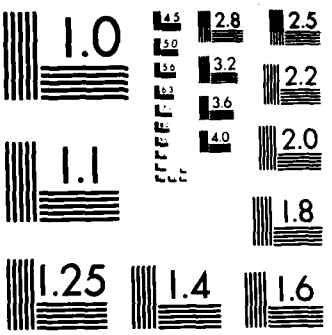
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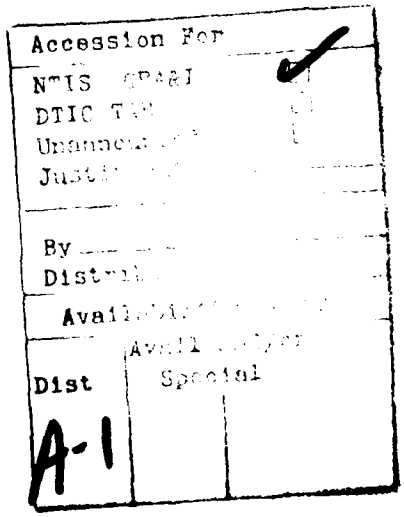
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MASTER OF ARTS DEGREES

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DOCTOR OF PHILOSOPHY

NUMERICAL SIMULATIONS OF THE RESPONSE OF INTENSE OCEAN CURRENTS TO ATMOSPHERIC FORCING

David Adamec
B.S., Florida State University, 1976
M.S., Florida State University, 1978

The two and three-dimensional response of strong ocean currents to atmospheric forcing is studied using numerical simulations. In particular, surface cooling is explored as a possible mechanism for explaining an observed 100 km southward shift in the mean position of the Gulf Stream during winter. The magnitude and direction of the cross-stream circulation is highly dependent on whether or not a vertical mixing of momentum occurs when the water column convectively adjusts in response to the surface cooling. A weak cross-stream flow toward the higher sea-surface temperatures occurs in the surface layer if momentum mixing does not occur, whereas a stronger flow toward lower sea-surface temperatures results if momentum mixing does take place. The response of three-dimensional simulations is very similar to the two-dimensional simulations in the immediate vicinity of the front. The response due to horizontal cooling gradients is not large enough to displace the Gulf Stream appreciably southward in any of the numerical simulations. By contrast, a moderate increase in the zonal wind stress is more effective in displacing the core of the current system than are strong gradients in the surface cooling. The position of the Gulf Stream has also been observed to change as it encounters changes in the bottom topography. The simulated adjustment of flow to a 200 m seamount is consistent with the conservation of potential vorticity. The inclusion of surface forcing does not affect the adjustment to the topography in any of the simulations, and does not steer the flow toward (away from) the topography so that the characteristics of the downstream flow are changed.

Doctor of Philosophy
March 1985

Advisor: R.L. Elsberry
Department of
Meteorology

TIME SERIES MODELS WITH A SPECIFIED SYMMETRIC NON-NORMAL MARGINAL DISTRIBUTION

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B.S., The Citadel, 1969
M.S. Naval Postgraduate School, 1977
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Time series models with autoregressive, moving average and mixed autoregressive-moving average correlation structure and with symmetric, heavy-tailed, non-normal marginal distributions, called ℓ-Laplace, are considered.

First, a flexible mixed model NLARMA (p,q) with Laplace (double exponential) marginals is investigated. The correlation structure for several special cases is derived. The innovation sequence for the second-order autoregressive case, NLAR (2), is derived. Parameter estimation in the NLAR (1) models is discussed in terms of moments, least squares and maximum likelihood.

Second, a family of continuous random coefficient models with ℓ-Laplace distributions are examined. The ℓ-Laplace distribution is described along with a useful transformation. The correlation structure for special cases is derived. For a special case when ℓ is one, the BELAR(1) model with Laplace marginals, the maximum likelihood estimator of serial correlation is derived. Least squares estimates are also derived using the concept of a linear residual. These estimators of correlation, along with other estimators of location and scale are compared in a small simulation study.

Thirdly, the NLAR(1) and the BELAR(1) processes are compared using higher-order residual analyses based on the uncorrelated, but dependent linear residuals, $\{R_n\}$.

Finally, open problems, as well as possible extensions and applications of the analyses given in this thesis are discussed.

Doctor of Philosophy
September 1985

Advisor: P.A. Lewis
Department of
Operations Research

A NUMERICAL AND ANALYTICAL INVESTIGATION OF LEE CYCLOGENESIS

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B.S., Bowling Green University, 1970
M.S., Naval Postgraduate School, 1977

The effect of topography on the evolution of a disturbance in a baroclinically unstable mean flow is studied using analytical and numerical simulations. In particular, dynamical mechanisms involved in cyclogenesis in the lee of long, meridional barriers similar to the Rocky Mountains are explored. The rapid growth observed in lee cyclogenesis is highly dependent on the superposition of a growing baroclinic wave with a steady, orographically forced wave of the same scale. As the baroclinic wave moves over the mountain, development is masked by the orographically-forced, high-pressure ridge. As it moves down the lee side of the mountain, the baroclinic wave appears to grow rapidly due to superposition with the forced, lee-side trough. Indications of enhanced, lee-side baroclinic instability are present in the numerical simulations, but the effect on wave development is minor compared to the effect of superposition. The rapid continuous-mode growth which has recently been demonstrated by Farrell (1982) is not observed in any of the simulations.

Doctor of Philosophy
March 1985

Advisor: R.T. Williams
Department of
Meteorology

A NUMERICAL STUDY OF THE PACIFIC POLAR LOW

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B.S., Northern Illinois University, 1973
M.S., University of Oklahoma, 1975

A numerical study is performed to test the hypothesis that the Pacific polar low forms primarily through baroclinic instability. Linear growth rates computed for a jet profile typical of conditions during the formation of Pacific polar lows yields a growth rate maximum at 1400 km. Although the horizontal scale of this disturbance agrees with observations of the Pacific polar low, this disturbance is shallower and forms further north relative to the jet than indicated by observations. Nonlinear simulations of the 1400 km disturbance indicate that the effects of convection and surface heat and moisture fluxes due to initially large air-sea temperature differences are needed for proper vertical structure, storm position and intensification. Energy budgets of model output indicate that the wave grows through baroclinic instability and that the diabatic effects enhance the baroclinic conversion within the storm.

Doctor of Philosophy
December 1984

Advisors: R.T. Williams
R.L. Elsberry
Department of
Meteorology

TENSOR FORMULATIONS FOR THE MODELLING OF DISCRETE-TIME NONLINEAR AND MULTI-DIMENSIONAL SYSTEMS

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B.Eng., Royal Military College of Canada, 1978

The modelling of nonlinear and multidimensional systems from input and/or output measurements is considered. Tensor concepts are used to reformulate old results and develop several new ones. These results are verified through non-trivial computer simulations.

A generalized tensor formulation for the modelling of discrete-time stationary nonlinear systems is presented. Tensor equivalents of the normal equations are derived and several efficient methods for their solution are discussed. Conditions are established that ensure a diagonal correlation tensor so that a solution can be obtained directly without matrix inversion.

Using a tensor formulation, a new proof of the Generalized Lattice Theory is obtained. Tensor extensions of the Levinson and Schur algorithms are presented.

New two-dimensional (2-D) lattice parameter models are derived. Using the tensor form of the Generalized Lattice Theory the 2-D multi-point error order-updates are decomposed into $O(N^2)$ single point updates. Two-D extensions of the Levinson and Schur algorithms are given. The quarter plane lattice is considered in detail, first in a general form, then in forms which reduce the computational complexity by assuming shift-invariance.

Based on the 2-D lattice, a new nonlinear lattice model is developed. The model is capable of updates in the nonlinear as well as time order.

Doctor of Philosophy
September 1985

Advisor: S.R. Parker
Department of
Electrical and Computer
Engineering

A DIAGNOSTIC STUDY OF BAROCLINIC DISTURBANCES IN POLAR AIR STREAMS

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Dunedin, New Zealand

Model-generated data and FGGE analyses are used to calculate quasi-Lagrangian budgets of mass, vorticity, heat and moisture following disturbances that form within polar air streams. These polar lows grow primarily through basic baroclinic instability processes and exhibit many features of larger maritime extratropical cyclones. Polar lows that originate on the equatorward side of a nearly straight upper-level jet are contrasted with lows that form on the poleward side of the jet and have considerable mid-tropospheric positive vorticity advection at formation time. The absence of favorable coupling to a jet stream was the missing factor in two model-generated polar lows that failed to develop. Although the vorticity balance is initially different for the two types of polar lows, the vorticity budgets during later stages are similar. The heat budget and the thickness tendency equation demonstrate that the self-development process that is present in larger maritime cyclones is also important for polar low intensification.

Doctor of Philosophy
September 1985

Advisor: R.L. Elsberry
Department of
Meteorology

AERONAUTICAL ENGINEER

COMPUTER PROGRAM FOR PERFORMANCE PREDICTION OF TANDEM-ROTOR HELICOPTERS

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B.S., Texas A & M University, 1978

A computer program for the HP-41 series calculator is presented which predicts the rotor shaft horsepower required for tandem-rotor helicopters to a given set of helicopter parameters and flight conditions. Three simplified analytical methods of calculating the induced power for tandem-rotor helicopters were explored during the development of the program and their effect on the total shaft horsepower required was compared to actual test data. These comparisons as well as size and complexity considerations were used in selecting the best method to be used. The program can be used in preliminary design analysis and as an educational tool where only an estimate of the actual shaft horsepower is required.

Aeronautical Engineer
Master of Science in
Aeronautical Engineering
June 1985

Advisor: D.M. Layton
Department of
Aeronautics

ELECTRICAL ENGINEER

CONTROL SYSTEMS FOR A DUAL MOTOR HIGH SPEED MOTION PICTURE CAMERA

Edward Y. Brewster
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B.S.E.E., University of Kansas, 1979

This thesis studies the control of a dual motor high speed motion picture camera. This camera is a modification of the one motor cameras presently in use today. First the system model is developed and then the control system is examined for the ideal tachometer. Next, non-ideal characteristics of the tachometer signal as derived from an optical tachometer are discussed. Included in this section is the need to have pretensioning prior to the filming and deceleration at the end of the filming. The remainder of the thesis examines phase locked loop techniques for speed control of the high speed camera.

Electrical Engineer
Master of Science in
Electrical Engineering
September 1985

Advisor: G.J. Thaler
Department of
Electrical and Computer
Engineering

PERFORMANCE EVALUATION OF THE ULCER DOWNLINK RECEIVER GROUP IN A SIMULATED SHIPBOARD RFI ENVIRONMENT

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B.S., Pennsylvania State University

The performance of the UHF downlink receiver group segment of a test low-orbit digital satellite communications relay system is investigated. This test system, designated as ULCER, utilizes Living Plume Shield (LIPS) as a low-orbit space platform.

Testing is divided into two phases. In the first phase, laboratory bit error ratio (BER) tests are performed on the receiver group in a simulated shipboard RFI environment. In the second phase, qualitative performance is evaluated in a link environment with LIPS. Additionally, received downlink power is measured as a function of LIPS elevation angle, and compared to theoretical values.

Electrical Engineer
Master of Science in
Electrical Engineering
December 1984

Advisor: J.B. Knorr
Department of
Electrical and Computer
Engineering

MECHANICAL ENGINEER

EFFECT OF STRAIN AND STRAIN RATE ON THE MICROSTRUCTURE OF A SUPERPLASTICALLY DEFORMED Al-10%Mg-0.1%Zr ALLOY

Mark E. Alcamo
Lieutenant, U.S. Navy
B.S., U.S. Naval Academy, 1977

The deformation characteristics of two thermomechanically processed, high-Magnesium, Aluminum-Magnesium-Zirconium alloys were investigated. The processing included warm rolling at 300°C to 90-95% reduction. Tension testing was done at various temperatures and strain rates and superplastic elongations were observed for both alloys. Subsequently, samples of Al-10%Mg-0.1%Zr were tested at 300°C to strains ranging from 8% to 267% as well as to fracture. Strain rates of $6.67 \times 10^{-3} s^{-1}$ and $6.67 \times 10^{-4} s^{-1}$ were used. These were examined via TEM to observe microstructural changes which occur during deformation. Quantitative analysis of the functional relationship between stress, strain, strain rate, and grain size for this alloy is done in an attempt to fit it's deformation response to current models for superplastic deformation.

Mechanical Engineer
Master of Science in
Mechanical Engineering
June 1985

Advisor: T.R. McNelley
Department of
Mechanical Engineering

OSCILLATING FLOW ABOUT CIRCULAR CYLINDERS AT LOW KEULEGAN-CARPENTER NUMBERS

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B.S., University of Hawaii, 1977

The in-line force and the resulting drag and inertia coefficients for smooth and rough circular cylinders immersed in a sinusoidally oscillating flow at low Keulegan-Carpenter numbers (K) have been determined experimentally and compared with those obtained theoretically by Stokes and Wang. In addition, flow visualization experiments were carried out with oscillating cylinders in a water table and the stability of the flow was investigated. The results have shown that for very low values of K, the flow about the cylinder is laminar, attached, and stable and the drag coefficient is nearly identical to that predicted theoretically. At a critical K, the flow becomes unstable to Taylor-Gortler vortices and the drag coefficient jumps to a higher value. Subsequently, the flow separates, becomes turbulent and results in a minimum drag coefficient. The subsequent increases in drag are attributed to vortex shedding. The inertia coefficient agrees with that obtained theoretically in the range where the flow in laminar.

Mechanical Engineer
Master of Science in
Mechanical Engineering
September 1985

Advisor: T. Sarpkaya
Department of
Mechanical Engineering

MASTER OF SCIENCE

IN

AERONAUTICAL ENGINEERING

PARTICLE SIZING IN A SOLID ROCKET MOTOR USING THE MEASUREMENT OF SCATTERED LIGHT

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Major, Indonesian Air Force
B.S., Indonesian Air Force Academy, 1968

An experimental investigation was conducted to determine the feasibility of measuring the change in particle size across the exhaust nozzle of a small solid propellant rocket motor. Light scattering measurements were made at small forward angles at the entrance and exit of the exhaust nozzle. The experimental technique was found to be practical, especially if used in conjunction with measurements of transmitted light of multiple wave lengths. However, the determination of D_{32} is difficult in the motor environment and is biased toward the larger particles in the size distribution. Particle size measurements were in reasonable agreement with sizes determined from collected exhaust products. Recommendations for further improvement of the apparatus are made.

Master of Science in
Aeronautical Engineering
March 1985

Advisor: D.W. Netzer
Department of
Aeronautics

A METHOD TO CALCULATE THE PARAMETERS
OF WINGS OF ARBITRARY PLANFORM

Edward M. Barber
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B.S., University of New Mexico, 1977

The computation method developed in this thesis proceeds from the theory developed by Jones, [Ref.1]. His final equations are first rewritten in matrix format. They are then organized into computational sequences that may be translated into computer programming language to calculate the aerodynamic parameters of wings of arbitrary planform.

Master of Science in
Aeronautical Engineering
December 1984

Advisor: T.H. Gawain
Department of
Aeronautics

AN INVESTIGATION OF PARTICLE SIZE MEASUREMENT
USING NON-INTRUSIVE OPTICAL TECHNIQUES
IN A GAS TURBINE COMBUSTOR

John S. Bennett
Lieutenant, United States Navy
B.S., Cornell University, 1977

This thesis investigated the use of three-wavelength light transmission and forward-angle scattered light intensity ratio techniques to determine the effects of fuel additives on particle sizes and mass concentrations in a T-63 combustor and evaluated several improvements to the T-63 diagnostic system.

Data from both optical methods indicated an increase in particle size in a range of .06 to .10 microns occurred in the exhaust region when the fuel additive was used, with no change in mass concentration. The two techniques resulted in different measured particle sizes and require further investigation. Current improvements to the T-63 diagnostic apparatus are discussed along with required changes for further testing.

Master of Science in
Aeronautical Engineering
September 1985

Advisor: D.W. Netzer
Department of
Aeronautics

AN INTERACTIVE DISCRETE CONTROLS ANALYSIS OPTION (ORACLS) FOR THE CONTROLS ANALYSIS PACKAGE ON THE IBM 3033

Michael K. Brenny
Lieutenant Commander, United States Navy
B.S., Iowa State University, 1976

This thesis discusses the implementation of a discrete control systems analysis option, ORACLS, for the CONTROLS analysis package. The option encompasses a collection of FORTRAN programs that facilitate the design and analysis of linear, multiple input/multiple output digital feedback control systems. All programs are interactive and operate in the VM/CMS environment of the IBM 3033.

The main focus of this thesis was the development of the FORTRAN programs ORACLSX and TRANFUNC. They serve as the foundation of the ORACLS option, complimenting as well as interacting with those programs currently in use in the CONTROLS package.

A collection of FORTRAN subroutines, "Optimal Regulator Algorithms for the Control of Linear Systems" (ORACLS), by E.S. Armstrong of the NASA Langley Research Center, was used in the development of the ORACLSX program. Subroutines from the "Optimal Systems Control" FORTRAN program (OPTSYS), were used as the foundation for the discrete transfer function analysis program, TRANFUNC.

The ORACLS option capabilities include: analog-to-digital matrix conversion, transfer function analysis, complete eigenvalue analysis, modal analysis, transient response calculation, Kalman-Bucy filter synthesis, and optimal regulator synthesis. Graphical results are available for the transient analysis and transfer function analysis portions.

Master of Science in
Aeronautical Engineering
June 1985

Advisor: D.J. Collins
Department of
Aeronautics

AN EXPERIMENTAL INVESTIGATION OF THE EFFECTS OF SWIRLING AIR FLOWS ON THE COMBUSTION PROPERTIES OF A SOLID FUEL RAMJET MOTOR

William H. Campbell, Jr.
Lieutenant, United States Navy
B.S., University of Mississippi, 1978

A series of reacting flow tests of a solid fuel ramjet were conducted with different air inlet swirl. Cold flow measurements of the air flow at the exit plane of the tube-in-hole injector were used to determine the Swirl Number for each configuration. Regression rates of a HTPB type fuel at low air mass flux were found to increase with swirl vane angle (and Swirl Number) up to 30 degrees.

