesis Advisor: T.R. McNelley
Mechanical Engineering
Department

Holographic Nondestructive Testing of Pipes

Paul Mikel Huber
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1966

Pipes with internal and external radial and axial flaws were tested using double-exposure interferometric holography. A hydrostatic pressure was applied internally between exposures to stress each specimen. Photographs of the resulting holograms are presented.

Surface displacements were measured from the interference fringe patterns formed in the holograms. Finite element methods were used to compute expected displacements. The results of the two methods compared within 32%.

Additional specimens with internal grooves, which simulated warheads, were tested to determine if fragmentation patterns could be predicted by nondestructive means using holographic techniques. The method of holographic interferometry shows great promise for immediate application for warhead development.

Master of Science in
Mechanical Engineering
March 1978

Advisor: A. E. Fuhs
Department of
Mechanical Engineering

Effects of Thermomechanical Processing on Damping Characteristics of Martensitic Cu-13.5 W/o Al Alloy for Ship Silencing Application

Edward William Kelly
Lieutenant, United States Navy
B.S., United States Naval Academy, 1971

Ca-Al alloys demonstrate a high damping capacity in the martensitic state. The specific damping capacity in the martensite of a Cu-13.5 W/o Al alloy was found to vary with grain size. Since platelet length increased with grain size while platelet width remained relatively invariant, it can be inferred that martensitic platelet motion was an active mechanism for damping.

Several thermomechanical processes were explored to establish positive grain size control. It was found that grain nucleation and recrystallization and grain growth were very sensitive to the usual parameters of prior strain, strain rate, annealing temperature and annealing time. Severe brittleness, reversible shape memory effects, and pseudoelasticity were encountered during the process experimentation.

Master of Science in
Mechanical Engineering
December 1977

Thesis Advisor: Jeff Perkins
Mechanical Engineering
Department

Effects of Hydrodynamic Variables on Corrosion: Study of 90/10 Cu-Ni in a Circling Foil with Synthetic Seawater

Gerhard Hannes Leumer
Lieutenant Commander, Federal German Navy

The effects of hydrodynamic variables and fluid properties on corrosion of 90/10 Cu-Ni (CDA 706) in single metal exposures and in galvanic couples with platinum were studied in synthetic seawater. An apparatus utilizing a circling foil as the specimen holder was redesigned as an experimental apparatus for this study. Various methods were applied to develop corrosion rate data for different flow situations. Particular emphasis was placed on the determination of variable parameters of fluid dynamics, and the correlation of non-dimensional hydrodynamic and mass transfer parameters with experimentally determined corrosion rates. Also, the corrosion morphology was studied macroscopically and microscopically for different velocities. A consideration of theoretical and practical factors concerning mass transfer and corrosion in a flowing medium concluded this study.

Master of Science in Mechanical Engineering
March 1978

Thesis Advisor: J. Perkins
Mechanical Engineering Department

An Experimental Study of Steam Condensation on a Single Horizontal Tube

Derry Thomas Pence
Lieutenant, United States Navy
B.S., University of Arizona, 1970

An experimental test facility capable of investigating plain and enhanced horizontal tubes was built. The test facility consists of an electric boiler, test condenser and associated piping for steam, condensate and cooling water. Performance of the test condenser was checked at a steam pressure of 3 psia with cooling water velocities ranging from 5 to 25 ft/sec.

Condensation data was obtained for a single, 0.625 inch outside diameter, 90-10 copper-nickel tube in a simulated tube bundle to determine the overall, inside and outside heat transfer coefficients. The overall heat transfer coefficient was determined directly from experimental data, and the Wilson Plot technique was used to determine the inside and outside heat transfer coefficients.

The experimentally obtained values for the inside heat transfer coefficient are within 5 percent of the theoretical values predicted by the Sieder-Tate equation. The experimental values obtained for the outside heat transfer coefficient are within 8 percent of the theoretical values predicted by the Nusselt equation.

Master of Science in
Mechanical Engineering
March 1978

Advisor: Paul J. Marto
Department of
Mechanical Engineering

Stress Analysis of Ceramic Gas Turbine Blades by the Finite Element Method Part II

John H. Preisel, Jr.
Lieutenant, United States Navy
B.S.Mar.E., United States Naval Academy, 1972

The complex geometry of many parts of a ceramic gas turbine engine and the need to know the stresses in these parts to a high degree of accuracy indicate that the finite element method should be employed. One analysis code used a finite element program based on an isoparametric 12-node brick. This allowed quadratic variation in one coordinate direction, but only linear variation in the other two coordinate directions. This introduced an artificial stiffness into the structure. This study was made to determine the effects of using a totally quadratic isoparametric brick, vice one which is quadratic in only one direction.

A distributed load preprocessor was also developed and tested.

FORTRAN IV was used throughout.

Master of Science in Mechanical Engineering and Mechanical Engineer
March 1978

Advisor: G. Cantin
Department of Mechanical Engineering

An Experimental Investigation of Enhanced Heat Transfer on Horizontal Condenser Tubes

David J. Reilly
Lieutenant, United States Navy
B.S., North Carolina State University, 1972

Heat transfer and hydrodynamic performance of three different spirally fluted tubes was determined. The tubes were 5/8" in nominal diameter and were made of aluminum. Results were compared to 5/8" OD, smooth copper-nickel and aluminum tubes.