Master of Science in
Aeronautical Engineering
September 1985

Advisor: D.W. Netzer
Department of
Aeronautics

DEVELOPMENT OF NATOPS PERFORMANCE SOFTWARE FOR THE H-46D HELICOPTER

John M. Caram
Lieutenant, United States Navy
B.S., University of Florida, 1977

This thesis generates closed-form equations for significant and frequently used NATOPS performance charts for the H-46D and H-46A (with T58-GE-10 engines) helicopters. These equations are developed into interactive software for the Hewlett-Packard HP-41CV hand-held programmable calculator. With this software installed in the calculator the user is able to calculate numerous NATOPS performance parameters (expeditiously, with reduced risk of error) both prior to and in flight.

Master of Science in
Aeronautical Engineering
March 1985

Advisor: D.M. Layton
Department of
Aeronautics

ANALYSIS OF CONTROL SYSTEM FROM A VIEWPOINT OF DESIRED POLE PLACEMENT AND DESIRED DEGREE OF ROBUSTNESS

Jinhwa Chang
Major, Republic of Korea Air Force
B.S., Republic of Korea Air Force Academy, 1975

A design method for solving the problem of robustness to cross-coupling perturbations in multivariable control systems for the X22A V/STOL aircraft is presented. The method uses numerical optimization procedures to manipulate the system feedback gains as direct design variables. The manipulation is accomplished in a manner that produces desired performance by pole placement and robustness by modification of the minimum singular values of the system return difference matrix.

Channels affected by cross-coupling perturbation may be recognized by the character of their transfer function Bode plots. The mechanism used by the pole placement and robustness routine in obtaining a robust design is evident from the gain changes associated with the transfer function diagram and the zero shifts shown on pole-zero plots. The pole placement and robustness routine uses gain equalization and zero assignment to modify the characteristics of the system in the areas of low singular values, producing a robust design.

Master of Science in
Aeronautical Engineering
December 1984

Advisor: D.J. Collins
Department of
Aeronautics

AUTOMATED POLE PLACEMENT ALGORITHM FOR MULTIVARIABLE OPTIMAL CONTROL SYNTHESIS

Chow, Wah Keh
B.A. (Hons), University of Oxford, 1978

This work addresses the application of numerical optimization technique to the pole-placement problem in multivariable optimal control. An algorithm is developed to select a set of weighting matrix elements such that the conventional transient response criteria are satisfied.

General properties of the optimal system in terms of stability, robustness and relative weights between state and control variables were explored by applying the method to the design of two multivariable systems. Results indicated that this method provides good insight into the problem for the designer and is therefore a useful tool in multivariable control synthesis.

Master of Science in
Aeronautical Engineering
September 1985

Advisor: D.J. Collins
Department of
Aeronautics

AN INTERACTIVE COMPUTER AID FOR THE DESIGN AND ANALYSIS OF LINEAR, SINGLE INPUT/SINGLE OUTPUT DIGITAL AND CONTINUOUS CONTROL SYSTEMS

Clifton M. Cooksey
Lieutenant, United States Navy
B.S., United States Naval Academy, 1977

In this thesis the development of the Digital and Analog Control System Analysis Program (DACSAP) is discussed. DACSAP is an interactive computer aid for the design and analysis of linear, single input/single output feedback control systems. DACSAP is user friendly; it uses menus for option selection and prompted data entry. The program will analyze systems which are described by transfer functions written in the s, z, w or w' domains. The program will manipulate the transfer functions of multi-loop systems to produce the open and closed loop transfer functions required for a variety of analysis techniques. The analysis techniques included in DACSAP are root locus, open and closed loop Bode frequency response, Nyquist frequency response, Nichols frequency response and closed loop time response. The output of any of these analysis techniques may be either a tabulation of data points or a high resolution plot.

Master of Science in
Aeronautical Engineering
December 1984

Advisor: M.D. Hewett
Department of
Aeronautics

DEVELOPMENT OF NATOPS PERFORMANCE SOFTWARE FOR THE SH-3D AND SH-3H HELICOPTERS

John T. Curtis
Lieutenant Commander, United States Navy
B.A., University of Georgia, 1973
M.A., Central Michigan University, 1981

This thesis generates closed form equations for significant and frequently used NATOPS performance charts for the SH-3D and SH-3H helicopters. These equations are developed into interactive software for the Hewlett-Packard HP-41CV hand-held programmable calculator. With this software installed in the calculator the user is able to calculate numerous NATOPS performance parameters (expeditiously, with reduced risk of error) both prior to and in flight.

Master of Science in
Aeronautical Engineering
March 1985

Advisor: D.M. Layton
Department of
Aeronautics

A PROGRAM MANAGER'S HANDBOOK FOR SYSTEM SAFETY AND MILITARY STANDARD 882B

Boyce W. Duke
Lieutenant Commander, United States Navy
B.A., University of California, Santa Barbara, 1969

The Program Manager's role in the acquisition of new weapon systems encompasses many disciplines, some of which he may have little, if any, training or experience in handling. One of these areas, which until recent years has received little attention, is System Safety Engineering. This thesis is an attempt, in handbook form, to introduce the Program Manager to the System Safety Process and provide basic guidance in the application of MIL STD 882B, the governing Department of Defense directive on system safety program requirements.

Master of Science in
Aeronautical Engineering
March 1985

Advisor: D.M. Layton
Department of
Aeronautics

ANALYSIS OF INCOMPRESSIBLE CASCADE FLOWS USING "STATE-OF-THE-ART" COMPUTER PROGRAMS

Paul E. Genskow
Captain, United States Marine Corps
B.S., Iowa State University, 1977

Two "state-of-the-art" computer programs, Q3DFLOW and a standard Cebeci boundary layer program as applied to aerodynamic flows in a cascade are examined. Q3DFLOW is a quasi three-dimensional finite element turbomachinery program. Only the incompressible blade-to-blade module of this program is used. The Cebeci boundary layer program is for incompressible, two dimensional, and constant viscosity flows. It is used to calculate boundary layers on a few isolated airfoils and airfoils/blades in a cascade. Experimental data and other analytical computations are compared for both programs. Additionally, the theory and operation of the Cebeci boundary layer program are presented.

Master of Science in
Aeronautical Engineering
March 1985

Advisor: M.F. Platzer
Department of
Aeronautics

EFFECT OF SMALL PRESSURE DISTURBANCES ON THE BREAKDOWN OF ROUND LAMINAR AND TURBULENT JETS

Zacharias Z. Gikas
Captain, Hellenic Air Force
B.S., Hellenic Air Force Academy, 1974
B.S., University of Patras Greece, 1981

The objective of the present work was to experimentally investigate the effect of small sinusoidal perturbations on the breakdown of circular water jets issuing from long tubes aiming to examine how the mean velocity profile for a fully developed laminar, transitional and turbulent flow as well as the frequency affects the mechanism of breakdown of the jet flow.

Observations using a high frequency stroboscope were recorded using a high speed photographic technique, for the most distinctive phenomena observed, for three selected Reynolds numbers corresponding to laminar, transitional and turbulent flow. Markedly different behavior of flow breakdown and droplet formation was observed for each of these flows as frequency waveform or phase angle was altered.

Master of Science in
Aeronautical Engineering
September 1985

Advisor: J.A. Miller
Department of
Aeronautics

MEASUREMENT OF TURBOFAN/TURBOJET THRUST FROM TAILPIPE STATIC PRESSURE

Todd W. Givens
Commander, United States Navy
B.S.A.E., Georgia Institute of Technology, 1967

John A. LeMoine
Major, United States Marine Corps
B.S.G., Villanova University, 1973

The most accurate method for measuring turbojet/turbofan thrust is mechanical. A more practical method is often desired, however, since a mechanical device is costly and non-portable. An investigation was conducted to determine whether inferring thrust indirectly from pressure provides sufficient accuracy to justify its use as an alternate technique for determining uninstalled thrust.

TF41 engine data were provided by the Naval Air Rework Facility at Jacksonville, Florida. The data consisted of a variety of engine parameters which had been recorded during routine post-maintenance performance tests plus an additional set of tailpipe static pressure readings that had been obtained from a "slave" tailpipe used for this project.

It was decided to approach the data evaluation empirically. The engine data were combined and an ensemble plot of tailpipe static pressure versus thrust was produced for analysis. A curve fitting technique was then employed to determine how well the parameter correlated with thrust.

The results were tested statistically and found to be reasonable. Correlation between thrust and tailpipe static pressure was excellent.

Master of Science in
Aeronautical Engineering
December 1984

Advisor: O. Biblarz
Department of
Aeronautics

CONSTRUCTION AND USE OF A RADIO CONTROLLED MODEL HELICOPTER FOR RESEARCH

Charles J. Hintze
Major, United States Army
B.S., South Dakota School of Mines and Technology, 1972

This thesis examines the relationship that exists between a radio controlled model helicopter and a full-size helicopter. The construction of a radio controlled model helicopter and flight training involved is discussed. Initial hover performance testing of a radio controlled helicopter is evaluated.

Master of Science in
Aeronautical Engineering
March 1985

Advisor: D.M. Layton
Department of
Aeronautics

A COMPUTATIONAL METHOD FOR WINGS OF ARBITRARY PLANFORM

Christopher S. Jones
Lieutenant Commander, United States Navy
B.S., Texas A & I University, 1968

The computational method developed in this thesis permits the calculation of the aerodynamic performance of a wing of arbitrary planform. Both basic and additional lift are analyzed. This treatise is restricted to thin wings in steady, inviscid, incompressible flow. The method uses a grid system of control points over the wing semi-span. The circulation over the wing is considered variable with discrete values at the specified grid points. Finite difference equations are utilized to determine these discrete values. Control point indeterminacies are evaluated analytically. Matrix inversion is required for solution by the method presented. Details of the matrix technique are developed in Ref. 4. A brief summary of the principal computational relations is included. No numerical results are yet available but are expected during the next phase of this research.

Master of Science in
Aeronautical Engineering
December 1984

Advisor: T.H. Gawain
Department of
Aeronautics

THE EFFECTS OF PARAMETER VARIATION ON HELICOPTER PERFORMANCE

Kim, Chul Koo
Major, Republic of Korea Air Force
B.S., Korea Air Force Academy, 1974

Six different cases of helicopter main rotor parameter variation are considered for each of three different forward velocities - hover, sixty knots and one-hundred fifty knots - in order to consider the effects of the changes on the total power required for the helicopter. The six cases included variations in rotor radius, rotor chord, solidity, disc area, rotational velocity and tip velocity.

Although strong positive or negative effects may be observed at some velocities, these trends are generally not the same at all velocities, indicating that trade-offs must be made in the design process in order to optimize the level flight performance.

Master of Science in
Aeronautical Engineering
March 1985

Advisor: D.M. Layton
Department of
Aeronautics

WIND TUNNEL DRAG EVALUATIONS OF HELICOPTER NOSE SECTIONS

Robert S. Mair
Major, United States Army
B.S., United States Military Academy, 1973

This thesis determines the aerodynamic drag parameters for three different generic helicopter nose fuselage sections at various angles of attack and velocities using a 3.5 x 5 foot wind tunnel and a locally constructed three component strain gage balance. A common center section is used with provisions for three different tail sections allowing for nine possible configurations to effect the overall shape of a fuselage. This allows a student in a basic conceptual helicopter design course a quantitative means of comparing general shapes in order to select the best configuration of the fuselage. However, the results are questionable due to problems with the strain gage balance used to determine the aerodynamic forces on the models.

Master of Science in
Aeronautical Engineering
March 1985

Advisor: D.M. Layton
Department of
Aeronautics

MOLECULAR BACK FLOW FROM THE EXHAUST PLUME OF A SPACE-BASED LASER

Scott E. McCarty
Lieutenant Commander, United States Navy
A.B., Stanford University, 1976

Back flow from the exhaust of a chemical laser in low earth orbit may be detrimental to the integrity and operation of the selfsame system. Difficulties arise in the calculation of exhaust plume properties and molecular flux as the gas expands from continuum to free-molecular flow. The solution of the governing Boltzmann equation is exceedingly complex; similarly, numerical solutions such as the Direct Simulation Monte Carlo technique require prohibitive amounts of computer processing time. An alternate method of the assessment of molecular flux is presented in which the continuous transition from viscous to collisionless flow is approximated by a suitably defined breakdown surface. The molecular flux incident on a given area of the spacecraft surface is determined by integration of flux from all significant portions of the breakdown surface. Results are presented for exhaust plumes of various stagnation and exit plane conditions emanating from an axisymmetric ring nozzle.

Master of Science in
Aeronautical Engineering
June 1985

Advisor: A.E. Fuhs
Department of
Aeronautics

DEVELOPMENT OF REDUCED ORDER MODELS FOR CONTROL SYSTEM DESIGN USING THE OPTSYSX PROGRAM

Stanley W. Nelson
Lieutenant Commander, United States Navy
B.S., University of Kansas, 1972

The modern controls engineer is often faced with designing a system which is characterized by a large number of first order differential equations. It is highly desirable and sometimes necessary that such complex systems be reduced for analysis, synthesis and implementation into a physical control system. It is the intent of this thesis to present a mathematical procedure and computer software based upon this procedure which enable the control engineer to formulate a reduced order model of a large order system.

As examples, two large order systems are analyzed: a sixteenth order model of the F100 turbofan engine and a ninety-eighth order model of the X-29A aircraft control system.

Master of Science in
Aeronautical Engineering
December 1984

Advisor: D.J. Collins
Department of
Aeronautics

A COMPUTER PROGRAM TO MODEL THE CN^2 OPTICAL TURBULANCE CHARACTERISTICS OF A GIVEN ATMOSPHERE, ITS CONVERSION TO IBM FORTRAN AND UTILIZATION

Nicholas J. Padula
Lieutenant, United States Navy
B.S., United States Naval Academy, 1977

This thesis describes the conversion of a computer program from Fortran IV used by the CDC computer to Fortran IV compatible with the Naval Postgraduate School IBM 3033 system. The converted program, called TURB2, estimates the magnitude of the refractive index structure parameter, $Cn^2(z)$, for a dry atmosphere in horizontal layers. The altitudes of the layers depend upon the corresponding altitudes of conventional meteorological rawinsonde balloon data. The data input is a formatted file called TURB2 DATAIN and the output consists of the value of dry Cn^2 at each altitude along with a graph of log Cn^2 vs. altitude.

Master of Science in
Aeronautical Engineering
June 1985

Advisor: D.L. Walters
Department of
Physics

PARTICLE SIZING FROM FORWARD SCATTERED LIGHT AT TWO ANGLES USING A VARIABLE-FOCAL-LENGTH OPTICAL SYSTEM

John Powers
Lieutenant, United States Navy
B.S., University of San Francisco, 1976

The theory of operation and description of a particle sizing device which indirectly determines the size of small particles from forward scattered light at two angles is presented. The device incorporates a fixed detector geometry and maintains a fixed intensity ratio at two photodiode detectors by adjusting the optical system focal length. Simple analogue signal processing is used with a servomotor to make continuous adjustments automatically.

The optical device is used to investigate the effects of an applied high intensity electric field on a fuel spray from a turbine engine fuel nozzle for changes in droplet size. Preliminary results on a T-56 nozzle spraying DF-2 fuel at 75 psig with the sample volume 8 centimeters from the nozzle and using a sharp electrode with the point 10 millimeters from the nozzle at a potential of 16 kV showed no conclusive changes in droplet size. The Sauter mean diameter of the fuel spray varied from 42 to 47 microns.

Master of Science in
Aeronautical Engineering
December 1984

Advisor: O. Biblarz
Department of
Aeronautics

THE NAVAL POSTGRADUATE SCHOOL FLIGHT MECHANICS LABORATORY: A FEASIBILITY STUDY

Kenneth S. Reightler, Jr.
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1973
M.S., University of Southern California, 1984

The Naval Postgraduate School (NPS) currently has no laboratory facilities to support the teaching of flight mechanics. This thesis concerns a feasibility study conducted to define the need for a flight mechanics laboratory at NPS, determine the methods used at other universities and availability of resources, develop a plan to integrate laboratory facilities into the NPS aeronautical engineering syllabus, and make recommendations concerning changes needed in the NPS Department of Aeronautics to enhance the teaching of flight mechanics. The general conclusion of the study is that a flight mechanics laboratory is essential to the study of flight mechanics at NPS. The proposed laboratory should include the selective use of flight simulators, computer instructional devices, a flight demonstration airplane, a fully instrumented flying laboratory, and a variable stability airplane. Extensive use should be made of contracted services. A flight mechanics laboratory used to support classroom instruction and research should be established at NPS as soon as possible.

Master of Science in
Aeronautical Engineering
December 1984

Advisor: D. Layton
Department of
Aeronautics

AN EXPERIMENTAL INVESTIGATION OF COMBUSTION PRESSURE OSCILLATIONS IN BYPASS CONFIGURED SOLID FUEL RAMJETS

Daniel C. Rigterink
Lieutenant, United States Navy
B.S., State University of New York at Albany, 1976

An experimental investigation of the mechanisms involved in combustion pressure oscillations in bypass flow configured solid fuel ramjets was conducted. Testing was done using cylindrically perforated polymethylmethacrylate fuel grains in a solid fuel ramjet with 180° opposed dumps into a plenum ahead of an axial dump combustor inlet. Bypass flow into the aft mixing chamber was accomplished using two dumps located either 180° or 90° apart, perpendicular to the centerline. Split inlet feed line lengths into the plenum were varied with no apparent change of the dominant pressure oscillation frequency of approximately 167 hz for bypass tests. Hot wire measurements indicated that in the short-coupled axial inlet, there were no dominant vortex shedding frequencies in the separation/shear layer or at the reattachment point on the fuel grain wall. The observed pressure oscillation frequency did not appear to be related to vortex shedding from the inlet jet. Coupling of the driving disturbance from bypass flow could possibly be with a longitudinal mode of the combustor or a Helmholtz mode involving the head section plenum.