Data was taken by a condensign steam at about 3 psig on the outside surface of a horizontally mounted tube in the center of a tube bank. The center tube was cooled by water on the inside at velocities of 3 to 25 feet per second. The overall heat transfer coefficient was determined directly from experimental data. The inside and outside heat transfer coefficients were determined using the Wilson p . technique. The cooling water pressure drop was measured inside the tube and converted to the friction factor in the enhanced section.

The overall heat transfer coefficient of the enhanced tubes were as large as 1.75 times the corresponding smooth tube value for the same mass flow rate of cooling water. The inside heat transfer coefficient increased by about a factor of 3 while the outside heat transfer coefficient decreased by 10 to 20 percent when compared to smooth tube values.

The results of this work indicate that the required condenser surface area can be reduced by 50 percent if these enhanced tubes are used in place of smooth tubes.

Asvisor: P. J. Marto, ME Department

Master of Science in
Mechanical Engineering
March 1978

Combustion Gas Generator for Gas Turbine Exhaust Systems Modeling

Paul Davidson Ross, Jr.
Lieutenant Commander, United States Navy
B.S., Princeton University, 1966

A combustion gas generator was constructed for the purpose of modeling shipboard gas turbine engine exhaust systems. In particular, the system was designed and validated for exhaust stack temperature varying from 700 to 900°F with an exhaust stack inside diameter of 7.122 inches. Additionally a proposed gas turbine exhaust four-nozzle eductor system was constructed for testing under high temperature conditions to verify temperature correlation parameters developed using cool air as the primary flow medium. A secondary air flow metering box was designed and partially completed for the determination of eductor pumping characteristics during hot flow operations.

Master of Science in
Mechanical Engineering
December 1977

Thesis Advisor: Paul F. Pucci
Mechanical
Engineering
Department

Effects of Hydrodynamic Variables on Corrosion: Study of 90/10 Cu-Ni in a Flow Channel with Natural Sea Water

Robert Paul Schack
Lieutenant, United States Navy
B.S., University of Wisconsin, 1970

The effects of hydrodynamic variables on the corrosion rate of 90/10 Cu-Ni were studied in sea water pumped from Monterey Bay. A one centimeter square flow channel was built providing a maximum flow velocity of 7.8 m/sec. The flow field was examined using hot film anemometry in an attempt to correlate variables such as turbulence intensity to corrosion rate. General concepts of turbulence that may affect corrosion are discussed with a view toward resolving the disparities in reported corrosion data taken under different flow situations. Possible leading edge effects due to the establishment of the mass transfer boundary layer were investigated and found to be negligible in 48 hour tests, provided care was taken to avoid crevices or mismatches in the channel wall.

Master of Science in
Mechanical Engineering
March 1978

Advisor: Jeff Perkins
Mechanical
Engineering
Department

A Feasibility Study of Heat Transfer Improvement in Marine Steam Condensers

Harry Thomas Search
Lieutenant, United States Navy
B.S., Bucknell University, 1968

A survey of condenser design principles and heat transfer augmentation schemes is provided. Using the ORCON 1 computer code, as developed by Oak Ridge National Laboratory, a thermal analysis was performed on the main condenser of the USS John F. Kennedy, CVA-67. A comparison was made between the standard design and fifteen test cases where heat transfer was improved using a variety of techniques, including internally finned tubing, corrugated tubing, promotion of dropwise condensation, and use of thin-walled titanium tubing at high sea water velocities. Each case was compared for heat load capability at constant pumping power, and for weight, volume, and estimated cost at an equivalent heat load.

Results show that with the present condenser volume, the heat load can be increased by as much as 50 percent using heat transfer improvement techniques. From a different point of view, at the same heat load, a 40 percent reduction in condenser weight and volume may be feasible.

Several of the proposed heat transfer improvement schemes may lead, however, to increased pumping power and/or cost. Continued research is recommended in several promising areas to provide more adequate design information and to improve the long term reliability of these proposed schemes.

Master of Science in Mechanical Engineering
December 1977

Thesis Advisor: P.J. Marto
Mechanical Engineering Department

STATE VARIABLE ANALYSIS OF A BOILER SYSTEM

Chusakdi Senanikrom
Lieutenant, Royal Thai Navy
B.S., Royal Thai Naval Academy, 1967

The state variable formulation of a Foster Wheeler ESD-III boiler is developed from fundamental principles. The response of the model for various input signals is determined using CSMP-III, the IBM simulation language. The sensitivity of the model to various coefficient value is noted as are the characteristics of various system states for small perturbation values.

Master of Science in Mechanical Engineering
March 1970

Advisor: Thomas M. Houlihan
Mechanical Engineering Department

An Apparatus to Measure Dropwise Condensation Heat Transfer Coefficients of Steam

Larry Ralph Sharp
Lieutenant, United States Navy
B.S., University of Utah, 1970

An experimental apparatus was designed and constructed for the purpose of determining dropwise condensation heat transfer coefficients on condensing surfaces of different thickness. The equipment included a completely self contained condensing chamber which enclosed both the boiler and condensing surface. Variable temperature cooling water was utilized to control the heat flux.

A thin film resistance thermometer was constructed to obtain the average surface temperature of the condensing surface. Inability to obtain linear and repeatable calibration data with this thermometer resulted in its being discarded. An intrinsic thermocouple was used in lieu of the thin film resistance thermometer.

Experimental data was taken for a 0.51 mm thick stainless steel condensing surface. Results indicated the existence of a condensing curve similar in shape to the characteristic boiling curve represented by heat flux versus $T_{vap}-T_{wall}$.