Master of Science in
Aeronautical Engineering
September 1985

Advisor: D.W. Netzer
Department of
Aeronautics

COMPUTER AIDED INSTRUCTION IN ENGINEERING

Theron B. Rose
Lieutenant, United States Navy
B.S., University of Utah, 1978

This thesis presents evidence that computer aided instruction (CAI) is effective and can improve instructional efficiency when it is properly implemented. An overview of CAI in other colleges is presented as a source of ideas. The Department of Aeronautics of the Naval Postgraduate School is used as an example of where CAI can be applied. Procedures for the proper implementation of CAI are presented; and the summary includes specific recommendations for the Aeronautics Department.

Master of Science in
Aeronautical Engineering
March 1985

Advisor: R.E. Ball
Department of
Aeronautics

THE INFLUENCE OF HELICOPTER TAIL SHAPE ON DRAG: AN AERODYNAMIC STUDY USING A LOW SPEED WIND TUNNEL

Christopher L. Sargent
Captain, United States Army
B.S., United States Military Academy, 1974

This thesis examines the effect of helicopter tail shape on drag using a low speed wind tunnel at the Naval Postgraduate School. A modification to the Aeronautical Engineering Department's 3.5' x 5' wind tunnel was made to update the facilities and allow this work. Major R. Scott Mair worked simultaneously to study the effect of nose shape on drag, a result of the 2-man requirement for wind tunnel work. The existing external balance was replaced with an internal balance and a variable angle-of-attack support system was constructed as well. Quantitative data was collected with this balance, and qualitative information was obtained by tufting the models and visualizing the airflow. The equipment built was adequate with the exception of one component of the balance, which will require a new balance to be built. This single deficiency was significant enough to invalidate the output of the balance and as a result any quantitative discussion of how a helicopter's tail shape affects drag. Without this data the explanation of drag, using flow visualization alone is also not practical.

Master of Science in
Aeronautical Engineering
March 1985

Advisor: D.M. Layton
Department of
Aeronautics

MASTER OF SCIENCE

IN

APPLIED MATHEMATICS

CAVES - COMPUTER-AIDED VEHICLE EMBARKATION SYSTEM

John M. Byzewski
Captain, United States Marine Corps
B.S., United States Naval Academy, 1979

In this thesis the two-dimensional vehicle loading problem is considered: that is, the problem of loading a rectangular deck of size L by W of a ship, drawing from a set of n vehicles. The objective is to maximize the area covered on the deck by the vehicles loaded. A heuristic algorithm is employed to solve the two-dimensional loading problem. A computer-aided vehicle embarkation system (CAVES) is developed using a menu driven micro-computer program designed to assist embarkation personnel to load vehicles on board a ship. CAVES provides the Embarkation Officer the flexibility and portability needed to make real time decisions about vehicle load plans.

Master of Science in
Applied Mathematics
June 1985

Advisor: L. Williamson
Department of
Mathematics

MASTER OF SCIENCE

IN

COMPUTER SCIENCE

THE DESIGN AND IMPLEMENTATION OF A HIERARCHICAL INTERFACE FOR THE MULTI-LINGUAL DATABASE SYSTEM

Timothy P. Benson
Captain, United States Marine Corps
B.S., United States Naval Academy, 1978

Gary L. Wentz
Captain, United States Marine Corps
B.S., University of Kansas, 1978

Traditionally, the design and implementation of a conventional database system begins with the choice of a data model followed by the specification of a model-based data language. Thus, the database system is restricted to a single data model and a specific data language. An alternative to this traditional approach to database-system development is the multi-lingual database system (MLDS). This alternative approach enables the user to access and manage a large collection of databases, via several data models and their corresponding data languages, without the aforementioned restriction.

In this thesis, we present the specification and implementation of a hierarchical/DL/I language interface for the MLDS. Specifically, we present the specification and implementation of an interface which translates DL/I language calls into attribute-based data language (ABDL) requests. We describe the software engineering aspects of our implementation and an overview of the four modules which comprise our hierarchical/DL/I language interface.

Master of Science in
Computer Science
June 1985

Advisor: D.K. Hsiao
Department of
Computer Science

A REAL-TIME EXECUTIVE FOR MULTIPLE-COMPUTER CLUSTERS

David J. Brewer
Lieutenant, United States Navy
B.S., University of Idaho, 1978

This thesis extends the multi-computer real-time executive, MCORTEX, for a cluster of single board computers (INTEL iSBC 86/12) on the MULTIBUS, to a multiple cluster system tied together by a Local Area Network (Ethernet). The E-MCORTEX system uses eventcounts and sequencers to synchronize processes resident in the network. Data communications between processes are presently limited to a single cluster with shared memory. However, future versions of E-MCORTEX will permit network-wide process synchronization and data communication.

Master of Science in
Computer Science
December 1984

Advisor: U.R. Kodres
Department of
Computer Science

DESIGN AND IMPLEMENTATION OF A PERSONNEL DATABASE

Bora Buyukcner
Major, Turkish Army
B.S., Military Academy, Ankara, Turkey, 1965

Yucel Ozin
Captain, Turkish Army
B.S., Military Academy, Ankara, Turkey, 1972

This thesis deals with the design considerations for a personnel database system. It introduces the important concepts related to the analysis and design phases of a database system. Two types of data models, namely conceptual and implementation models are described, particulary concentrating on the Semantic Data Model (SDM) for conceptual and the Relational Data Model for implementation. The Semantic Data Model is used to indicate the entities and relationships between those entities for the Personnel Database. After the completion of this process, the SDM design is converted into a corresponding relational database which is implemented using the ORACLE Database Management System (DBMS).

Master of Science in
Computer Science
June 1985

Advisor: S.H. Parry
Department of
Computer Science

INVESTIGATION AND IMPLEMENTATION OF A TREE TRANSFORMATION SYSTEM FOR USER FRIENDLY PROGRAMMING

Mohamed B. Chok
Captain, Tunisian Army

The programming system (TTPS) described in this thesis is based on tree transformation techniques, commonly known as abstract transformation. The objects manipulated by the user through "TTPS" are: the templates, the transformation rules, and the programs. The templates define the syntactic and semantic language framework which will be used to parse and unparse both the rules and the program trees. The rules define the semantic behavior of the transformation process. The program represents the source tree which describes the problem to solve, and will be interpreted by a successive application of the supplied rules until they no longer apply.

"TTPS" provides an appropriate environment for a large class of applications (e.g. system programming, code generation, structure transformation, simulation of syntax directed editors, and other conventional applications), and supports many programming styles such as functional programming, conventional programming, and user defined style.

Master of Science in
Computer Science
December 1984

Advisor: B.J. MacLennan
Department of
Computer Science

COGNITIVE ISSUES IN SOFTWARE REUSE

Eduardo M.P. Coehlo
Lieutenant Commander, Portuguese Navy
B.S., Portuguese Naval Academy, 1968

Vast resources are invested in the construction of software. Reuse of software offers potential savings in the construction of new software systems. From the perspective of cognitive science, current proposals for software reuse are depicted. This work starts with a cognitive analysis of programming behavior (human thought processes). The aspects of cognitive behavior related to program comprehension, the notions of knowledge domain, knowledge acquisition and reconstruction and memory mechanisms are discussed. The definition of software reusability is presented and methods to achieve reuse are discussed. The software development model called DRACO is presented and its concepts are related to software reuse and reconstruction.

Master of Science in
Computer Science
June 1985

Advisor: G.H. Bradley
Department of
Computer Science

HOW COGNITIVE PROCESSES AID PROGRAM UNDERSTANDING

Paul R. Dorin
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1976

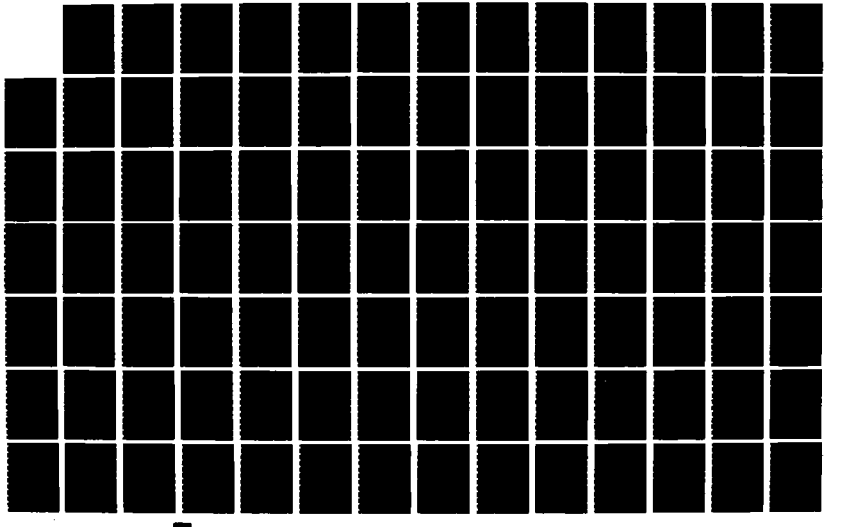
A theoretical model of how an expert programmer goes about understanding a piece of software is presented. This understanding plays an especially critical role in software maintenance tasks. The model is based on three cognitive processes: CHUNKING, SLICING, and HYPOTHESIS GENERATION and VERIFICATION. These processes are used in conjunction with a programmer's knowledge base and categories of information critical to program understanding are identified. The model also takes advantage of certain characteristics of an associative memory to describe, using a semantic net representation, the mechanisms behind these processes and the organization of memory resulting from their use. The benefits of documentation and the use of commenting and mnemonics are described in terms of the model and may be useful as a guide for incorporating these into the code.

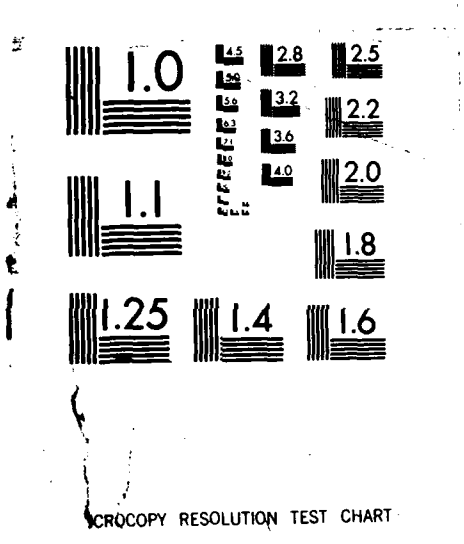
Master of Science in
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June 1985

Advisor: G.H. Bradley
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CROCOPY RESOLUTION TEST CHART

DEVELOPMENT AND ENHANCEMENT OF COMPUTER PERFORMANCE MODELING TOOL (CPMT)

Jose G. Duarte
Lieutenant Commander, Portuguese Navy
B.S., Portuguese Naval Academy, 1970

The Computer Performance Modeling Tool (CPMT) is a queueing network simulator to be used in support of Computer Performance and Evaluation courses like CS4400. This thesis is a continuation of the CPMT development project and consists of adaptive and perfective maintenance work to modify the existing simulator to add extended modeling capability and to improve the simulator performance. The thesis effort also included rewriting the CPMT user's manual to reflect new features, establishing a change log for the program and continuing validation of the simulator.

Master of Science in
Computer Science
June 1985

Advisor: A.A. Ross
Department of
Computer Science

AN ALGORITHM TO TEST FOR CONFLUENCE IN A SYSTEM OF LEFT TO RIGHT REWRITE RULES

Rachel Griffin
Lieutenant, United States Navy
B.A., Wellesley College, 1975

Formal specifications of computation systems promise to afford us not only a strictly enforced discipline in describing the semantics of the system, but also a way of proving that the system functions as described. There exists a rich body of mathematical theory regarding the use of formal specifications. However, the bridge from the theoretical world to the practical world is nonexistent in most cases. This research concentrates on developing practical techniques to determine the correctness of a formal specification. The foundation for the specifications we describe is in abstract algebras. However, the view of the axioms for a specification is modified so that axioms are treated as left to right rewrite rules, rather than as mathematical equalities. The major result of the research is a new and practical algorithm to determine confluence in an axiom system of left to right rewrite rules that satisfy certain restrictions.

Master of Science in
Computer Science
December 1984

Advisor: D.L. Davis
Department of
Computer Science

THE FORMAL SPECIFICATION OF A VISUAL DISPLAY DEVICE: DESIGN AND IMPLEMENTATION

James E. Hunter
Lieutenant Commander, United States Navy
B.S., Pennsylvania State University, 1973

The visual display is usually treated as a separate I/O device. The interface to the programmer is at a low conceptual level and vaguely defined. Software that uses sophisticated displays are notoriously non-portable. In this study, we apply techniques using an axiom specification method to design, specify, and implement the resources of a bit-mapped color display device which is fully integrated with an abstract processor called AM. In conjunction, we provide a precise and high conceptual interface to the resource to facilitate image programming.

Master of Science in
Computer Science
June 1985

Advisor: D.L. Davis
Department of
Computer Science

DESIGN AND IMPLEMENTATION OF AN INTELLIGENCE DATABASE

Jang, Jai Eun
Captain (P), Republic of Korea Army

This thesis presents the design and implementation of the Intelligence Database system. A database management system must be used in the Intelligence System in order to increase end-user productivity, decrease staff effort, enable the work to be done more efficiently, and permit end-user management more authority and responsibility. The Semantic Database Model was chosen as the method for designing the database. The SDM is a high-level semantics-based database description and structuring formalism for database design and enhances usability of the database system. Using the output of SDM in the Intelligence database, the records are rearranged in order to fit a relational DBMS. The Intelligence database is implemented, using the ORACLE relational DBMS.

Master of Science in
Computer Science
December 1984

Advisor: S.H. Parry
Department of
Computer Science

THE DESIGN AND IMPLEMENTATION OF A RELATIONAL INTERFACE FOR THE MULTI-LINGUAL DATABASE SYSTEM

Gary R. Kloepping
Captain, United States Army
B.S., United States Military Academy, 1976

John F. Mack
Captain, United States Army
B.S., United States Military Academy, 1978

Traditionally, the design and implementation of a conventional database system begins with the choice of a data model followed by the specification of a model-based data language. Thus, the database system is restricted to a single data model and a specific data language. An alternative to this traditional approach to database-system development is the multi-lingual database system (MLDS). This alternative approach enables the user to access and manage a large collection of databases via several data models and their corresponding data languages without the aforementioned restriction.

In this thesis we present the specification and implementation of a relational/SQL language interface for the MLDS. Specifically, we present the specification and implementation of an interface which translates SQL language calls into attribute-based data language (ABDL) requests. We describe the software engineering aspects of our implementation and an overview of the four modules which comprise our relational/SQL language interface.

Master of Science in
Computer Science
June 1985

Advisor: D.K. Hsiao
Department of
Computer Science

AN ALGEBRAIC SPECIFICATION LANGUAGE AND A SYNTAX DIRECTED EDITOR

Norvell L. Lilly
Lieutenant Commander, United States Navy
B.S., University of Pittsburgh, 1973

The rising cost of software has created a demand for methodologies which will allow the creation of portable software. Formal specification methods have been used to increase the portability of software, permit a degree of verification and validation, and lessen the burden of maintenance. The underlying theory for most specification methods, however, make them difficult to use and frequently are not applicable to many problems. Formal specifications based on initial algebras provide a framework for precisely defining program behavior and avoid the problems of informal specification methods. This thesis presents a specification language based on initial algebras, describes the various parts of specification produced by the language and describes an experimental syntax directed editor which uses the language's grammar.

Master of Science in
Computer Science
December 1984

Advisor: D.L. Davis
Department of
Computer Science

THE DESIGN AND IMPLEMENTATION OF AN OBJECT-ORIENTED, PRODUCTION-RULE INTERPRETER

Heinz M. McArthur
Captain, United States Marine Corps
B.S., United States Naval Academy, 1977

In this thesis we describe the design and implementation of two prototype interpreters for Omega, an object-oriented, production-rule programming language. The first implementation is a throw-away prototype written in LISP; the second implementation is a more complete version written in C. The Omega language features two major components: a set of production rules executed through pattern-directed invocation, and a relational database of values and objects. We develop a simple system of rule evaluation which relies on hashed indexing for rule selection and a list implementation of relations. The system's performance is evaluated in comparison with LISP and Prolog interpreters. We conclude with a discussion of our experience in developing example applications, and recommend extensions to the language based on this experience.

Master of Science in
Computer Science
December 1984

Advisor: B.J. MacLennan
Department of
Computer Science

REVIEW OF THE PSYCHOLOGICAL ISSUES RELATING TO THE EFFECTIVENESS OF STRUCTURED PROGRAMMING

Cynthia A.C. McGrath
Lieutenant, United States Navy
B.S., Miami University, 1979

Claims have been made that the failure of empirical studies to establish the efficacy of structured programming is due to the lack of psychological models of the programming task. Many authors have pointed out that psychological research on the human information processing model might provide substance to the claim that structured programming facilitates a programmer's understanding of program logic. This thesis reviews the results of current psychological research and shows that at this time it is not possible to build a satisfactory psychological model of the programmer and his/her task. In order to define the programming task more clearly, the issues involving the psychological model are identified.

Master of Science in
Computer Science
December 1984

Advisor: G. Bradley
Department of
Computer Science

A SYSTOLIC ARRAY IMPLEMENTATION OF A REED-SOLOMON ENCODER AND DECODER

Stephen S. McKenzie
Lieutenant, United States Navy
B.S., United States Naval Academy, 1979

A systolic array is a natural architecture for the implementation of a Reed-Solomon (RS) encoder and decoder. It possesses many of the properties desired for a special-purpose application: simple and regular design, concurrency, modular expansibility, fast response time, cost-effectiveness, and high reliability. As a result, it is very well suited for the simple and regular design essential for VLSI implementation.

This thesis takes a modular approach to the design of a systolic array based RS encoder and decoder. Initially, the concept of systolic arrays is discussed followed by an introduction to finite field theory and Reed-Solomon codes. Then it is shown how RS codes can be encoded and decoded with primitive shift registers and implemented using a systolic architecture. In this way, the reader can gain valuable insight and comprehension into how these entities are coalesced together to produce the overall implementation.