Master of Science in
Mechanical Engineering
March 1978

Advisor: P. J. Marto
Mechanical Engineering Department

A Statistical Study of Synoptic Storm Activity over the North Pacific In 1975

Gary Charles Heise
Captain, United States Air Force
B.S., North Dakota State University, 1966

A statistical analysis was made of the 00 and 12 GMT surface wind analysis prepared by Fleet Numerical Weather Central (FNWC) during 1975 to describe the synoptic storm activity over the North Pacific Ocean. Temporal variance of the surface wind components at each individual grid-point was "band passed" (approximately 2.5-6 days) using the filtering procedure of Blackmon (1976). Both the original winds and the time-filtered wind components were used to calculate the cube of the friction velocity and the wind stress curl. Monthly mean maps of u_*^3 from the filtered wind components show clearly the location and intensity of the monthly mean synoptic storm activity during this period. Also, this measure of the synoptic storm activity was qualitatively related to the monthly mean sea surface temperature (SST) anomalies as analyzed by Namias.

A somewhat surprising result was that the monthly mean wind stress curl from the filtered wind components did not appear to have a well organized spacial pattern and did not appear to play a significant part in the generation of SST anomalies. Prior to the study, some type of relationship was thought to be probable in view of the known proportionality of wind stress curl to the Ekman pumping mechanism.

Master of Science in Meteorology
December 1977

Advisor: Robert L. Haney
Department of Meteorology

A Comparative Study of the Coastal Marine Aerosol

Alan Anthony Simoncic
Captain, United States Air Force
B.S., United States Air Force Academy, 1970

Aerosol size distributions near the coast of Panama City, Florida and off the Southern California coast near the Channel Islands are investigated in this study. The relationships of the coastal marine aerosol to wind speed, relative humidity, stability, and sub-synoptic circulation are examined. Relative humidity and stability are shown to have the largest effect on the aerosol distribution during periods of light winds. Coalescence and sedimentation of droplets greater than 1.5 μ radius are most pronounced when the wind speed and sea surface production of salt nuclei are weak. When wind speeds exceed 7 m/sec, a state of equilibrium between sedimentation and production of these larger droplets appears to exist. An apparent zone of transition between the two bubble bursting sea-salt producing mechanisms is observed near .5 μ radius. The highest correlation between wind speed and particle concentration occurs under unstable conditions. Secondary circulations are shown to be important determinants of the coastal marine aerosol in the absence of synoptic scale forcing.

Master of Science in Meteorology
December 1977

Adviser: Kenneth L. Davidson
Department of Meteorology

Structure of Synoptic-Scale Waves in the Tropical Pacific During July-December 1974-1976

Donald Joseph Bepristis
Lieutenant, United States Navy
B.A., San Jose State University, 1972

Composite wave structures, sea-surface temperatures (SST), and mean zonal winds are studied for the period July through December over the three consecutive years 1974, 1975 and 1976. These three years were found to possess an "average" SST anomaly distribution, a cold anomaly pattern and a warm anomaly pattern respectively. Radiosonde data for the six month period for each year and each of the six stations (Koror, Yap, Truk, Ponape, Kwajalein and Majuro) were analyzed to derive composite wave descriptions of meridional and zonal wind components, temperature and specific humidity. The basic results such as periodicity and structural tilt were generally in agreement with previous research. Combining the SST data, mean zonal flow and wave composites leads to some new insights into the effects of the tropical SST on the semi-permanent Walker circulation and transient easterly waves. Results indicate that the east to west oscillation of the Walker circulation may be directly related to the tropical eastern Pacific SST. It is also shown that the migration of the Walker circulation and subsequent change in the upper-tropospheric flow is directly related to the structural tilt of migratory tropical waves. Consideration of the wave thermal structure and its relation to the SST indicates that the waves energetics may reflect the effects of the upstream SST.

Master of Science in Meteorology and Oceanography
December 1977

Advisor: Chih-Pei Chang
Department of Meteorology

Response of the Upper

Ocean to Hurricane Eloise

Laurence Victor Friese
Lieutenant Commander, United States Navy
B.S., University of Washington, 1965

Buoy data provided clear evidence of mixed layer deepening and an internal wave caused by Hurricane Eloise, September 1975. Logarithmic temperature profiles below an isothermal mixed layer were assumed and used to model thermocline oscillation and heat budget calculation as influenced by Eloise over a 21-day period. Results show that prior to the arrival of Eloise at the buoy, the average mixed layer depth was about 33m. As the winds increased due to hurricane approach, the mixed layer deepened steadily to about 42m before upwelling to approximately 22m. The thermocline then underwent three distinctly large oscillations of inertial periodicity, while the mixed layer continued to deepen. The post-storm average mixed layer depth was about 52m. Values of mixed layer depth were concluded to be accurate to within 2m. Vertical velocities, calculated first by assuming zero horizontal temperature advection in the material derivative equation and second by finding the mass transport necessary to balance the heat budget, show that in the upper 500m of the water column downward vertical motion of 1m/hr or less prevailed during storm approach, followed by upward vertical velocity as great as 5.35m/hr during the 12 hr immediately following hurricane passage followed by downward vertical velocity during the large thermocline oscillations.

Master of Science in
Meteorology and Oceanography
December 1977

Advisors: Russell L. Elsberry
Dept. of Meteorology
Dale F. Leipper
Dept. of Oceanography

A Study of the Variation of Convective Activity Associated with Easterly Waves in the Tropical Pacific Using Satellite Radiation Data

Vincent Francis Looft
Lieutenant, United States Navy
B.S., University of Oklahoma, 1969

A composite study is carried out to deduce the structure of convective activity associated with easterly waves at five tropical Pacific radiosonde stations, Majuro, Ponape, Truk, Yap, and Koror, for the latter halves of 1974, 1975 and 1976. The data used include digitized satellite infrared radiation and albedo. The resultant structure, in general, shows maximum convective activity in or near the wave troughs. The distribution is similar to that of the humidity field composited previously by Repristis (1977).

In order to examine the possible effects of sea-surface temperature on tropical convection, the wave-organized convection and the seasonal-mean convective fields as indicated by the satellite data are compared to the seasonal mean sea-surface temperature. It is found that west of Majuro the interannual and spatial variation of the 10-degree upstream sea-surface temperature have a much better positive correlation with those of the wave-organized convective field than those of the seasonal mean. This result is consistent with that for the latter halves of 1972 and 1973 obtained by Delaney (1977) using subjectively-digitized satellite cloud data, and Repristis' (1977) result of a positive correlation between the waves' upper-tropospheric thermal structure and the 10-degree upstream sea-surface temperature. It suggests that the sea-surface temperature in the immediate upstream vicinity may exert a positive influence on the convective activity modulated by an easterly wave. However, no similar influence of the local sea-surface temperature can be found for the total convection.

Master of Science in
Meteorology and Oceanography
March 1978

Advisor: Chih-Pei Chang
Department of Meteorology

Salinity Effects in an Oceanic Mixed-Layer Model

Richard Alan Paulus
Lieutenant, United States Navy
B.S., Iowa State University, 1970

A one-dimensional mixed-layer model of ocean thermal structure (Camp, 1976) was first modified to determine the effects of a salinity profile on density structure and secondly to observe the added effects of surface salinity flux. The model was tested in August and November-December 1974 with (1) hydrocast data at Ocean Stations HOTEL and PAPA and (2) salinity profiles statistically derived from historical data for six ocean stations and adjusted to correspond to an observed BT. Inclusion of salinity structure did not significantly affect mixed-layer depth or temperature predictions during the summer period. During the winter period, salinity structure tended to inhibit deepening yielding a slightly warmer, shallower mixed layer. Surface salinity flux altered significantly the thickness of the isothermal layer, with decreases in thickness during precipitation (E-P<0) and a tendency for increased thickness during some periods of net downward heat flux when E-P>0.

Master of Science in Meteorology and Oceanography
March 1978

Advisor: Russell L. Elsberry
Department of Meteorology

Dynamical Numerical Prediction of Large-Scale Thermal Anomalies in the North Pacific Ocean

Wayne Stuart Shiver
Lieutenant, United States Navy
B.S., University of North Carolina, 1972

A ten-level primitive equation ocean circulation model is used to investigate the formation and evolution of large-scale thermal anomalies observed in the central North Pacific Ocean during the fall and winter of 1976. Several initial value model integrations of 4 months duration are carried out in order to help explain the observed anomaly development. Initial and verifying ocean data down to 400 m depth are obtained from the NORPAX ships of opportunity program. Anomalous atmospheric wind forcing is obtained from Namias' monthly mean sea-level pressure anomalies, while climatological heat fluxes are used.

The skill with which the model simulates the observed anomaly evolution in the different experiments is estimated synoptically and measured statistically by calculating root mean square (RMS) temperature errors and S1 skill scores. Analysis indicates that anomalous atmospheric wind forcing improves the model predictions in the upper levels. For this particular winter case using climatological heating, however, knowledge of the initial anomalous temperature conditions does not improve the model results. The model skill at upper levels exceeds both persistence and climatology (forecast of zero anomaly) while at the lower levels it is comparable to persistence but not as good as climatology.

Master of Science in Meteorology and Oceanography
December 1977

Advisor: Robert L. Haney
Department of Meteorology

An Analysis of a Lanchester-Type Combat Model Reflecting Attrition Due to Unit Deterioration And Ineffective Combatants

Paul Augustus Bigelman
Major, United States Army
B.S., United States Military Academy, 1967

This thesis develops a Lanchester-type combat model that reflects attrition due to unit deterioration and ineffective combatants. After examining the operational factors and influence unit deterioration, it modifies Lanchester's classic "aimed-fire" equations to reflect these factors. A computer program was developed to facilitate numerical integration of the model's non-linear differential attrition equations, and the resultant model is exercised for several "typical" combat engagements. The result of parametric changes to the model is discussed. Victory prediction conditions are given for the model. The implications of the unquantifiables in combat are discussed.

Master of Science in
Operations Research
March 1978

Thesis Advisor: J.G. Taylor
Operations Research
Department

The Dynamic Programming Approach to the Multicriterion Optimization Problem

Kim Kwang Bog
Major, Republic of Korea Marine Corps
B.S., Korea Naval Academy, 1969

Decision makers are often confronted with problems for which there exist several distinct measures of success. Such problems can often be expressed in terms of linear or nonlinear programming models with several "criterion" functions instead of single objective functions. A variety of techniques have been applied to multicriterion problems, but the approach used here, "The Dynamic Programming Approach to Multicriterion Optimization Problem," is based on the concept that the ideal solution to a multiobjective problem must be a pareto optimal solution. In many cases simply narrowing the set of candidate solutions to the set of all pareto optimal solutions may enable the decision maker to find the compromise being sought. The determination of nondominated points and corresponding nondominated values (pareto optimal solution) related to the multicriterion optimization problem is approached through the use of dynamic programming. The dynamic programming approach has an attractive property which provides the basis for generation of nondominated solutions at each stage by the decomposition method. By using recursive equations we can find out the nondominated points and corresponding nondominated solutions of multiaggregate return function.