Master of Science in
Computer Science
June 1985

Advisor: H.M. Fredricksen
Department of
Mathematics

RELATIONAL PROGRAMMING: DESIGN AND IMPLEMENTATION OF A PROTOTYPE INTERPRETER

Stephen G. Mitton
Lieutenant Commander, United States Navy
B.S., Rhode Island College, 1975

John R. Brown
Captain, United States Army
B.S., Rochestor Institute of Technology, 1975

Relational programming is a methodology which combines the advantages of functional programming with the relatively simple laws which govern relations. The goal is to give the programmer an environment which allows a higher level of programming abstraction than currently exists, an easier approach to proving programs correct, and a language which can support new parallel architectures. In this report, the design and implementation of a prototype interactive interpreter for a relational programming language is presented. The reasoning behind the decision to use LISP as the implementation language is presented followed by an in depth discussion of the design issues involved and the implementation decisions made. How to use the interpreter and future research topics are discussed. Also several appendices are provided which include the grammar, the relational operators implemented, and the documented LISP code.

Master of Science in
Computer Science
June 1985

Advisor: B.J. MacLennan
Department of
Computer Science

REUSABLE SOFTWARE: TRADE-OFF ANALYSIS AND A NEW APPROACH

Cynthia A. Murnan
Lieutenant, United States Navy
B.S., State University of New York, 1975

Software reusability is seen as a resource which can assist in resolving the current software crisis. This thesis discusses issues that are relevant to the concept of reusable software. It reviews the definition of reusable software and presents software development scenarios to describe possible guidelines for performing a trade-off analysis in determining the pros and cons of incorporating reusable software concepts into a software product. The thesis also suggests the need for some new and dramatically different methodologies to make software reusability a viable concept.

Master of Science in
Computer Science
June 1985

Advisor: G.H. Bradley
Department of
Computer Science

PERFORMANCE EVALUATION OF THE JRS AUTOMATIC MICROCODE GENERATING SYSTEM

Terry J. Newton
Captain, United States Air Force
B.S., United States Air Force Academy, 1976

The purpose of this thesis was to evaluate the performance of microcode automatically generated from a high level language. The performance of the generated microcode was compared to the performance of Fortran code on the VAX 11/780 to see if any increase in throughput could be attained by using the microcoded version.

The factors affecting the automatic generation of microcode: compaction, optimization, cost, and machine independence are discussed. This is followed by a definition of the testing areas, description of the tests, and a description of the performance evaluation methods.

The tests showed that the automatically generated microcode does not always out perform Fortran. In general, the Fortran code was better for mathematical calculations while the automatically generated microcode was better for bit manipulation and sorting/searching type applications.

Master of Science in
Computer Science
June 1985

Advisor: A.A. Ross
Department of
Computer Science

A SURVEY OF PROPERTIES OF RELATIONS WHICH HAVE THE CONFLUENCE PROPERTY

Ugur Ozkan
Lieutenant, Turkish Air Force
B.S., Air War Academy, 1979

The confluence property arises in a number of areas of computer science; from its origins in the lambda-calculus to its use in the theory of abstract data types and term rewriting systems. Its abstract properties and its application to a number of problems, such as algebraic specifications of abstract data types and term rewriting systems, are surveyed here.

Master of Science in
Computer Science
June 1985

Advisor: D.L. Davis
Department of
Computer Science

AUTOMATION OF THE PAYROLL SYSTEM OF THE HELLENIC AIR FORCE

Harilaos A. Papadopoulos
Major, Hellenic Air Force

Currently, the payroll for the Hellenic Air Force is computed manually. The author proposes an automated system to compute the monthly payroll for the Hellenic Air Force, and produce the required management reports. Various factors affecting a member's pay (both entitlements and deductions) are examined, as well as their relationship to the total system. Sample input forms to submit various changes in a member's payroll status (payraise, allowances, retirement, promotion, tax rate, family support, new assignment, etc.) are shown.

A design for a system of programs to provide various reports and update the appropriate master file is included. Also included are a general description of the inputs, purpose, and outputs for each of the main programs of the system, as well as a record layout for the database.

Master of Science in
Computer Science
December 1984

Advisor: P.W. Callahan
Department of
Computer Science

REMOTE TERMINAL LOGIN FROM A MICROCOMPUTER TO THE UNIX OPERATING SYSTEM USING ETHERNET AS THE COMMUNICATIONS MEDIUM

John D. Reeke
Lieutenant Colonel, United States Marine Corps
B.S., Regis College, 1966

This thesis examines the viability of a microcomputer based process which allows its terminal to become a terminal to a remote host which utilizes the UNIX operating system. The means of communication to the remote host is an Ethernet local area network.

The preponderance of the software to accomplish the remote login is PL/I thus enabling the software to be utilized by any combination of computer/operating system that supports PL/I. The Ethernet driver makes use of assembly language in order to program the Ethernet Controller Board and is therefore dependent upon the underlying microprocessor.

Although the communications medium is the Ethernet, ARPANET Internet and Transmission Control protocols are also utilized. This is necessitated by the manner in which the UNIX operating system's remote login process operates and allows the far more general case where the remote host is part of the ARPANET.

Master of Science in
Computer Science
December 1984

Advisor: U.R. Kodres
Department of
Computer Science

ON THE INTEGRATION OF LOGIC PROGRAMMING AND FUNCTIONAL PROGRAMMING

Randy E. Rhodes
Lieutenant, United States Navy
B.S., Auburn University, 1980

Two programming paradigms, logic programming and functional programming, are discussed in detail with emphasis on the particular advantages and disadvantages of each paradigm.

The integration of these two progamming paradigms is explored based on the notion that declarative sorts of knowledge (facts and logical relationships) should be expressed in a declarative way, and that procedural sorts of knowledge (manipulation, control, and utilization of knowledge) should be expressed in a procedural way. Toward this end, the conceptual framework for an integrated language is established, and the basic features of the language are outlined.

Master of Science in
Computer Science
June 1985

Advisor: B.J. MacLennan
Department of
Computer Science

A GRAPH THEORETIC ALGORITHM FOR CONTOUR SURFACE DISPLAY GENERATION

Mustafa Sahintepe
Lieutenant, Turkish Air Force
B.S., Air War Academy, 1981

In this study, we develop a graph theoretic algorithm for contour surface display generation.

The inadequacies of the currently published algorithms, with respect to contour line generation for a subgrid, are pointed out in a brief review of the available literature. The algorithm developed in this study, called the Large Contouring Tree Algorithm, gets rid of the cited inadequacies.

The core component of the introduced algorithm is a two-dimensional contouring algorithm that operates on two-dimensional slices of a larger three-dimensional grid. We present the Large Contouring Tree Algorithm in the Pascal programming language in Appendix A.

Master of Science in
Computer Science
June 1985

Advisor: M.J. Zyda
Department of
Computer Science

AN IMPLEMENTATION IN PASCAL: TRANSLATION OF PROLOG INTO PASCAL

Ahmet Saraydin
Captain, Turkish Army
Turkish Army War School, 1970

This thesis tries to find a mapping algorithm between Prolog and Pascal languages. For this purpose: a small subset of Prolog is chosen and translated into Pascal code. Also, the concept of logic programming and its practical application in the programming language Prolog, are discussed. The reader is expected to be familiar with Pascal and Prolog.

Master of Science in
Computer Science
June 1985

Advisor: N.C. Rowe
Department of
Computer Science

DESIGN AND IMPLEMENTATION OF
INVENTORY DATABASE

Osman Sari
Lieutenant, Turkish Air Force
B.S., Turkish Air War Academy, 1978

This thesis presents the design and implementation of the inventory database system. In order to effectively command and control the inventory of an Air Force, the commander must know the status of his resources. The use of a database management system can significantly increase his access to information regarding resource availability, location, state of operational readiness, and also increase end-user productivity, and decrease staff effort. The Semantic Data Model (SDM) was chosen as the method for designing the database. SDM provides an effective base for accommodating the evolution of the content structure and use of the database. After logical design of the inventory database, records are rearranged in order to satisfy relational database management system requirements. The inventory database is implemented by using the ORACLE relational DBMS.

Master of Science in
Computer Science
June 1985

Advisor: S.H. Parry
Department of
Computer Science

A PASCAL INTERPRETER FOR THE FUNCTIONAL PROGRAMMING LANGUAGE ELC

Ralph P. Steen Jr.
Captain, United States Army
B.S., United States Military Academy, 1976

Functional programming is a methodology designed to eliminate many of the problems of past programming languages through actions such as the elimination of the assignment statement and the ability to program in an environment that is at a higher level of abstraction than any previous languages. In this report an interpreter, written in Pascal, for the Extended Lambda Calculus is presented. Initially, the events leading to the development of functional programming are discussed followed by an in depth look at how the interpreter operates. Numerous example ELC programs are presented, including discussions of practical applications and statistical information about execution times and memory requirements. The Berkeley Pascal source code for the interpreter is also included in Appendix C.

Master of Science in
Computer Science
December 1984

Advisor: B.J. MacLennan
Department of
Computer Science

A HIERARCHY OF KNOWLEDGE LEVELS IMPLEMENTED IN A RULE-BASED PRODUCTION SYSTEM TO CALCULATE BOUNDS ON THE SIZE OF INTERSECTIONS AND UNIONS OF SIMPLE SETS

Barry M. Tilden
Lieutenant, United States Navy
B.S., United States Naval Academy, 1978

In this paper, the work done by Rowe in [Ref.1] and [Ref.2] is combined in the implementation of a rule based system to produce upper and lower bounds and estimates as to the size of intersections and unions of simple sets. The system constructed for this paper uses the hierarchy of knowledge levels of [Ref.2] as the tabulated statistics in the database abstract. The system is tested and analyzed to determine the advantages and disadvantages of increasing the knowledge level of the database abstract used for the calculation and of varying the number of partitions used in constructing the database abstracts. The paper also discusses the implementation details encountered during the construction of this system in the PROLOG programming language.

Master of Science in
Computer Science
December 1984

Advisor: N.C. Rowe
Department of
Computer Science

THE DESIGN, IMPLEMENTATION AND APPLICATION OF A TABLE-DRIVEN SYNTAX-DIRECTED EDITOR

George M. Tilley, Jr.
Captain, United States Army
B.S., United States Military Academy, 1977

A syntax-directed editor facilitates the creation of programs in a particular programming language. Because it is based on the syntax of the language, the editor insures the syntactic correctness of edited programs. This paper discusses the writer's development of a table-driven syntax-directed editor capable of editing information structured under virtually any context-free grammar. Not only does this editor insure syntactically correct programs, but it also possesses limited translation capabilities, both between high-level languages and from a high-level language into a directly executable form. The broader implications of such an editor, and of syntax-directed editing in general, are also discussed.

Master of Science in
Computer Science
December 1984

Advisor: B.J. MacLennan
Department of
Computer Science

DESIGN, ANALYSIS AND IMPLEMENTATION OF THE PRIMARY OPERATION, RETRIEVE-COMMON, OF THE MULTI-BACKEND DATABASE SYSTEM (MBDS)

Hsiang-Lung Tung
Commander, Republic of China Navy
B.S., Chinese Naval Academy, 1974

The multi-backend database system (MBDS) in the Laboratory for Database System Research at the Naval Postgraduate School is designed to overcome the performance-gain and capacity-growth problems of either the traditional database system or the single-backend-software database system. The original MBDS supported four primary operations, namely, RETRIEVE, DELETE, UPDATE and INSERT.

This thesis presents the design and implementation of the fifth primary operation, the RETRIEVE-COMMON operation. The retrieve-common operation is used to merge two files by their common attribute values. First, the overall design and implementation of MBDS is reviewed. Then, several alternatives are compared and analyzed to select the best one as our design and implementation approach. Finally, we describe the detailed design and the implementation. Our goal is to maximize the utilization and minimize the effects to the existing system.

For integrating our design into MBDS, several modifications are made. The algorithms for the modifications and their program specifications are also provided in chapters IV, V and the Appendix.

Master of Science in
Computer Science
June 1985

Advisor: D.K. Hsiao
Department of
Computer Science

THE DESIGN AND ANALYSIS OF A STYLIZED NATURAL GRAMMAR FOR AN OBJECT-ORIENTED LANGUAGE (OMEGA)

Robert P. Ufford
Captain, United States Army
B.S., United States Military Academy, 1978

In this thesis we discuss the design issues of a stylized natural language syntax for Omega, an object-oriented programming language built upon rule-based pattern matching. Emphasis is placed on simplicity and flexibility in the design. The feasibility of the proposed grammar (Omega-1.5) is evaluated by developing a prototype translator to translate the Omega-1.5 grammar into the predicate logic style of Omega-1. Sample applications are provided to examine the features of the grammar and to explore possible application areas. Limitations in the design are analyzed and potential amelioriations are suggested. We conclude with a general assessment of the overall Omega system.

Master of Science in
Computer Science
June 1985

Advisor: B.J. MacLennan
Department of
Computer Science

A PERFORMANCE MEASUREMENT METHODOLOGY FOR SOFTWARE MULTIPLE-BACKEND DATABASE SYSTEMS

James R. Vincent
Captain, United States Air Force
B.S., Fitchburg State College, 1970
B.S., University of Utah, 1979
M.S., University of Northern Colorado, 1977

Software multiple-backend database systems provide high-performance, cost-effective database management support for systems with very large and growing databases. One backend computer, called the backend controller (or briefly, controller), controls transaction processing of the remaining backend computers, i.e., backends, and interfaces with the host computers. These systems are designed to provide performance-gain and capacity-growth potential by increasing the number of backends connected to their controllers.

In this thesis we develop a comprehensive methodology for the performance evaluation of multiple database systems. We also apply this methodology to develop a test-database set and test-transaction mix for the evaluation of the multi-backend database system, MBDS.

Master of Science in
Computer Science
June 1985

Advisor: D.K. Hsiao
Department of
Computer Science

THE FORMAL SPECIFICATION OF AN ABSTRACT MACHINE: DESIGN AND IMPLEMENTATION

John M. Yurchak
Lieutenant, United States Navy
B.A., Lycoming College, 1978

The high cost of porting software from one machine to another stems from the ad hoc way in which the programmer's problem solving abstraction interacts with the machine's physical resource abstraction. If this interaction could be formalized, the well known semantic gap would at least be better understood, if not narrowed significantly. In this study, we apply techniques borrowed from contemporary research in abstract data type specification to design, specify and implement the physical resources of an abstract machine called AM.

Master of Science in
Computer Science
December 1984

Advisor: D.L. Davis
Department of
Computer Science

MASTER OF SCIENCE

IN

ELECTRICAL ENGINEERING

DETECTION OF PERIODIC SIGNAL OF ARBITRARY SHAPE WITH RANDOM TIME DELAY

Khalil Ahmed Ansari
Lieutenant, Pakistan Navy
B. Engg., NED University of Engineering and Technology, 1979

The detection of periodic signals of arbitrary wave shape with random time delay in additive white Gaussian noise, is a problem of practical significance in radar and communication applications.

In this thesis, the analysis and design of optimum and suboptimum receivers for detecting signals as described above has been carried out. The design of optimum (in minimum probability of error, P_e sense) receivers is based on the likelihood ratio test under the assumption of low SNR conditions. The design of suboptimum receivers is based on the heuristic approaches that intuitively yield reasonably good performance. Examples have been analyzed in order to present numerical results in graphical form on the performance of the receivers under different assumptions of wave shapes and p.d.f. on the random time delay associated with the signal.

Master of Science in
Electrical Engineering
June 1985

Advisor: D. Bukofzer
Department of
Electrical and Computer
Engineering

HIERARCHICAL IMAGE SEGMENTATION TO INFRARED IMAGES

James D. Bloomquist
Lieutenant, United States Navy
B.S., LaVerne College, 1976

Recursive image segmentation with hierarchical scope views is a new technique in image processing which systematically divides an image into smaller and smaller quadrants with each region within the quadrants having a structured descriptor. The regions are then processed to remove noise and to check for connected regions across the quadrant boundaries. The quadrants are then brought back together with the obscured target enhanced and distinguishable from the background. Infrared image data of five different ship targets with the associated noise and interference was processed by this technique with the target information being greatly enhanced. The procedures developed to evaluate the data were found to be inadequate for the task, necessitating hand evaluation to extract the target. The technique was proven to be a viable solution for extracting target information from infrared data, but very slow processing times and inadequate evaluation procedures limit the usefulness of the program in its present form.

Master of Science in
Electrical Engineering
June 1985

Advisor: C.H. Lee
Department of
Electrical and Computer
Engineering

UNDERWATER ACOUSTIC MODEL-BASED SIGNAL PROCESSING APPLIED TO THE DETECTION OF SIGNALS FROM A PLANAR ARRAY OF POINT SOURCE ELEMENTS

Richard J. Blount, Jr.
Lieutenant, United States Coast Guard
B.S., DeVry Institute of Technology, 1979

A computer simulation of a correlator receiver was developed and exercised to study the impact of a model-based signal processing algorithm on the detection of transmitted CW and LFM pulse acoustic signals incident on a planar array of electroacoustic transducers. The model of the ocean communication channel incorporates a space-variant sound speed profile. The transducer output electrical signals are cophased by an FFT beamformer via phase weighting, and summed to form a total array output signal. The total array output signal is correlated with a delayed replica of the transmit waveform and compared to a Neyman-Pearson threshold. Receiver performance is measured using a Monte Carlo technique to estimate the probability of detection for a fixed probability of false alarm versus the signal-to-noise ratio at the input of a single transducer. White, zero-mean, Gaussian transducer noise is assumed to facilitate comparison between theoretical and simulated performance. Results indicate that model-based signal processing provides significant improvement of receiver performance.

Master of Science in
Electrical Engineering
September 1985

Advisor: L.J. Ziomek
Department of
Electrical and Computer
Engineering

TARGET OBSERVABILITY FOR SATELLITE-BASED SENSORS

Robert E. Lee Bond
Lieutenant, United States Navy
B.S. Systems Engineering, U.S. Naval Academy, 1979

The purpose of this thesis is to discuss the observability of targets moving on or near the earth's surface when viewed from space by an orbiting satellite. simplified derivation of the satellite's orbital mechanics is undertaken, which taken in conjunction with a description of the target's motion allows for the derivation of a system of relative coordinates. An observability analysis is then performed on the resulting series of nonlinear equations, which in turn forms the basis for the design of a deterministic nonlinear observer and an Extended Kalman Filter to track the target.

Master of Science in
Electrical Engineering
March 1985

Advisor: R.R. Mohler
Department of
Electrical and Computer
Engineering

MEASURED NOISE PERFORMANCE OF A NEW METHOD OF FREQUENCY HOPPING

Peter S. Buczynski
Lieutenant, United States Navy
B.S., University of Connecticut, 1979

A frequency hopping (FH) technique in which symbols are transmitted as unique multiple hop sequences is the basis of this research. The receiver, of primary interest, uses a phase locked loop as a frequency to voltage converter and then uses difference amplifier circuits to compare the received sequence with all utilized sequences for data recovery. This report presents the design and results of this FH technique. A bit probability of error of 0.001 at 1.6 dB SNR was obtained.

Master of Science in
Electrical Engineering
December 1984

Advisor: G.A. Myers
Department of
Electrical and Computer
Engineering

ANGULAR TRACKING ERROR IN A PHASE COMPARISON MONOPULSE TRACKING RADAR: A CRITICAL REVIEW AND EXTENSION OF THE PHASE FRONT DISTORTION APPROACH

Sopon Bumroongpol
Lieutenant Commander, Royal Thai Navy
Royal Thai Naval Academy, Thailand, 1970

This thesis studies the inherent angular errors of a phase comparison monopulse system used for tracking a complex target. The phase compensation equation is utilized in justifying Howard's hypothesis on the relationship between the phase front distortion of the scattered wave from a complex target and angular tracking errors, in extending this hypothesis to closer ranges to the target, and in determining the limitations of this hypothesis. Through the phase compensation equation, global errors are demonstrated. A local error bound is also determined for the tracking of a two element target. These new results are not predicted by Howard's hypothesis.

Master of Science in
Electrical Engineering
December 1984

Advisor: H.M. Lee
Department of
Electrical and Computer
Engineering

A DIGITAL RECORDING SYSTEM FOR SPACE-BASED APPLICATIONS UTILIZING FOUR-MEGABIT MAGNETIC BUBBLE MEMORIES

Bruce A. Campbell
Lieutenant, United States Navy
B.S. Aerospace Engineering, U.S. Naval Academy, 1977

Magnetic bubble memory technology offers several desirable characteristics for applications in space as a mass data recording and storage system.

A modular combination on Intel Corp. state-of-the-art four-megabit magnetic bubble memory components is presented which can be configured as a digital data recorder of variable capacity and input rate.

A description of magnetic bubble memory technology and operation is included in an appendix.

Master of Science in
Electrical Engineering
June 1985

Advisor: R. Panholzer
Department of
Electrical and Computer
Engineering

EFFECTS OF WAVEGUIDE MODES ON THE SCATTERING OF A FINITE TUBULAR CYLINDER

Gyoo Pil Chung
Lieutenant, Republic of Korea Navy
B.S., Republic of Korea Naval Avademy, 1980

This thesis is a study of the back scattering of finite tubular cylinders with circular cross-sections and very thin conducting walls. Measurements of several scaled tubular cylinders were taken and the experimental results were compared to theoretical data and to previous results, respectively.

This research is part of an ongoing project to investigate the resonant scattering characteristics of targets. The results are expected to find applications in target identifications.

Master of Science in
Electrical Engineering
September 1985

Advisor: H.M. Lee
Department of
Electrical and Computer
Engineering

ULTRASONIC POSITION REFERENCE SYSTEMS FOR AN AUTONOMOUS SENTRY ROBOT AND A ROBOT MANIPULATOR ARM

William M. Dunkin
Lieutenant, United States Navy
B.S., United States Naval Academy, 1978

This thesis proposes and develops two microprocessor controlled ultrasonic systems which provide absolute coordinate reference for an autonomous sentry robot and a robotic manipulator. These systems close the positon control loop which has never been fully closed in robotics and provide a better "testbed" for testing path planning and manipulator arm trajectory control.

Each system involves known points of reference and ranges to these points which are determined by timing the interval of propagation of the ultrasonic transmissions. With this data, a microprocessor calculates the positions in cartesian coordinates.

Master of Science in
Electrical Engineering
March 1985

Advisor: G.J. Thaler
Department of
Electrical and Computer
Engineering

ANALYSIS OF A DIGITAL TECHNIQUE FOR FREQUENCY TRANSPOSITION OF SPEECH

Vincent DiGirolamo
Lieutenant, United States Navy
B.S., United States Naval Academy, 1978

Frequency transposition is the process of raising or lowering the frequency content (pitch) of an audio signal. The hearing impaired community has the greatest interest in the applications of frequency transposition. Though several analog and digital frequency transposing hearing aid systems have been built and tested, this thesis investigates a possible digital processing alternative. Pole shifting, in the z-domain, of an autoregressive (all pole) model of speech was proven to be a viable theory for changing frequency content. Since linear predictive coding (LPC) techniques are used to code, analyze and synthesize speech, with the resulting LPC coefficients related to the coefficients of an equivalent autoregressive model, a linear relationship between LPC coefficients and frequency transpositon is explored. This theoretical relationship is first established using a pure sine wave and then is extended into processing speech. The resulting speech synthesis experiments failed to substantiate the conjectures of this thesis. However, future research avenues are suggested that may lead toward a viable approach to transpose speech.

Master of Science in
Electrical Engineering
September 1985

Advisor: P.H. Moose
Department of
Electrical and Computer
Engineering

EXPERIMENTAL PERFORMANCE OF A FREQUENCY MEASUREMENT CIRCUIT

George H. Eastwood
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1969

The accuracy with which the frequency of a sinusoid and a pulsed sinusoid can be measured using a phase locked loop is investigated. A frequency divider is inserted into the feedback loop and a very stable local clock is used to determine the effect of these modifications on the frequency measurement accuracy of the phase locked loop. The primary result is that there is no theoretical limit to the accuracy of frequency measurement, independent of gate time, using a phase locked loop with frequency division and very stable clocks. The practical tradeoffs for improved frequency measurement accuracy are a higher required signal to noise ratio and a reduction of the frequency capture range of the phase locked loop.

Master of Science in
Electrical Engineering
December 1984

Advisor: G.A. Myers
Department of
Electrical and Computer
Engineering

COMPUTER SIMULATION OF A CRUISE MISSILE USING BRUSHLESS DC MOTOR FIN CONTROL

Gene C. Franklin
Lieutenant, United States Navy
B.S., University of Washington, 1980

A computer simulation was developed in order to provide a method of establishing the potential of brushless DC motors for applications to tactical cruise missile control surface positioning. In particular, an altitude hold controller has been developed that provides an operational load test condition for the evaluation of the electromechanical actuator.

A proportional integral control scheme in conjunction with tachometer feedback provides the position control for the missile tailfin surfaces. The fin control system is further imbedded in a cruise missile model to allow aititude control of the missile.

The load on the fin is developed from the dynamic fluid environment that the missile will be operating in and is proportional to such factors as fin size and air density.

The program written in CSMP language is suitable for parametric studies including motor and torque load characteristics, and missile and control system parameters.

Master of Science in
Electrical Engineering
March 1985

Advisor: A. Gerba, Jr.
Department of
Electrical and Computer
Engineering

SILICON COMPILER DESIGN OF COMBINATIONAL AND PIPELINE ADDER INTEGRATED CIRCUITS

Alexander O. Froede, III
Captain, United States Army
B.S., University of Arizona, 1978

The architecture and structures used by the MacPitts silicon compiler to design integrated circuits are described, and the capabilities and limitations of the compiler are discussed. The performance of several combinational and pipeline adders designed by MacPitts and a hand-crafted pipeline adder are compared. Several different MacPitts design errors are documented. Tutorial material is presented to aid in using the MacPitts interpreter and to illustrate timing analysis of MacPitts-designed circuits using the program Crystal.

Master of Science in
Electrical Engineering
June 1985

Advisor: D.E. Kirk
Department of
Electrical and Computer
Engineering

GENERATION OF AN OPTIMUM HIGH SPEED HIGH ACCURACY OPERATIONAL AMPLIFIER

Patrick Gariano Jr.
Lieutenant Commander, United States Navy
B.S., University of South Florida, 1972

This research examines and discusses the feasibility of utilizing Composite Operational Amplifiers to overcome the inherent inability of IC op-amps to simultaneously perform in a very fast, very accurate mode. Composite operational amplifiers, known to provide enhanced stability, decreased sensitivity to circuit element variations, and an extended operating frequency rnage, can now be used to generate an operational amplifier that concurrently exhibits both high speed and high accuracy. The composite op-amp is the only generalized method known to produce an op-amp that is both very fast and very accurate. This has never before been achievable in a simple individual entity.

Master of Science in
Electrical Engineering
September 1985

Advisor: S. Michael
Department of
Electrical and Computer
Engineering

"HEAD-ON" SCATTERING OF A TUBULAR CYLINDER OF FINITE LENGTH FOR RADAR TARGET INDENTIFICATION PURPOSES

David Geller
Lieutenant, Israeli Navy
B.S., Technion-Israeli High Institute of Technology, 1977

This thesis studies the "Head-on" back scattering of a finite tubular cylinder with a circular cross-section and a very thin conducting wall.

At this aspect angle, the back scattered fields depend only on the first Fourier component of the circumferential variations of the ϕ-current.

Measurements of several scaled tubular cylinders were taken and the experimental results were compared to theoretical data available.

This thesis is part of an ongoing project of target identification through the investigation of the cross-section of a target over a broad frequency band.

Master of Science in
Electrical Engineering
March 1985

Advisor: H.M. Lee
Department of
Electrical and Computer
Engineering

INTERACTIVE COMPUTER PROGRAM FOR THE ANALYSIS AND DESIGN OF LINEAR TIME INVARIANT SYSTEMS

Habib Ismail
Lieutenant Commander, Pakistan Navy
B.E., University of Karachi, Pakistan, 1974

In this thesis, an interactive computer program for the analysis and design of time invariant unity feedback control systems is presented, using cascade or feedback or both types of compensation.

By using this program, the user is freed from the tedious, time consuming and error prone method of hand calculations, letting the computer handle these tasks efficiently and quickly. The user can then concentrate fully on the placement of poles and zeroes of the compensator(s) used.

Design of control systems by classical methods being essentially a repetitive, trial and error procedure, this program greatly cuts down the turn around time and leads to faster, more satisfactory results.

Master of Science in
Electrical Engineering
December 1984

Advisor: G.J. Thaler
Department of
Electrical and Computer
Engineering

BROADSIDE SCATTERING OF A TUBULAR CYLINDER FOR EVALUATION OF TARGET IDENTIFICATION

Boaz Hakley
Lieutenant, Israeli Navy
B.S., Jerusalem College of Technology, 1980

The concept of target identification through its back scattering cross section, in the resonance region was investigated. Measurements from the broadside aspect angle of several scaled tubular cylinders have been used for this purpose. The experimental results and theoretical approximation for some of the cylinders are presented. That data will serve as the baseline for further investigation in this project.

Master of Science in
Electrical Engineering
March 1985

Advisor: H.M. Lee
Department of
Electrical and Computer
Engineering

FINLINE HORN ANTENNAS

Mumtaz ul Haq
Lieutenant Commander, Pakistan Navy
B.E., Karachi University, Pakistan, 1976

This thesis presents the results of an experimental investigation of the finline horn antennas. Both near-field and far-field measurements were made for horns with different physical and electrical parameters. This revealed the influence of the various parameters on the radiation pattern and led to a design which appears to be close to the optimum with respect to gain and sidelobe levels. The application of these horns in a printed circuit monopulse comparator is also demonstrated.

Master of Science in
Electrical Engineering
September 1985

Advisor: J.B. Knorr
Department of
Electrical and Computer
Engineering

AN ANALYSIS OF COHERENT DIGITAL RECEIVERS IN THE PRESENCE OF COLORED NOISE INTERFERENCE

Avraham Hasarchi
Major, Israeli Air Force
B.Sc.E.E., Technion, Haifa, Israel, 1973
M.B.A., University of Tel-Aviv, Israel, 1981

Optimum receivers for detecting binary signals in additive colored Gaussian noise are analyzed and their performance evaluated in terms of bit error probabilities (P_e). Implementation and practical design implications of such receivers is discussed. Evaluation of P_e for receivers that are optimum for additive white Gaussian noise (WGN) environments but due to jamming or "friendly" ECM interferers, must operate in a colored Gaussian noise environment has been carried out. It was generally found that such receivers do not perform significantly worse than receivers specifically designed to operate in a colored noise environment. Examples were considered in which the colored noise interference was modeled as the output of a one-pole filter driven by WGN. Additional work has been carried out on the jamming of binary (colored noise) receivers using a deterministic jammer model. While this modeling assumption needs to be refined, it has been demonstrated that a power constrained jammer can seriously degrade the performance of a receiver designed to operate in a colored noise environment.

Master of Science in
Electrical Engineering
June 1985

Advisor: D. Bukofzer
Department of
Electrical and Computer
Engineering

THREE-DIMENSIONAL DATA DISPLAY ON THE TWO-DIMENSIONAL SCREEN

Hwang, Ho-Sang
Lieutenant Colonel, Republic of Korea Air Force
B.S., Republic of Korea Air Force Academy, 1973

The difficulties encountered when implementing orthographic reprojection of three-dimensional image data onto a two-dimensional screen are considerable. They arise principally because of the size of data being manipulated and the tendency for underlying or overlying structures to obscure a clear view of the desired image. In this work, implementation was performed with an orthographic reprojection technique and many heuristic approaches were used to resolve some of the related problems.

Several coordinate rotating algorithms were tested in this work. Among them the Precalculation and Indexing method proved to be the most efficient algorithm.

Due to the disparity of the viewing-coordinate grids and the voxels of the volume data after rotation, three-dimensional interpolation is required for applying the reprojection technique. Several methods implementing linear interpolation have been tried. Interpolation with a cone-shape kernel is the most appropriate method in the 2D situations and can be easily extended to a sphere-shaped kernel in 3D situations.

The orthographic reprojection method includes a single plane dissection capability. Results on an artificial test data are collected using the above algorithms.

Several resulting images are included as well as the associated PASCAL programs.

Master of Science in
Electrical Engineering
December 1984

Advisor: C.H. Lee
Department of
Electrical and Computer
Engineering

AN ANALYSIS OF JAMMING EFFECTS ON NONCOHERENT DIGITAL RECEIVERS

Joo, Hae-Yeon
Lieutenant, Republic of Korea Navy
B.S., Republic of Korea Naval Academy, 1979

The effects of various jamming waveforms on conventional binary incoherent digital receivers was analyzed in terms of resulting receiver performance (i.e., receiver probability of error).

Probability density functions associated with the test statistic generated by incoherent receivers under the influence of noise and jamming have been obtained.

Due to the complexity of the mathematical expressions specifying receiver probability of error in closed form, no attempt has been made to obtain absolute optimum jamming waveforms operating against binary incoherent receivers. Therefore near optimum jammer signals were proposed, studied, and evaluated.

The effect of a varying threshold on receiver performance was investigated and a jamming strategy involving use of an FM jammer was considered, and its effect evaluated.

Graphical results are presented that highlight the mathematical results obtained.

Master of Science in
Electrical Engineering
December 1984

Advisor: D. Bukofzer
Department of
Electrical and Computer
Engineering

A MATCHED FILTER ALGORITHM FOR ACOUSTIC SIGNAL DETECTION

Dorsett W. Jordan
Lieutenant, United States Navy
B.S., University of Colorado, 1977

This thesis is a presentation of several alternative acoustic filter designs which allow Space Shuttle payload experiment initiation prior to launch. This initiation is accomplished independently of any spacecraft services by means of a matched band-pass filter tuned to the acoustic signal characteristic of the Auxilliary Power Unit (APU) which is brought up to operating RPM's approximately five minutes prior to launch.

These alternative designs include an analog filter built around operational amplifiers, a digital IIR design implemented with an INTEL 2920 Signal Processor, and an Adaptive FIR Weiner design. Working prototypes of the first two filters are developed and a discussion of the advantage of the 2920 digital design is presented.

Master of Science in
Electrical Engineering
June 1985

Advisor: R. Panholzer
Department of
Electrical and Computer
Engineering

A COMPUTATION OF FIN-LINE IMPEDANCE

Kim, Byungyong
Major, Korean Air Force
B.S.E.E., Korean Air Force Academy, 1977

The spectral domain solution for the wavelength and characteristic impedance of a millimeter wave fin-line was originally published by Knorr and Shayda. The dispersion equations were subsequently reformulated by Knorr in a form more suitable for numerical computation.

This thesis presents a reformulation of the equations for characteristic impedance for the same purpose. The equations have been used to implement a computer program, FINIMP. The program runs smoothly without the overflow and underflow problems experienced by Knorr and Shayda. FINIMP data is compared with other existing data and good agreement is shown to establish the correctness of the FINIMP numerical results.

Master of Science in
Electrical Engineering
December 1984

Advisor: J.B. Knorr
Department of
Electrical and Computer
Engineering

VLSI DESIGN WITH THE MACPITTS SILICON COMPILER

Robert C. Larrabee
Lieutenant, United States Navy
B.S., University of Texas at Austin, 1978

An analysis of the MacPitts silicon compiler is presented. The emphasis of the analysis is on the interrelationship between algorithmic syntax and resulting circuit structure. Errors inherent to the silicon compiler are investigated, and corrections to the errors are proposed.

Master of Science in
Electrical Engineering
September 1985

Advisor: D.E. Kirk
Department of
Electrical and Computer
Engineering

RADAR TARGET IDENTIFICATION THROUGH ELECTROMAGNETIC SCATTERING STUDIES

Mario Lolic
Major, Yugoslavian Navy
B.S., University of Electrical Engineering-Split, 1972

Radar target identification using electromagnetic scattering in the Mie or resonant region is discussed. Frequencies being used are those corresponding to wavelengths from half the target size to one-tenth the target dimensions. The frequency domain calibration of the free field radar range at the Naval Postgraduate School is performed and validated on several perfectly conducting metallic spheres. Measurements of the radar cross section and the phase of the return on several finite length, thin walled, right circular cylinders were done.