Master of Science in Operations Research
March 1978

Advisor: J. K. Hartman
Operations Research
Department

SIMULATION OF POSITION ERRORS WHEN USING SELECTED ARMY MAP PRODUCTS

Jimmy Wayne Cotner
Major, United States Army
B.S. Mathematics, University of Oklahoma 1963

A simulation approach is given to estimating the distribution of navigational errors observed during a test of four Army map products, conducted by the US Army Combat Development Experimentation Command. Exponential and Gamma distributions are simulated with sample sizes identical to the actual data. The simulated samples are then replicated one thousand times to provide sample sizes of one thousand for key parameters such as skewness, standard deviation, coefficient of variation, range and selected quantiles. Comparison of these parameters is then made with the parameters observed in the data to determine the fit of simulated distributions.

Master of Science
Operations Research
December 1977

Advisors: P.A. W. Lewis
S. H. Parry
Operations Research
Department

Target Allocation in the Air Defense Air-to-Ground Engagement (ADAGE) Model

David Arthur Grover
Captain, United States Army
B.S., University of Maine, 1970

The Campaign submodel of the Air Defense Air-to-Ground Engagement (ADAGE) model was modified to evaluate the relative merits of six target allocation schemes. These schemes included fixed, proportional, and Lagrange Multiplier procedures. The study examined the expected fraction of a target array remaining at preselected points in the simulation. Model output was provided for each allocation scheme simulated under different offense to defense ratios, aircraft attack profiles, and target priority systems. Conclusions were drawn based on a mean value differential analysis of the model output.

Master of Science in
Operations Research
March 1978

Thesis Advisor: S.H. Parry
Operations Research
Department

Nonparametric Estimation from Censored Data

Lee Won Hyung
Major, Korean Army
B.S., Korean Military Academy, 1970

For nearly two decades we have witnessed an intensive development of a statistical methodology for assessing length of life and reliability of performance from empirical data. The initial stimulus for research on statistical problems in life testing and reliability came from the need to answer pressing practical questions which could not be treated by the existing statistical techniques. Because life and performance tests are so time consuming and expensive to run, it is a practical necessity to terminate them as soon as possible.

For the statistician this means developing estimation and decision procedure for data, which are severely curtailed in one way or another long before all items on test have actually failed. The estimation is more complicated when the data are truncated, i.e. when the observer loses track of some individuals before death occur. The product limit method of Kaplan and Meier is one way of estimating p(t) when the mechanism causing truncation is independent of the mechanism causing death.

This paper proposes alternative estimators and compares them to the product limit method. A computer simulation is used to generate the times of death and truncation from a variety of assumed distributions. No single estimator gives the best fit to the "true" distribution of death under all situations. However, other estimators are shown to be better than the product limit estimator under all of the assumed situations.

Master of Science in
Operations Research
March 1978

Advisor: Donald P. Gaver
Department of Operations Research
and Administrative Sciences

Network Design for Survivable Military Satellite Communication

Kusnadi Djati Juwono
Captain, Indonesian Air Force
B.S., Indonesian Air Force Academy, 1970

The survivability criterion of a communication network consisting of satellite and terrestrial radio links, is defined as the number "m" of node-disjoint paths between any node and the ground satellite terminal; assuming that the terminals and the satellite links are highly invulnerable. In this thesis, an heuristic method for finding the required number and the locations of satellite ground terminals and designing a low cost terrestrial network satisfying a pre-specified survivability criterion in an area with a specific geographical condition is presented.

Master of Science in
Operations Research
March 1978

Thesis Advisor: G. Howard
Operations Research
Department

Simulation of the Tactical Employment of Field Artillery

Edward Peter Kelleher Jr.
Lieutenant Colonel, United States Army
B.S., Boston College, 1960

This thesis presents a stochastic simulation model of a field artillery cannon battery in support of the defense. The operating elements of the field artillery fire support system, a target array and a parametrically generated terrain are represented. Target detection, selection based on priority, and engagement are simulated, as are the results of engaging targets. The results of varying field artillery tactics are investigated under several sets of conditions. The effects of the tactics and conditions as indicated by five Measures of Effectiveness are presented and statistically analyzed. Conclusions resulting from the anaiysis are presented and potential future applications and expansions of the model are discussed.

Master of Science in
Operations Research
December 1977

Advisor: S. H. Parry
Operations Research
Department

Simulation and Analysis
of Ammunition Transport Capability
in Support of a Combat Unit

John Richard Kelley
Captain, United States Army
B.S., Kansas State University, 1970

This thesis presents a simulation of the combat support mission of a Support Platoon, the organic transport element of a U. S. Army Tank Battalion. The model utilizes Monte Carlo techniques to determine ammunition hauling capability as a function of maintenance and vehicles lost due to enemy action. These factors are parametrically varied with vehicle replacement times, alternative numbers of task vehicles, and the number of round trips per day. Plausible input parameters are selected and discussed and output is statistically evaluated by Analysis of Variance and Mean Value Differential Analysis computer programs. The effects of the main factors are presented by graphical displays based on the latter program. A scenario is constructed to describe operational concepts in a combat zone and to develop a regression model. Potential uses of this simulation and a discussion of the overall modelling technique are discussed.