Master of Science in
Electrical Engineering
December 1984

Advisor: H.M. Lee
Department of
Electrical and Computer
Engineering

COMPOSITE OPERATIONAL AMPLIFIERS AND THEIR USE IN IMPROVING BANDWIDTH, SPEED AND ACCURACY IN ACTIVE NETWORKS

Michael A. Luczak
Lieutenant Commander, United States Navy
B.S., SUNY College at Geneseo, 1968

This research examines a unified approach to several of the problems associated with Operational Amplifiers (OAs), namely, speed, accuracy, and frequency dependent gain. The approach which is examined is the Composite Operational Amplifier (CNOA), where N=2, 3, or 4 single OAs. The CNOA is found to greatly extend the useful operating frequencies of the OA while maintaining low sensitivity to circuit element variations and a high degree of stability. It also provides a method for obtaining a fast and accurate OA. An additional feature of the CNOA is that it can be implemented using current technology. A computer model for the single OA was created and validated, and provides the basis for proving the superiority of the CNOA. Theoretical and experimental results were used with these computer simulation results to fully substantiate the findings.

Master of Science in
Electrical Engineering
June 1985

Advisor: S. Michael
Department of
Electrical and Computer
Engineering

A CSMP COMMUTATION MODEL FOR DESIGN STUDY OF A BRUSHLESS DC MOTOR POWER CONDITIONER FOR A CRUISE MISSILE FIN CONTROL ACTUATOR

Peter N. MacMillan
Lieutenant, United States Navy
B.S., Rensselaer Polytechnic Institute, 1976

Recent improvements in rare earth magnets have made it possible to construct strong, lightweight, high horsepower DC motors. This has occasioned a reassessment of electromechanical actuators as alternatives to comparable pneumatic and hydraulic systems for use as flight control actuators for tactical missiles. A dynamic equivalent circuit model for the analysis of a small four pole brushless DC motor fed by a transistorized power conditioner utilizing high speed switching power transistors as final elements is presented. The influence of electronic commutation on instantaneous dynamic motor performance is particularly demonstrated and good correlation between computer simulation and typical experimentally obtained performance data is achieved. The model is implemented in CSMP language and features improvements in transistor and diode models as well as a more accurate air gap flux representation over previous work. Hall effect sensor rotor position feedback is simulated. Both constant and variable air gap flux is modeled, and the variable flux model treats the flux as a fundamental and one harmonic.

Master of Science in
Electrical Engineering
June 1985

Advisor: A. Gerba
Department of
Electrical and Computer
Engineering

THE USE OF FILTERS IN DIGITAL COHERENT RECEIVERS OPERATING IN A JAMMING AND NOISE ENVIRONMENT

Damian Macone
B.S., Tufts University

The effectiveness of the use of front-end bandstop filters in coherent digital receivers versus previously derived optimum jammer waveforms is analyzed. The receivers studied are the binary frequency shift key (FSK) and the binary phase shift key (PSK) coherent (correlator) receivers. The filters analyzed for use against an optimum jammer are a single bandstop region ideal filter, and a second order single bandstop region real filter. General expressions in frequency domain form, are derived for the probability of error of coherent receivers with a front-end filter, then applied specifically to the performance of receivers operating in the presence of noise, jamming, and PSK or FSK modulation. Finally these results are presented in graphical form, and additionally analyzed and interpreted.

Master of Science in
Electrical Engineering
June 1985

Advisor: D. Bukofzer
Department of
Electrical and Computer
Engineering

LOW-NOISE PHASE/FREQUENCY DETECTOR

John W. McCorkle
Naval Surface Weapons Center
B.S., Virginia Polytechnic Institute and State University, 1975

The purpose of the research reported on in this paper, is to demonstrate the effectiveness of a new circuit technique proposed by the author to eliminate the dead-zone anomaly in a digital phase/frequency detector. In addition to demonstrating the elimination of the dead zone, a new loop filter is described. The filter takes advantage of the new phase detector circuit technique so as to simultaneously provide both low-level reference sidebands and a lock-up time of one cycle of the reference.

Master of Science in
Electrical Engineering
September 1985

Advisor: G.A. Myers
Department of
Electrical and Computer
Engineering

FIN-LINE HORN ANTENNAS

John R. Musitano
Lieutenant Commander, United States Navy Reserve

A new bilateral fin-line horn antenna is introduced and the results of testing discussed. Experimental return loss and absolute gain data are presented and used to make comparisons between the characteristics of conventional and fin-line horns. Classical analysis assuming Huygen source distribution and E-plane sectoral horn modeling is applied with limited success.

Master of Science in
Electrical Engineering
December 1984

Advisor: J.B. Knorr
Department of
Electrical and Computer
Engineering

VLSI TUTORIALS THROUGH THE VIDEO-COMPUTER COURSEWARE IMPLEMENTATION SYSTEM

Liesel R. Muth
Lieutenant, United States Navy
B.A., The University of Michigan, 1976

An overview of the University of Utah Video-computer Courseware Implementation System (VCIS) programs is presented. A tutorial is included which is designed to provide an author with enough knowledge to create a simple lesson containing text and graphics frames. VCIS was used in creating two tutorials, which exercise most of the functions in the authoring system. One tutorial is only text and is an introduction to the Berkeley UNIX operating system and its vi editor. The other tutorial contains both text and graphics and is an introduction to Very Large Scale Integrated (VLSI) circuit design. An evaluation of the VCIS is also included.

Master of Science in
Electrical Engineering
March 1985

Advisor: D.E. Kirk
Department of
Electrical and Computer
Engineering

DESIGN OF A JAMMING SIMULATOR FOR A BINARY COMMUNICATION SYSTEM

Theodoros J. Pantos
Lieutenant, Hellenic Navy
B.S., Hellenic Naval Academy, 1973

Two receivers for coherent Phase Shift Key (PSK) and Frequency Shift Key (FSK) transmission have been designed in order to validate theoretical studies involving jamming of digital communication receivers.

Binary PSK and FSK signals were generated, transmitted, and processed by each receiver, and measurements of each receiver's performance were recorded as each system operated in the presence of White Gaussian Noise (WGN) as well as in the presence of a combination of White Gaussian Noise and a jammer waveform.

The system's performance is expressed in terms of the probability of receiver error occuring during the transmission of digital information. The results are plotted as receiver Probability of error (P_e) versus Signal-to-Signal ratio (SNR) for fixed values of and Jammer-to-Signal (JSR). Signal and receiver designs are presented and diagrams as well as schematics have been included for clarity.

Master of Science in
Electrical Engineering
December 1984

Advisor: D. Bukofzer
Department of
Electrical and Computer
Engineering

INHERENT ANGULAR TRACKING ERROR IN AN AMPLITUDE COMPARISON MONOPULSE RADAR

Dae Hyun Park
Major, Republic of Korea Army
B.S., Korea Military Academy, 1976

Amplitude comparison monopulse tracking of a two-element target is studied. A Gaussian radiation pattern for the antennas is assumed. It is demonstrated that the cross over angle of the antenna assembly and the target angular span are essential parameters for determining the angular tracking error. Computational results showing the inherent error curve, $X_{\epsilon}(A)$, are provided.

Master of Science in
ELectrical Engineering
December 1984

Advisor: H.M. Lee
Department of
Electrical and Computer
Engineering

RANGE ESTIMATION USING MULTIPLE FRAME INFRARED (IR) IMAGES

Stephens S. Payne
Lieutenant, United States Navy
B.S., North Carolina State University, 1978

This thesis examines the use of multiple frames of infrared (IR) images to estimate the range of a target. The data obtained from the image is the ratio of the target's horizontal length (assuming 90 degree aspect) to the viewing area horizontal width.

A curve of the measured ratios from every image is compared to a curve of computed ratios. The computed ratios are based on an initial range estimate for the first image. This range is incrementally decreased and a new curve of computed ratios is generated and compared to the measured ratios. The range estimates have a predetermined number of values over which the best match between the measured ratios and computed ratios must be obtained. By obtaining the best fit for the measured ratio curve, the best estimate of the present image's range is also known.

Results of the range estimation procedure performed on a computer generated model and actual IR image data are included. Range estimation on the actual data is based on manual measurements of the image ratio and computer program measurements of the image's ratios.

Master of Science in
Electrical Engineering
June 1985

Advisor: C.H. Lee
Department of
Electrical and Computer
Engineering

DESIGN OF A SIXTEEN BIT PIPELINED ADDER USING CMOS BULK P-WELL TECHNOLOGY

William R. Reid
Lieutenant Commander, United States Navy
B.S., Purdue University, 1975

The design of a sixteen-bit pipelined adder CMAS integrated circuit is presented. The adder is designed to maximize throughput and to provide for testability. Tutorial material on CMOS design is also presented.

Master of Science in
Electrical Engineering
December 1984

Advisor: D.E. Kirk
Department of
Electrical and Computer
Engineering

DESIGN OF A FREESTANDING NOISE MEASUREMENT AND RECORDING SYSTEM TO PREDICT THE INTENSITY AND LOCATION OF ELECTROMAGNETIC RADIATION FROM EARTHQUAKES

Mickey V. Ross
Lieutenant, United States Navy
B.S., United States Naval Academy, 1977

The design, construction, and testing of a freestanding radio frequency (RF) noise measurement and recording system in the 30 MHz and 150 MHz rnage is presented. Placement of the system along the San Andreas fault to permit the establishment of a correlation between increased background RF noise to earthquake fault activity for potential as an earthquake prediction tool is described.

Master of Science in
Electrical Engineering
December 1984

Advisor: R.W. Adler
Department of
Electrical and Computer
Engineering

VOICE COMMUNICATIONS OVER PACKET RADIO NETWORKS

Seah, Moon Ming
B. Eng (Hons), National University of Singapore, 1980/81

The use of packet virtual circuit technique for voice communications in military radio networks was investigated. The work was concerned with various aspects of networking which include network modeling, communications techniques, traffic analysis and network control.

An attempt has been made to develop a simple yet efficient time slot assignment algorithm. Performance of this algorithm was analyzed under a variety of slot depths and network topologies using computer simulation. The Erlang' B results were used to provide more insight into the channel characteristics of the packet radio networks. The capabilities of implementing TDMA/CDMA hybrid schemes in the system were scrutinized.

A method to estimate the transmission capacity of the inter-node links was found. We demonstrated its effectiveness in controlling local congestion by computer simulation. Graphical results were presented to highlight the behavior of the proposed packet radio networks. We concluded that an appropriate link weight function would provide efficient and reliable network services.

Master of Science in
Electrical Engineering
March 1985

Advisor: J.M. Wozencraft
Department of
Electrical and Computer
Engineering

IMPLEMENTATION OF A SERIAL COMMUNICATION PROCESS FOR A FAULT TOLERANT, REAL TIME, MULTI TRANSPUTER OPERATING SYSTEM

Zafer Selcuk
Lieutenant J.G., Turkish Navy
B.S., Turkish Naval Academy, 1978

The purpose of this thesis is to study a more reliable and faster microcomputer system for real time applications. The new product of VLSI technology, IMS T424 Transputer is used for the prototype design of this multicomputer system.

The multicomputer system's design with the fault tolerance feature, is emphasized in this thesis. Also a serial communication subsystem has been implemented using the VAX 11/780 VMS system for the proposed fault tolerant real time multitransputer operating system.

Master of Science in
Electrical Engineering
December 1984

Advisor: U.R. Kodres
Department of
Computer Science

COMPUTER-CONTROLLED IMAGE ANALYSIS OF SOLID PROPELLANT COMBUSTION HOLOGRAMS USING A QUANTIMET 720 AND A PDP-11

Marvin P. Shook
Lieutenant, United States Coast Guard
B.S., United States Coast Guard Academy, 1979

This thesis describes the implementation of a computer-controlled image analyzer to obtain particle size information from holograms of rocket engine combustion products. The two machines utilized were a Quantimet 720 Image Analyser and a DEC PDP-11 digital computer. The machines are described in terms of their hardware, software, and interface. Preliminary results have been included and indicate that the present system is incapable of obtaining the desired particle information from a hologram. The causes for this, as well as their resolution are discussed.

Master of Science in
Electrical Engineering
September 1985

Advisor: J.P. Powers
Department of
Electrical and Computer
Engineering

VLSI DESIGN OF A SIXTEEN BIT PIPELINED MULTIPLIER USING THREE MICRON NMOS TECHNOLOGY

Richard J. Simchik, Jr.
Captain, United States Army
B.S., Clarkson University, 1978

The application of computer-aided design (CAD) tools in the full custom design and testing of a 16-bit pipelined two's complement multiplier in three micron NMOS is described. A comparison between the full custom carry-save addition (CSA) multiplier designed using CAD tools and a multiplier generated by the MacPitts silicon compiler is presented. Additional background material is also presented on the CSA multiplication algorithm utilized.

Master of Science in
Electrical Engineering
June 1985

Advisor: H.H. Loomis
Department of
Electrical and Computer
Engineering

TROPO: A MICROCOMPUTER-BASED TROPOSCATTER COMMUNICATIONS SYSTEM DESIGN PROGRAM

Edward M. Siomacco
Captain, United States Army
B.S., North Carolina State University, 1975

This thesis presents a microcomputer based, computer-aided design program for tactical military troposcatter radio systems. The program has the capability of predicting the system performance and reliability for both analog (FM/FDM) and digital troposcatter radiolinks. Propagation gain generated by elevated tropospheric ducts is called height gain. A height gain computational algorithm is derived from statistical radiosonde weather data. A terrain profile plot, real-time radiosonde data analysis, and the probability of error for digital radiolinks are provided as program options.

Master of Science in
Electrical Engineering
September 1985

Advisor: J.B. Knorr
Department of
Electrical and Computer
Engineering

ALGORITHMIC STUDY ON SYSTOLIC ARRAY STRUCTURES

Leopoldo Jorge de Souza
Capitao de Corveta, Marinha do Brasil
Engenheiro Eletricista, Universidade de Sao paulo, 1975
Oficial da Marinha do Brasil, Escola Naval, 1970

Computation bound problems impose a severe burden on the CPU. In order to speed up computation, specific problems that are identified as the main burden can be done using parallel processing. In this way, the time consuming tasks can be executed on specially tailored hardware. This hardware is designed to implement an algorithm-oriented parallel-processing structure that works more efficiently than the CPU for these specific tasks. This thesis is a study of the mapping of the algorithms onto a kind of structure called systolic array. The development and utilization of a software tool designed to assist on such analysis is presented here. This tool, called Systolic Array Graphics Simulator (SYSGRAS), has the capability of representing any type of systolic array, no matter how complex the cells and structure. Because of the capability of SYSGRAS, an interactive computer program simulator, the study of systolic arrays is simplified. The complexity of the time-space relationships is analyzed with the help of some color graphics techniques. The visualization of the data interaction is thus enhanced and the user is alleviated from the burden of keeping track of partial results and can dedicate attention to the processing algorithm.

Master of Science in
Electrical Engineering
June 1985

Advisor: C.H. Lee
Department of
Electrical and Computer
Engineering

AN AUTOMATIC CONTROL DESIGN FOR THE MARINER CLASS SHIPS

Tayfun Tansan
Lieutenant Junior Grade, Turkish Navy
B.S., Turkish Naval Academy, 1978

The increase in fuel prices has initiated considerable interest by ship operators in new ship autopilots which minimize the propulsion losses due to steering.

This research presents the results of work on a steering design for the Mariner class ship based on a computer simulation. A model of the Mariner class ship was coupled to a function minimization subroutine to minimize the added resistance caused by rudder activity and hull drag of inertial origins caused by periodic yawing of ship in seaway.

The Mariner class ship computer model was tested in calm water and in a seaway. The optimal controller parameters are shown in look up tables as functions of ship speed, sea state, encounter angle and encounter frequency. This technique can be used as an adaptive controller.

Master of Science in
Electrical Engineering
December 1984

Advisor: G.J. Thaler
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Electrical and Computer
Engineering

USE OF THE GPIB FOR DATA COLLECTION AND DISPLAY

Thomas Taylor
Lieutenant, United States Navy
B.S., University of Utah, 1977

The objective of this study is to examine the uses of a General Purpose Interface bus (GPIB) to link a microcomputer controller to computer-controllable test equipment. The Hewlett-Packard HP-85 microcomputer is examined as the system controller. The test equipment is configured to conduct basic electronic laboratories and the results are compared with current manually-controlled test equipment. Test equipments evaluated include: The Wavetek Model 270 programmable function generator, Tektronix DC5009 programmable counter/timer, Tektronix DM5010 programmable digital multimeter, Tektronix PS5010 programmable power supply, Hewlett-Packard 1615A programmable logic analyzer, and the Photodyne Model 488XII GPIB interface with digital power meter. These equipments and others are evaluated singly and in combination. Various methods for displaying and plotting acquired data are discussed and evaluated.

Master of Science in
Electrical Engineering
June 1985

Advisor: J.P. Powers
Department of
Electrical and Computer
Engineering

SHIP OUTLINE FEATURE SELECTION USING B-SPLINE FUNCTION

Werewong Thavamongkon
Lieutenant, Royal Thai Navy
B.S., Royal Thai Naval Academy, 1975

This thesis presents two methods of ship classification with IR images. The first method is the Fourier Coefficient method which transform the sample points of a supersturcture profile of a ship to the spatial frequency components. The shape of the coefficient curve can be used to classify the type of a ship from 8 different categories. But, the differences are so minor that it is difficult to implement a computer program to recognize it. The second method is a B-spline Coefficent method which uses the uneven spaced spline coefficents to find the beginning, the peak, and the area of the lumps of a ship for classification. This method isbetter than the Fourier Coefficient method. The study of these methods is presented here.

Master of Science in
Electrical Engineering
December 1984

Advisor: C.H. Lee
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Electrical and Computer
Engineering

EXPERIMENTAL EVALUATION OF A NEW FORM OF M-ARY (M=8) PHASE SHIFT KEYING INCLUDING DESIGN OF THE TRANSMITTER AND RECEIVER

Gregory E. Thompson
Major, United States Marine Corps
B.A., Concordia College, Moorhead, Minnesota, 1977

For transmitting digital information over bandpass channels, M-ary Phase Shift Keying (PSK) schemes are used to conserve bandwidth at the expense of signal power. A block of k bits is used to change the phase of the carrier. These k bits represent M possible phase shifts since M=2. Common forms of M-ary PSK use equally spaced phase angles. For example, if M=8 and k=3, 8-ary PSK uses eight phase angles spaced 45 degrees apart.