Master of Science in
Operations Research
March 1978

Thesis Advisor: S.H. Parry
Operations Research
Department

An Analysis of Optimal Tracking Rate Filters In Support of the Supplemental Fire Control Test

George Edward Newman
Major, United States Army
B.S., United States Military Academy, 1967

Evaluation of tank fire control systems is the subject of much emphasis at the present time. Test data collected during a fire control test conducted by the United States Army Material Systems Analysis Activity is examined using several different analysis procedures. The objective of the analysis is to determine the optimal time to employ in the tracking rate filter of a tank fire control lead prediction algorithm. An additional objective is to quantify individual components of target error and to investigate the character of these errors as a function of varying tracking rate filter times.

Master of Science in Operations Research
March 1978

Advisor: S. H. Parry
Department of Operations Research

A Proposed Damage Routine for the Warfare Effectiveness Simulator (WES)

Ellen Franz Roland
Lieutenant, United States Navy
B.S., University of Wisconsin, 1972

The Warfare Effectiveness Simulator (WES), being developed at the Naval Ocean Systems Center (NOSC) - San Diego, is a computer software program designed to permit two-sided, real-time, interactive play of a tactical Navy situation. It is a stochastic model in which the probabilities of detection of enemy forces and the probabilities of hit for launched weapons are calculated and using the technique of Monte Carlo, a determination of a possible outcome is projected and thus influences the game situation. At present, WES contains a deterministic, expected value model for the calculation of damage resulting from a successful weapon arrival. The problem addressed in this thesis is the development and testing of a more efficient, effective and realistic damage evaluation model for WES, utilizing stochastic methods. It will detail shore facility, surface ship, submarine, and aircraft damage with respect to non-nuclear, tactical weapons. The problem can be stated as the maximization of model and damage detail subject to the constraints of WES computer time, computer space and initial variable input.

Master of Science in Operations Research
December 1977

Advisor: Alvin F. Andrus
Department of
Operations Research

Some Models for Manpower Planning in the Indonesian Air Force

Billy Tunas
Captain, Indonesian Air Force
Drs, FKIT.IKIP Bandung, 1974

The problem of determining a promotion policy which can maintain a well-balanced force structure, has long been a great concern of the Indonesian Air Force manpower planner.

Starting with the current out-of-balanced force structure condition, this study is intended to develop some mathematical models to assist the manpower planner in establishing a reasonable promotion policy which can create and maintain a well-balanced force structure in the Indonesian Air Force.

Master of Science in Operations Research
March 1978

Thesis Advisor: J.K. Hartman
Operations Research Department

COMPARISON OF FOUR SEQUENTIAL PROBABILITY RATIO TESTS

Sung Hwan Wie
Lieutenant, Republic of Korea Navy
B.S., Korean Naval Academy, 1974

An investigation of expected sample size (E[n]), variance of sample size (V[n]) and robustness of four sequential tests applicable to testing bombing system accuracy is made using computer simulation.

Operating characteristics, E[n], V[n] and error rates for these tests are presented.

Master of Science in Operations Research

March 1978

Advisor: Donald R. Barr
Operations Research
Department

Frontal Analysis and Acoustic Propagation in the Western Alboran Sea

Richard Peerson Adams
Lieutenant Commander, United States Navy
B.S., University of Virginia, 1965

Oceanic frontal activity in the western Alboran Sea of the Mediterranean Sea was investigated to evaluate spatial and temporal variability. Subsurface features were compared with DMSP sensed sea surface temperature to estimate the feasibility of determining frontal location from DMSP photography. Low frequency sound propagation across the front was modeled to evaluate the effect of the frontal system on propagation loss.

Master of Science in
Systems Technology
December 1977

Advisors: R. H. Bourke
A. B. Chace
Systems Technology
(ASW)

An Antisubmarine Warfare Training War Game

Gary Leonard Coyle
Lieutenant, United States Navy
B.S., United States Naval Academy, 1972

The emplcyment of manual tactical gaming in a training environment is discussed, outlining the advantages and disadvantages of this method of training in the context of shipboard requirements. A two-sided, manual tactical war game is described and rules provided for play of the game. The utility of the game in assisting Commanding Officers and Training Officers in training junior officers using the Personnel Qualification Standard (PQS) System is described, with recommendations for further use of the game as a possible tactical training tool.

Master of Science in
Systems Technology
March 1978

Advisor: A. R. Washburn
Operations Research
Department

Human Factors Evaluation of the AN/UYQ-21 Display Console

Thomas Edward Klocek
Lieutenant, United States Navy
B.S., United States Naval Academy, 1969

This paper analyses the AN/UYQ-21 display console from a human factors standpoint. The AN/UYQ-21 is programmed for use in NTDS acoustics displays and can have fire control applications. The paper is organized so that the current threat and the Naval Tactical Data System are discussed briefly in the introduction. A general discussion of man as a system component follows along with a description of the AN/UYQ-21. The man-machine engineering aspects of the console are discussed at length including controls, display, viewing angles, maintainability, symbology and physical dimensions. The paper concludes with comments and recommendations for improvement on this and follow-on systems.