This thesis considers a hybrid form of PSK when M=8 and k=3. Each of eight blocks of data with three bits per block are represented by different phase shifts of the carrier. The phase angles are chosen to give an equal distance between states (symbols) when projected onto the sine axis and the cosine axis of a phasor diagram. Thus, when the three bits are recovered, using two coherent phase detectors, the separation of the decision regions (voltage levels) are equal. This scheme was evaluated by building a transmitter and a receiver to implement this 8-ary PSK technique. This method was found to improve the noise performance over conventional 8-ary PSK schemes by approximately 0.4 dB.

Master of Science in
Electrical Engineering
December 1984

Advisor: G.A. Myers
Department of
Electrical and Computer
Engineering

PARAMETER ESTIMATION IN COMMUNICATION SYSTEM
TRACKING SATELLITE OBSERVATIONS

Vassilios Ath. Tsafaras
Lieutenant, Hellenic Navy
B.S., Greek Naval Academy, 1973

The estimation of parameters from a satellite communication system is often through the use of Kalman filtering. In this work the location of the eye of a hurricane is estimated from satellite observations. A comparison with a posteriori meteorologist's analysis was attempted. An adaptive gating scheme was employed in the filter to accomodate "manueuvers" of the storm.

The observations were at random intervals and also came from several different sources (aircraft and land based radar as well as satellite).

Master of Science in
Electrical Engineering
December 1984

Advisor: H.A. Titus
Department of
Electrical and Computer
Engineering

PERFORMANCE OF COHERENT MULTILEVEL DIGITAL COMMUNICATIONS RECEIVERS IN THE PRESENCE OF NOISE AND JAMMING

Armando J. Mazzotti Vila
Teniente Primero, Peruvian Navy
B.S. Equivalence Satisfied for E.E., Naval Postgraduate School, 1983

The effect of jamming waveforms on optimum multilevel digital coherent communications receivers designed to operate in a Gaussian noise only environment is analyzed and evaluated in terms of receiver performance. Near optimum jamming waveforms (such as a tone jammer and a weighted sum of signals jammer) are postulated in order to determine their effect on the performance of an M-ary Phase Shift Keying coherent receiver. Additionally, the optimum power constrained jamming waveform is derived and analyzed for an M-ary Amplitude Shift Keying coherent receiver. Graphical results of numerical analyses resulting from the evaluation of receiver performance are presented and interpreted in order to quantify the effectiveness of the jammers. Receiver performance is measured in terms of word error probability as a function of signal-to-noise ratio.

Master of Science in
Electrical Engineering
March 1985

Advisor: D. Bukofzer
Department of
Electrical and Computer
Engineering

AN AUTOPILOT FOR COURSE KEEPING AND TRACK FOLLOWING

Sommart Vimuktananda
Lieutenant, Royal Thai Navy
B.S., Royal Thai Navy, 1974

Computer control of ship steering provides track following as well as course keeping. The desired track is stored in the computer, and the positon of the ship (as provided by a satellite navigation system) is compared with track coordinates. A heading correction is calculated continuously and used to update the course command.

Master of Science in
Electrical Engineering
September 1985

Advisor: G.J. Thaler
Department of
Electrical and Computer
Engineering

AN ADAPTIVE MODEL BASED DISK FILE HEAD POSITIONING SERVO SYSTEM

Kenneth R. Wikstrom
Lieutenant, United States Navy
B.S.E.E., Purdue University, 1979

The feasibility of controlling a disk file head positioning servo with an adaptive computer simulation model is investigated. During the seek mode, model updating of position, velocity, and motor gain parameter are accomplished from samples of head position only, thereby eliminating the requirement for a tachometer in the positioning servo system. In the track follow mode, three methods of linear compensation are presented to settle the transients of the servo and allow for the positioning of the read/write head on track center in minimum time. Implementation of the simulation model into a microprocessor is investigated.

Master of Science in
Electrical Engineering
September 1985

Advisor: G.J. Thaler
Department of
Electrical and Computer
Engineering

DIGITAL PHASE-LOCKED LOOP SPEED CONTROL FOR A BRUSHLESS D.C. MOTOR

Michael G. Wise
Lieutenant, United States Navy
B.E.T., Southern Technical Institute, 1978

Speed control of d.c. motors by phase-locked loops (PLL) is becoming increasingly popular. Primary interest has been in employing PLL for constant speed control. This thesis investigates the theory and techniques of digital PLL to speed control of a brushless d.c. motor with a variable speed of operation. Addition of logic controlled count enable/disable to a synchronous up/down counter, used as a phase-frequency detector, is shown to improve the performance of previously proposed PLL control schemes.

Master of Science in
Electrical Engineering
June 1985

Advisor: A. Gerba, Jr.
Department of
Electrical and Computer
Engineering

MASTER OF SCIENCE

IN

ENGINEERING ACOUSTICS

DEVELOPMENT OF A MODIFIED TIME DELAY SPECTROMETRY TECHNIQUE FOR UNDERWATER ACOUSTIC MEASUREMENTS IN A MULTIPATH ENVIRONMENT

Bjoern Brekke
Commander, Royal Norwegian Navy
B.S., Royal Norwegian Naval Academy, 1970

A measurement technique has been developed which makes possible the determination of the acoustic transmission loss for various paths between a source and a receiver at relatively short ranges in the ocean. The method is based upon a technique called Time Delay Spectrometry (TDS). The theory for utilizing TDS to perform measurements on an underwater test range with a homogeneous water column is presented. The experimental parameters concerning test geometry together with criteria for the source signal are discussed and the limitations are described. A computer program written in HP BASIC is the tool in a multipath measurement system where analog sound signals recorded on tape are processed by an HP 3561A Dynamic Signal Analyzer under program control.

Master of Science in
Engineering Acoustics
December 1984

Advisors: O.B. Wilson, Jr.
Department of
Physics

J.P Powers
Department of
Electrical and
Computer Engineering

AN EXPERIMENTAL STUDY OF THE PRESSURE IN A FAST BOTTOM BENEATH THE APEX OF AN OVERLYING FLUID WEDGE

Michael K. Hedrick
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1972

The pressure profile in a fast bottom directly beneath the apex of a fluid wedge was investigated experimentally and compared with a computer model, which used saddle-point approximations based on image theory to predict the pressure under varying acoustical and geometrical parameters. Transducer fluid served as the fluid wedge overlying a water substrate. The fluid in the wedge was contained in an enclosed structure and was separated from the substrate by a thin Mylar membrane. The density ratio was 0.98 and the speed of sound ratio was 0.91. The experiment was conducted at a frequency of 88.2 kHz. Data were taken with the enclosure pressurized and nonpressurized for wedge angles of two through ten degrees, and with projector elevation angles at one-half and one-quarter the wedge angle. The experimental results agreed with theoretical predictions. Additionally, acceptable agreement was achieved between pressurized and nonpressurized conditions.

Master of Science in
Engineering Acoustics
December 1984

Advisor: J.V. Sanders
Department of
Engineering Acoustics

MEASUREMENT OF MODE INTERACTION DUE TO WAVEGUIDE SURFACE ROUGHNESS

Stephen R. Kasputis
Lieutenant, United States Navy
B.S., Pennsylvania State University, 1977

Paul D. Hill
Lieutenant, United States Navy
B.S., Miami University, 1978

A laboratory experiment was conducted examining the effects of large slope surface roughness on mode propagation in a rigid walled waveguide. A waveguide hundreds of depths in length was developed, as well as a mode transduction system comprised of electret type mode transducers, and an amplitude and phase selectable amplifier. A device for automatically measuring surface roughness was also built. The interaction of modes with two types of surface roughnesses, deterministic and random, is compared to propagation in the smooth waveguide. The results demonstrate coupling between modes and difference of this coupling in the presence of either a deterministically rough surface or a randomly rough surface. A significant change in modal phase speed due to roughness is demonstrated at selected frequencies.

Master of Science in
Engineering Acoustics
December 1984

Advisor: H. Medwin
Department of
Physics

COMPARISON OF NARROW BAND AND ONE THIRD OCTAVE BAND AMBIENT NOISE MEASUREMENTS

Ronald M. Lovelace
Lieutenant, United States Navy
B.S., United States Naval Academy, 1978

In preparation for the eventual testing of a drifting environmental acoustic buoy, the ambient noise in an area off the Monterey, California coast was measured using two analysis methods. Narrow band processing (9 Hz) was compared to 1/3 octave band processing for frequencies up to 2500 Hz. Noise generation due to shipping and local wind was examined for the contribution of each to the noise spectrum. Noise spectrum levels measured using either approach agreed within 2 dB, usually within 1 dB. Local and distant shipping varied on a daily basis and appeared to coincide with port activity. The mean variability at 50 Hz was 5 dB for hourly records influenced by individual ships. Distant shipping at 50 Hz showed a 2-3 dB variation. Also, this study shows that mean ambient noise curves may be used to estimate wind speed using the ambient noise at 1700 Hz, provided there are no local ships within 16 km. Ships at greater range appear to contribute little to the wind-dependent spectrum at 1700 Hz.

Master of Science in
Engineering Acoustics
June 1985

Advisors: C.R. Dunlap
R.H. Bourke
Department of
Oceanography

VIBRATION ISOLATION OF A MICROPHONE

Charles D. Stehle
Commander, United States Navy
B.S., United States Naval Academy, 1968

A microphone vibration isolation system using a bungee elastic suspension, designed for use in a system (NASA Project G-313) to measure the ambient noise in the Space Shuttle's payload bay during launch is described. The isolator's transmissibility was measured using a computer controlled shaker table system programmed to simulate the Shuttle's vibrational spectrum in 21 third octave bands between 20 and 2000 Hertz. Static deflection and transient response measurements verified the axial and radial transmissibility measurements. Free decay measurements were made at 5, 20, and 65 C. The isolator's natural frequency of 15 Hertz represents a substantial improvement over the isolator used previously whose lowest resonance was above 100 Hertz. Test procedures and calibration data for three microphones are included.

Master of Science in
Engineering Acoustics
September 1985

Advisor: S.L. Garrett
O.B. Wilson
Department of
Physics

PROPAGATION OF SOUND IN A LAYERED LABORATORY MODEL

Mohammad Tariq
Lieutenant Commander, Pakistan Navy
M.Sc (Physics) University of Punjab Lahore (Pakistan), 1972

Suttichai Rungsirotekomol
Ensign, Royal Thai Navy
B.S., Royal Thai Naval Academy, 1980

The propagation of sound in a laboratory model consisting of a surface layer of water overlying a thick bottom layer of sand was experimentally investigated. The variations of pressure amplitude as a function of receiver depth, range, and transverse location were measured for the source at constant depth in the surface layer of water. Three frequencies for which only the lowest mode propagates were used in this investigation. The measurements of pressure amplitude as a function of depth and range were found in good agreement with normal mode theory, when absorption in the bottom was taken into consideration.

Master of Science in
Engineering Acoustics
December 1984

Advisor: J.V. Sanders
Department of
Engineering Acoustics

LINEAR TIME-INVARIANT SPACE-VARIANT FILTERS AND THE WKB APPROXIMATION WITH APPLICATIONS TO UNDERWATER ACOUSTIC SIGNAL PROCESSING

Jan Vos
Lieutenant, Royal Netherlands Navy
B.S., Delft University of Technology (Netherlands), 1981

A computer simulation model is developed treating wave propagation in a random, inhomogeneous ocean as transmission through a linear time-invariant, space-variant random communication channel. The ocean volume is modelled by an index of refraction which is decomposed into a depth-dependent deterministic part and a depth-independent Gaussian zero-mean random part. Computer simulated output electrical signals were generated that depend on the complex frequency spectrum of the transmitted electrical signal, the far-field beam pattern of the transmit array and the random transfer function of the ocean medium. Output was generated for different test cases. In all cases the transmit electrical signal was represented by a finite Fourier series and random cases were modelled by a random number generator. The computer simulated output electrical signals were then processed by a 3-D DFT beamformer and the results for the deterministic inhomogeneous and random inhomogeneous cases were compared to the homogeneous non-random case in order to study the effects of the medium on signal distortion and source localization.

Master of Science in
Engineering Acoustics
December 1984

Advisor: L.J. Ziomek
Department of
Electrical and
Computer Engineering

MASTER OF SCIENCE

IN

ENGINEERING SCIENCE

COMBAT SYSTEM LETHALITY

Robert A. Butt
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1976

A methodology for calculating warhead, weapon system, and combat system lethality is described for use in AE 3705, a Naval Postgraduate School course in warheads and lethality. A template to outline the methodology and two case studies using the template are developed. The case studies may be used as examples or given as class projects. The first case study considers a generic missile system versus a sea skimming cruise missile. The second case study considers a generic medium caliber gun system versus the same sea skimming cruise missile.

Master of Science in
Engineering Science
December 1984

Advisor: R.E. Ball
Department of
Aeronautics

INFRARED DETECTION OF SURFACE VEHICLE; CALCULATION USING ATMOSPHERIC MODEL LOWTRAN 6

Ioannis Egolfopoulos
Lieutenant, Hellenic Navy
B.S., Hellenic Naval Academy, 1975

The thermal signature of a surface vehicle, "SPRUANCE' type destroyer, quantified by the signal-to-noise ratio of a thermal seeking missile head is parametrically investigated. The effects of the ship internal temperature, ship body paint emissivity, sky condition, sun elevation angle above the horizon, atmospheric profile, missile optics and flight altitude are examined in detail. Results show that both the ship body temperature and signal-to-noise ratio increase as the incident solar energy and the ship body paint emissivity increase and that the signal to noise ratio appears a pick for sun elevation angle in the range of 40° to 60°. Moreover, the signal-to-noise ratio increases as the missile flight altitude decreases and keeping the other parameters constant, higher values are found for the Midlatitude Summer atmospheric profile than for the Tropical atmosphere.

Master of Science in
Engineering Science
December 1984

Advisor: A.W. Cooper
Department of
Physics

IMPLEMENTATION OF A SERIAL DELAY INSERTION TYPE LOOP COMMUNICATION FOR A REAL TIME MULTITRANSPUTER SYSTEM

Bekir Evin
Lieutenant J.G., Turkish Navy
B.S., Turkish Naval Academy, 1978

This thesis presents a design and implementation of a model of a multicluster loop interface. This Delay Insertion Loop type of interface is based on the IMS T424 Transputer and the Concurrent Sequential Processes type of programming language OCCAM. The Loop-type of communications systems are described and the Delay Insertion type of interface has been selected as the most appropriate one for high performance real-time applications. The OCCAM programming language, hosted on the VAX 11/780 VMS system (VAX-Virtual Address extension, VMS-Virtual Memory System), was used to program the simulated version of the multicluster loop interface.

Master of Science in
Engineering Science
June 1985

Advisor: U.R. Kodres
Department of
Computer Science

OPTIMIZATION OF SURFACE SHIP STEERING IN SEA STATE

Emmanuel Horianopoulos
Lieutenant, Hellenic Navy
B.S., Naval Academy of Greece, 1975

Propulsion losses are increased by added drag due to steering of the ship. A carefully designed automatic steering control provides the desired heading while it simultaneously minimizes the rudder activity and holds the potential for reducing propulsive losses.

A computer model of the SL-7 containership along with a cascaded controller (one pole, one zero) were coupled to a function minimization subroutine and a sea state generator program. This scheme provided the appropriate controller parameters in order to accomplish the best performance.

The model was tested in calm waters and sea states (regular and irregular) as well, for a certain speed and different encounter wave angles and encounter frequencies.

Also, an adaptive control was studied which updates the controller parameters while either the environmental conditions or the ship's steering characteristics change in order to maintain optimal steering performance.

Master of Science in
Engineering Science
December 1984

Advisor: G.J. Thaler
Department of
Electrical and
Computer Engineering

AIR DEFENSE CONCEPTS AND EFFECTIVENESS

Jerry M. Jones
Lieutenant, United States Navy
B.S., North Carolina State University, 1977

This thesis is intended to become a portion of the textbook to be utilized in the course entitled "Warheads and Lethality" (AE-3705). The text will include an unclassified discussion of the development of anti-aircraft weapon systems intended for defense against hostile manned aircraft and guided missiles. In particular, this thesis discusses the basic concepts, some history, the terminology, and the damage producing aspects of the generic air defense system.

Master of Science in
Engineering Science
December 1984

Advisor: R.E. Ball
Department of
Aeronautics

AN EXPERIMENTAL INVESTIGATION OF FUEL REGRESSION RATE CONTROL IN SOLID FUEL RAMJETS

Ko, Bog Nam
Major, Korea Army
B.S., Korea Military Academy, 1975
B.E., Yon Sei University, Seoul, Korea, 1980

An experimental investigation was conducted to examine fuel regression rate control methods other than variable bypass air flow rates in the solid fuel ramjet. Air and oxygen injection at various axial locations within the fuel grain were examined as well as air, oxygen and ethylene injection through the step face. One inlet swirl design was also tested. Secondary gas injection was found to be inadequate for regression rate control. A small amount of inlet swirl resulted in a significant increase in the fuel regression rate, indicating that variable inlet swirl may be a viable technique for providing in-flight fuel flow rate modulation in the solid fuel ramjet.

Master of Science in
Engineering Science
December 1984

Advisor: D.W. Netzer
Department of
Aeronautics

BEARINGS ONLY TARGET TRACKING - MANEUVERING TARGET

Dimitrios Kourkoulis
Lieutenant, Hellenic Navy
B.S., Hellenic Naval Academy, 1976

The estimation of the position and velocity of a target moving in a two-dimensional frame is studied in this paper. The estimator is a Kalman filter which processes noisy bearings of the target gathered by the tracker.

The case of maneuvering targets is examined and a solution using a variable value of the system's noise covariance matrix is studied.

Master of Science in
Engineering Science
December 1984

Advisor: H.H. Loomis
Department of
Electrical and
Computer Engineering

DEVELOPMENT OF CRITERIA FOR AUTOMATIC STEERING

Pericles Kyritsis-Spyromilios
Lieutenant, Hellenic Navy
B.S., Naval Academy of Greece, 1975

The effect of added resistance due to steering on a high-speed containership is propulsion reduction. Limitation on the propulsion losses can be achieved by a properly designed controller, which minimizes the rudder activity as well as providing desired overseas heading.