Master of Science in
Systems Technology
March 1978

Advisor: Douglas E. Neil
Operations Research
Department

Career Development for an Antisubmarine Warfare Officer Specialist

Abraham Joel Lassman
Lieutenant, United States Navy
B.S., United States Naval Academy, 1971

Antisubmarine Warfare technology has made significant advances since World War II. However, this thesis is based on the assumption that training for ASW Surface Officers has not kept pace with this rapid technological growth. This thesis proposes that the career pattern for surface officers desiring in-depth ASW training be modified to improve this situation while allowing surface officers to maintain a viable career pattern in the Surface Warfare community. Such a career pattern seems to be feasible.

Master of Science in
Systems Technology
March 1978

Advisor: Douglas E. Neil
Department of
Operations Research

Radiation Patterns by Computer Simulation For RMS Antenna Locations on a U.S. Army M-60 Tank

Jerry Allen McKenzie
Lieutenant Commander, United States Navy
B.S., Wisconsin State University, 1965

A potential replacement antenna for use with the RMS/DCS system on the M-60 tank was modeled using a digital electromagnetic antenna analysis program. The M-60 tank was also modeled using a digital Geometric Theory of Diffraction (GTD) program to investigate probable antenna mounting positions. A $\lambda/4$ monopole antenna was used to validate the GTD tank model for three separate possible antenna locations on the tank. The interface capabilities of the two programs were then investigated, resulting in the detection of GTD program limitations. The number of flat surfaces available in the program proved to be insufficient for the complex tank structure. Also, the computation time required increased exponentially with the number of inputs to the program. These limitations are under investigation at the NOSC San Diego. Some recommendations and areas of further study are offered.

Master of Science in Telecommunications Systems Management
March 1978

Advisor: Milton L. Wilcox
Department of Electrical Engr.

Soviet Involvement in Africa--A Descriptive and Quantitative Analysis

Bruce C. Cook
Lieutenant Commander, United States Navy
B.A., Dartmouth College, 1962

Paul M. Hoffman
Commander, United States Navy
B.S., Pennsylvania State College, 1960

In recent years, Soviet involvement in Africa has become increasingly evident. This thesis examined, using descriptive and quantitative analyses, various hypotheses concerning this involvement to see if there was any significant underlying pattern which might be useful in measuring and/or predicting future Soviet penetration of Lesser Developed Countries. "Guttman Scaling" was successful in measuring Soviet "involvement"; however, scaling and regression techniques provided only limited success in developing a predictive model. Three significant results emerged from the analysis. First, was to confirm a probable impending Soviet oil crisis. Second, was that other mineral resources play only a limited role in determining Soviet penetration. Finally, was to highlight the competition for influence in Africa between the Soviet Union and the People's Republic of China.

Master of Arts in
National Security Affairs
March 1978

Advisor: Jiri Valenta
National Security
Affairs Department

Japanese Perspectives
Toward
U.S.-P.R.C. Relations Since 1971

Charles Frederick Gore
Lieutenant, United States Navy
B.A., University of North Carolina, 1969

The objective of this thesis is to examine Japanese perspectives toward U.S.-P.R.C. relations since 1971 through the eyes of interest groups which have a significant foreign policy role in Japan. It is vital that Americans understand these perspectives in light of the potential for improved Sino-American relations in the near term. As background, some security aspects of Japan's foreign policy are discussed, and U.S.-P.R.C. relations from 1949-present are encapsulated. The foreign policy roles and the attitudes of the ruling Liberal Democratic Party, the opposition parties, the central bureaucracy (Ministry of Foreign Affairs and Ministry of International Trade and Industry), the economic community and public opinion toward Sino-American policy developments and current issues are then analyzed. The thesis concludes that the beginnings of a rapprochement between the U.S. and China has caused a great deal of consternation within these groups and that they all perceive the dangers inherent in a continued warming trend in Sino-American relations.

Master of Arts in
National Security Affairs
March 1978

Advisor: Claude Buss
National Security Affairs
Department

Japan and North Korea: The Growing Accommodation between Japan and North Korea and its Effect on the National Security of the United States

William Jamie Hulsey
Lieutenant Commander, United States Navy
A.B., Princeton University, 1967

The purpose of this thesis is to analyze the relations between Japan and North Korea, identifying each nation's concept of its own security interests. It has, by way of introduction, described the present status of Korea, both north and south, and examined the transitory division between the two halves of what both profess is a single divided country. Chapter II examines the strategic significance of the Korean peninsula to China, the Soviet Union, the United States, and Japan.

Chapters III and IV discuss North Korea's and Japan's foreign policy goals, especially as they relate to internal and external security considerations. Chapter V attempts to determine the nature of the accommodation between North Korea and Japan, based on their own strategic interests. The effect of this accommodation on the United States, should it accelerate, reaching a positive conclusion; should it drag on with little progress; or should it fail, will be examined in Chapter VI.

Master of Arts in
National Security Affairs
March 1978

Advisor: Claude A. Buss
National Security
Affairs Department

Poland: National Autonomy or Soviet Invasion?

An Analysis of Political and Economic Upheaval in Poland, 1956, 1970, & 1976, and Prospects for the Future

Dallace Leroy Meehan
Major, United States Air Force
B.A., Florida State Christian College, 1971
B.S., University of the State of New York, 1975

The eruption of violence in Poland since the Second World War has twice resulted in massive changes in the Polish leadership. At least one of those changeovers occurred in the face of Soviet threats to intervene militarily. As recently as 1976, violence again threatened the stability of the Communist Party of Poland, indicating that the dangers of upheaval are still very much present in that strategically important East European state. This study analyzes developments in post-war Poland, with particular emphasis on the turbulent events of 1956, 1970, and 1976, and develops prospects for Poland's future vis-a-vis the Soviet Union. More specifically, the conclusion evaluates the conditions under which a future Soviet military intervention in the manner of the 1968 invasion of Czechoslovakia can be expected, as well as how the Poles might establish a very high degree of national autonomy and independence without such an invasion.

Master of Arts in
National Security Affairs
March 1978

Advisor: J. Valenta
Department of National
Security Affairs

American Images of Arabs: A Data Based Analysis

Eugene Michael Mensch
Captain, United States Army
B.A. Washburn University, 1968

This study identifies and analyzes American images of Arabs. It is a content analysis of nine years of the New York Times (1967-1975), which: (1) determines whether the American image of Arabs is unfavorable, neutral or favorable, (2) identifies the favorable and unfavorable images, (3) identifies trends as the images change and as they apply to specific Arab nations or peoples and (4) analyzes these findings and assesses their importance in future policy formation.

Data was collected on thirteen Arab nations and the Palestinians. Statistical techniques of content analysis were applied to the 2,401 cases examined. Basic conclusions include: (1) the majority of cases (51.6%) indicates an unfavorable American image of the Arabs; (2) the three most frequent themes found were that Arabs are terrorists, factionated and disunited and are militant and belligerent; (3) over the period there has been a small increase in the favorable rating and a dramatic decrease in the unfavorable rating, and; (4) this type of research may be usefully employed in assessing the feasibility of certain foreign policy decisions which involve Arab nations.

Master of Arts in
National Security Affairs
March 1978

Advisor: John W. Amos
National Security
Affairs Department

JEWISH -- ZIONIST TERRORISM

and the

ESTABLISHMENT OF ISRAEL

John Louis Peeke
Captain, United States Air Force
B.S., University of Maryland, 1968
M.L.A., Texas Christian University, 1976

Terrorist bombings of public buildings, attacks on public officials, hijackings and assassinations of political leaders are not new phenomena in Middle East politics. In recent history, incidents initiated by the Palestine Liberation Organization and its various components have captured headlines around the world. As recently as World War II, however, another terrorist war was fought over the same territory and for the same purposes--the creation of a Palestinian state. This time, though, the terrorists were Jewish. This paper looks at the activities of the Jewish "terror" organizations in their quest for a Jewish state. Through three chronological, more or less parallel tracks, the paper will deal with the formation of the military and paramilitary groups, their organization, leadership philosophy and actions which eventually forced Great Britain to yield to Zionist demands for a Jewish state in Palestine.

Master of Arts in
National Security Affairs
December 1977

Advisor: John W. Amos
National Security Affairs
Department

Moroccan Political Development
and the Resultant Impact
on Moroccan-U.S. Relations

Richard Salvatore
Lt. Colonel, United States Air Force
B.A., Bellevue College, 1974

This thesis has two basic research objectives. First to examine the political development of Morocco and to prove, despite an outward appearance of political tension, that the nation is politically stable and progressing politically at a pace which will ensure representational government. Second, United States-Moroccan relations will be examined to determine the amount of influence the United States commands in Morocco.

The thesis first establishes historical perspective by tracing Moroccan history back to the initial Arab conquests which shaped Moroccan society into its unique segmentation. The roles of traditionalism, primordialism, Islam, the monarchy, elites and education are studied to illustrate their importance on Morocco's political development. The growth of Moroccan nationalism is studied as well as the formation of political parties. Theories of political development are used to predict the future course of Moroccan politics.

This thesis reviews United States military and economic aid to Morocco during the last twenty years. A correlation is then made between this aid and Moroccan support for United States policies based on Moroccan voting patterns in the United Nations.

Master of Arts in
National Security Affairs
December 1977

Thesis Advisor: John W. Amos
National Security
Affairs Department

Civil Defense in the United States

Theodore Eleftherios Tzavellas
Lieutenant, United States Navy
B.A., Louisiana State University in New Orleans, 1972

This thesis analyzes Civil Defense within the context of its contribution to United States national political and military strategy; reviews its acceptance by and utility to the American populace; and promotes some recommendations and conclusions which may be useful to future discussions of the topic. Included in the thesis and interspersed throughout are references to the present level of Soviet Civil Defense preparedness and capabilities based on the most current and complete unclassified data available.

Master of Arts in
National Security Affairs
March 1978

Advisor: Frank Teti
Natl. Security Affairs

THE FRENCH LEFT AND DEFENSE POLICY

Mary Elizabeth Walsh
Captain, United States Air Force
B.A., Stanford University, 1971

This study reviews the historical development of the socialist and communist movements in France, focusing specifically on the origins and evolution of their attitudes regarding problems of national security and defense. There is an investigation of the philosophical, social, economic and political conditions which gave birth to socialism in modern (i.e. post-revolutionary) France. This study attempts to illuminate the differences, as well as the similarities between the Socialist and Communist Parties, the two main branches of the French Left. This study, also, demonstrates the difficulty experienced by the two Parties in reconciling their theoretical ideals with contemporary practical exigencies. During the 20th century, the French Socialists and Communists have already collaborated in two predominantly Leftist governments. This study reviews the defense decisions made by the Leftist ministers of those governments and the defense plans elaborated by past and present party leaders of the French Left.

Master of Arts in
National Security Affairs
December 1977

Advisor: David Burke
National Security
Affairs Department

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