A computer program, simulating a cascade configuration of the SL-7 high-speed containership along with a specific controller was coupled to a function minimization subroutine as well as a sea state generator subroutine in order to minimize a performance criterion.

The entire model was tested for a fixed speed, several encounter frequencies, several encounter angles in calm waters and in a seaway as well.

Master of Science in
Engineering Science
December 1984

Advisor: G.J. Thaler
Department of
Electrical and
Computer Engineering

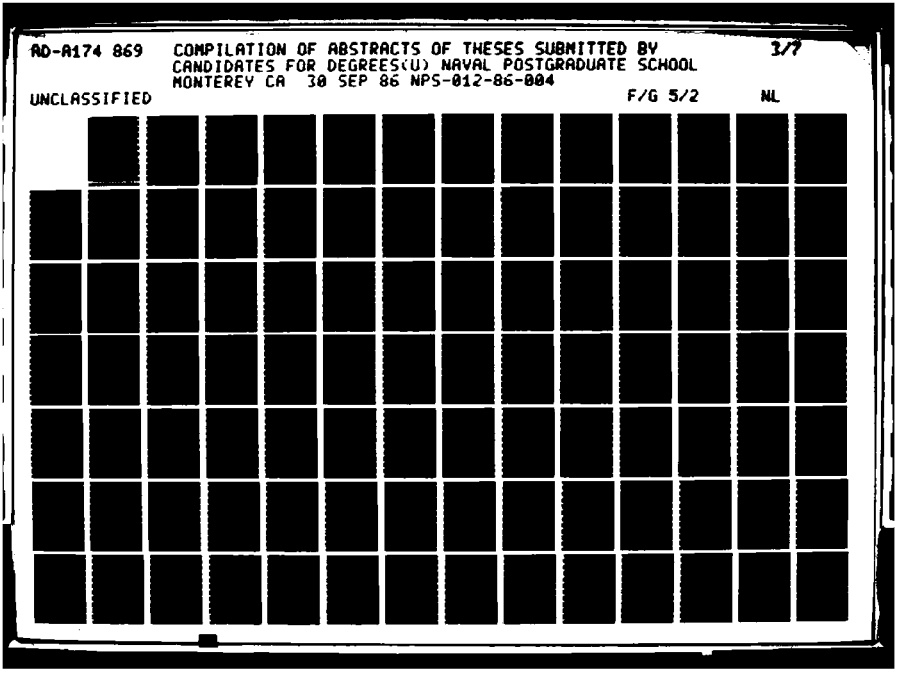
SOME STUDIES IN FILTERING OF ATMOSPHERIC TURBULENCE

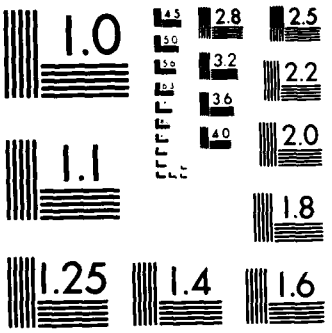
Cheong Koo Lee
Lieutenant Colonel, Republic of Korea Army
B.S., Korea Military Academy, 1972

This study, assuming stationary Gaussian turbulence model, investigates the effect on the crossing frequency of different spectral functions: von Karman, Kaimal and Teunissen for the x and z directions with five filters: ideal band-pass, ideal low-pass, "quadratic-type", "sine-type" and the Hanning. The filters have a much greater effect than the spectral functions. The estimated crossing frequency variation is as much as 50 percent among the quadratic-type, low-pass and sine-type filters. The Hanning filtering predicts crossing rates up to thirty times higher, and the ideal one decade wide band-pass filtering predicts rates of eight times higher than the ideal low-pass filtering. The variation, between the x and z direction, is less than 10 percent for the von Karman spectrum, and over 40 percent for the Teunissen one.

Master of Science in
Engineering Science
December 1984

Advisor: J.V. Healey
Department of
Aeronautics


AD-A174 869 COMPILATION OF ABSTRACTS OF THESES SUBMITTED BY CANDIDATES FOR DEGREES(U) NAVAL POSTGRADUATE SCHOOL MONTEREY CA 30 SEP 86 NPS-012-86-004
3/7
UNCLASSIFIED
F/G 5/2
NL



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

TARGET VULNERABILITY TO AIR DEFENSE WEAPONS

Bruce E. Reinard
Lieutenant, United States Navy
B.S., Virginia Military Institute, 1979

This thesis is intended to become a portion of the textbook utilized in the course entitled "Warheads and Lethality" (AE-3705). This portion of the text includes an unclassified discussion of a target's susceptibility to an e ,ernally detonating HE warhead and a target's vulnerability. In particular, the section on target susceptibility leads to the development of the number of fragments which strike a target aircraft from an externally detonating warhead. The section on target vulnerability explains the methodology used for identifying critical components and conducting a vulnerability assessment, and leads to the effects of fragments and penetrators striking an aircraft.

Master of Science in
Engineering Science
December 1984

Advisor: R.E. Ball
Department of
Aeronautics

A STUDY OF THE WORLD'S NAVAL SURFACE-TO-AIR MISSILE DEFENSE SYSTEMS

Sukij Saraparung
Lieutenant Junior Grade, Royal Thai Navy
B.E., King Mongkute's Institute of Technology, 1978

The shipborne surface-to-air missile (SAM) systems of the US, French, Royal, Italian, Canadian, Israeli, and Soviet Navies are examined. For each SAM system, the details of the physical make-up, target detection and tracking, missile guidance, warhead, and missile performance are presented. Finally, a study of the shipborne air defense used by the Royal Navy in the Falklands Conflict in the Spring of 1982 is made.

Master of Science in
Engineering Science
December 1984

Advisor: R.E. Ball
Department of
Aeronautics.

THE EFFECT OF ALLOY ADDITIONS ON SUPERPLASTICITY IN THERMOMECHANICALLY PROCESSED HIGH MAGNESIUM ALUMINUM-MAGNESIUNM ALLOYS

Richard J. Self
Lieutenant, United States Navy
B.S., University of California, Los Angeles, 1977

This research extends previous thesis work by Becker and Mills, and is concurrent with that of Stengel on the superplastic behavior of warm rolled high-Mg, Al-Mg alloys. In this work, the effects of various alloy additions are investigated. The following Al-Mg alloy compositions are studied: 8% Mg; 8% Mg-0.4% Cu; 8% Mg-0.4% Cu-0.5% Mn; 10% Mg; 10% Mg-0.4% Cu; 10% Mg-0.2 Mn. These materials were solution treated and hot worked at 440°C and then warm rolled at 300° to 94% reduction. Tensile testing was then conducted for the as-rolled condition. The alloys were tested at temperatures ranging from room temperature to 300°C and at strain rates from 5.6×10^{-5} sec^{-1} to 1.4×10^{-1} sec^{-1}. The copper addition has, on the same weight percentage basis, the same effect on superplasticity as does the addition of manganese to the alloy. The addition of small amounts (i.e., approximately 0.2 weight percent) of manganese appears to offer little advantage over the binary compositions in terms of superplasticity.

Master of Science in
Engineering Science
December 1984

Advisor: T. McNelley
Department of
Mechanical Engineering

EVALUATION AND IMPLEMENTATION OF A FUNCTIONAL MICROPROGRAM GENERATOR

Deborah R. Stiltner
Lieutenant, United States Navy
B.S., Miami University, 1977

When a programmer writes a microprogram, as a part of a machine's instruction set or to implement an algorithm in microcode for faster execution, he must be concerned with the smallest details of the hardware in the machine. Microprogramming exists at the lowest (closest to the machine) level and is the most tedious computer "language" to program. In the field of computer design, where microprogramming is used most extensively, designers use microprogramming to perfect instruction sets and to optimize frequently used routines.

A computer-aided design tool called a microcode generator is proposed in this thesis. It is an interactive, menu-driven functional programming tool. The user builds a microroutine by selecting functions from a series of menus as they are presented in a logical sequence. It is implemented in the language C on the Naval Postgraduate School Computer Science Department's VAX 780 computer using the Unix program development system components. The microcode generator is designed to produce microroutines targeted for a specific machine, the Am29203 Evaluation Board, an ALU implemented in bit-slice components.

Master of Science in
Engineering Science
December 1984

Advisor: A.A. Ross
Department of
Computer Science

FIN LINE FILTERS TECHNOLOGY AND ELECTRONIC WARFARE

Stamatis Vitalis
Lieutenant, Hellenic Navy
B.S., Naval Academy of Greece, 1975

Waveguide E plane fin line filters with various numbers of inductive strips are analyzed using the MICRO-COMPACT (MPAC) computer program. The scattering parameters for the inductive strips are obtained from a spectral domain program (FINSTEIP).

Filters were fabricated and tested in X-band (8-12 GHz). Good agreement between the predicted response from a MICRO-COMPACT (MPAC) program and the measured response from a network analyzer was obtained in the case of simple filters (two inductive strips).

Some applications of fin line filter technology in Electronic Warfare are also shown.

Master of Science in
Engineering Science
December 1984

Advisor: J.B. Knorr
Department of
Electrical and
Computer Engineering

MASTER OF SCIENCE

IN

HYDROGRAPHIC SCIENCES

A COMPARISON OF METHODS OF LEAST SQUARES ADJUSTMENT OF TRAVERSES

Saman Aumchantr
Lieutenant, Royal Thai Navy
B.S., Royal Thai Naval Academy, 1976

Traverse is a method of surveying in which a sequence of lengths and directions of lines between points on the Earth are measured and used in determining positions of the points. This method is one of several used to find the accurate geodetic positions which various agencies use. Traversing is a convenient, rapid method for establishing horizontal control.

The theoretical background is provided here to explain the method of traverse station position computations and adjustments in the Universal Transverse Mercator grid coordinates. Closed traverse station positions were computed and adjusted using the Approximate Method and by the Least Squares Method. The adjusted coordinates of both methods were transformed from the Universal Mercator grid coordinates to geographic coordinates and compared with the coordinates which were adjusted by the U.S. National Ocean Service.

Master of Science in
Hydrographic Sciences
December 1984

Advisor: R.L. Hardy
Department of
Oceanography

COASTAL EROSION ALONG MONTEREY BAY

Williams R. Lima Blanco
Lieutanant Commander, Venezuelan Navy
B.S., Naval Academy of Venezuela, 1971

Anastasios I. Sklavidis
Lieutenant, Hellenic Navy
B.S., Naval Adademy of Greece, 1973

The permanent beach erosion in Southern Monterey Bay is episodic, occurring infrequently when high tides coincide with stormy weather which allows wave action to erode the tow of the cliffs. Precise photogrammetric techniques are used to measure cliff recession from 1946 through 1984. This study shows maximum erosion occurs in the vicinity of Fort Ord (7.3 ft/yr) and decreases to the south. The analysis and errors associated with determining cliff recession using aerial photogrammetry are discussed in detail.

A model is developed to predict cliff erosion based on the hypothesis that erosion only occurs when the water level due to combined tides, wave set-up and run-up exceeds the tow of the cliff elevation. The model combines predicted tidal elevations and wave heights. Refraction of the wave energy is responsible for the variability of erosion rates along the shore. The bathymetry of Monterey Bay is such that the refracted wave energy is greater in the Fort Ord area than to the south. The model qualitatively replicates the temporal variability of the measured recession rates and gives a resonable prediction of the spatial variation of the mean recession rates.

Master of Science in
Hydrographic Sciences
March 1985

Advisor: E.B. Thornton
Department of
Oceanography

PRECISE MARINE POSITIONING USING THE GLOBAL POSITIONING SYSTEM (GPS)

Rahyono
Mayor Laut (P) Indonesian Navy
B.S., Indonesian Naval Academy, 1967

The development of the Global Positioning System (GPS) has led to the possibility of positioning marine platforms with great accuracy. This report describes position computations made from GPS observations aboard a ship and the evaluation of the accuracy and precision of a Texas Instruments TI-4100 GPS Receiver at sea in a low dynamic mode. The observed pseudoranges were corrected and smoothed by Doppler count, and then were used to compute position using an eight-state Kalman filter. A comparison is made between the ship's position obtained by the GPS receiver and by Del Norte Trisponders.

Data covering a period of 3600 s were processed and compared, yielding a total of 3171 s of data points from both positioning systems, which consisted of 2740 s of data with four satellites present and 431 s of data with three satellites.

The mean of the root-mean-square differences between launch positions determined by means of GPS satellites and by Trisponder was found to be ±11 m when four satellites were available and ±21 m when only three were present. Some 29% of the time, the GPS positions and Trisponders positions had similar accuracy.

Master of Science in
Hydrographic Sciences
September 1985

Advisors: N.K. Saxena
The University of Hawaii

S.T. Tucker
Department of
Oceanography

AN ANALYSIS OF SOUND VELOCITY VARIATION IN AN ESTUARY FOR NOS STANDARDS

John D. Wilder
Lieutenant, National Oceanic and Atmospheric Administration
B.S., University of South Carolina, 1976

Investigation of oceanographic data acquired in the Columbia River estuary, which lies between the states of Washington and Oregon, revealed significant variation in sound velocity with respect to time and location. National Ocean Service (NOS) standards for echo-sounder acquired soundings require the knowledge of sound velocity to within plus or minus 4 meters per second. To meet this requirement in the Columbia River estuary, methods were devised to allow prediction of sound velocity based on location and the height of tide.

Confidence intervals associated with sound velocity predictions provided by regression analyses showed a substantial improvement in accuracy when compared to using a single average velocity for each location. Nevertheless, there were still some cases where the NOS requirement could not be met.

Master of Science in
Hydrographic Sciences
September 1985

Advisor: G.R. Schaefer
Department of
Oceanography

MASTER OF SCIENCE

IN

INFORMATION SYSTEMS

SECURITY CONTROLS IN THE STOCKPOINT LOGISTICS INTEGRATED COMMUNICATIONS ENVIRONMENT (SPLICE)

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This thesis examines security controls specified and implemented in the Stock Point Logistics Integrated Communications Environment (SPLICE) project. Controls provided by the Defense Data Network and the Tandem operating system are reviewed. Alternatives from current literature in areas of authentication, encryption, and dialport protection are reviewed for the purpose of suggesting enhancements. Issues discussed apply to most interactive/decentralized systems in operation today and include administrative as well as technical recommendations.

Master of Science in
Information Systems
March 1985

Advisor: N.F. Schneidewind
Department of
Administrative Sciences

AN EVALUATION AND IMPLEMENTATION STUDY OF THE ZENITH 120 MICROCOMPUTER IN WEST COAST FLEET COMMANDS

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Austere funding and the increased administrative burdens being placed on Fleet units will ultimately take their toll on performance, morale, and combat readiness. Applying low cost microcomputer technology presents one method to alleviate many of these burdens. However, the current implementation process being used is not sufficient to meet the needs of the Fleet. Empirical evidence indicates that expenditures on computers are not accompanied by the expected rise in productivity.

The use of microcomputers is feasible. They are being used successfully throughout both the civilian and military communities. This study discusses the environment necessary to meet user needs. The central theme is one of standardization and documentation. Necessary tools and general recommendations are discussed.

Master of Science in
Information Systems
September 1985

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STRATEGIC PERFORMANCE MANAGEMENT EVALUATION FOR THE NAVY'S SPLICE LOCAL AREA NETWORKS

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M.A., Austin College, 1974

This thesis investigates those aspects of network performance evaluation thought to pertain specifically to strategic performance management evaluation of the Navy's Stock Point Logistics Integrated Communications Environment (SPLICE) local area networks at stock point and inventory control point sites. Background is provided concerning the SPLICE Project, strategic management, computer performance evaluation tools, computer and local area network performance metrics and performance evaluation methodology, capacity planning, the SPLICE LAN communications subnetwork hardware and software, and internetworking of SPLICE LAN's via the Defense Data Network (DDN). These topics, relevant case studies, and observations of one SPLICE LAN site are used to arrive at implications and recommendations applicable for improving the future generic SPLICE LAN planning and performance.

Master of Science in
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AN OVERVIEW OF THE NAVY AUTOMATED TRANSPORTATION DOCUMENTATION SYSTEM (NAVADS)

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M.P.A., State University of New York at Albany, 1974

The Navy Automated Transportation Documentation System (NAVADS) is a multiple subsystem, multi-modal automated data processing and management information system. The system is designed to accept, release, consolidate, and track material requests at Naval stock points.

This thesis will address some of the basic, current, and historic issues that confront the system and those issues which have found solutions within the NAVADS framework. The paper will also provide a rudimentary description of the system operation in terms of the files, programs, and solution methods used by the system to perform its mission. Additionally, the thesis will provide a brief review of a civilian freight operation within the ADP environment. The thesis is designed to work as a primer to provide an orientation in basic NAVADS operations and the problematic and operational environment in which it operates.

Master of Science in
Information Systems
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AN ANALYSIS OF INFORMATION RESOURCE MANAGEMENT WITHIN THE DEPUTY CHIEF OF STAFF FOR PLANS U.S. ARMY MILITARY PERSONNEL CENTER

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M.S., University of Southern California

Organizations are becoming increasingly aware of the need for identifying and controlling their information resources. The Paperwork Reduction Act of 1980 explicitly tasks federal agencies with establishing information policy and mechanisms for implementing that policy. As a result, increasing emphasis is being placed on information resource management (IRM).

The Deputy Chief of Staff for Plans, U.S. Army Military Personnel Center, has expressed a critical need for improved information resource management. At present, manpower projections developed through the use of manpower modeling by DCS Plans, determine the Army's manpower policies for both the officer and enlisted forces. Not only does this shape the structure of the force, but it has a major budgetary impact on the Army.

This thesis models the current information resource management structure of DCS Plans and proposes a solution.

Master of Science in
Information Sciences
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A LOGICAL DESIGN OF THE NAVAL POSTGRADUATE SCHOOL HOUSING ACTIVITY

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B.S., Youngstown State University, 1977

Navy Housing activities have been automating internal administrative functions through the purchase of office automation equipment. This thesis provides a comprehensive study and logical design of the facilities management branch of a housing activity utilizing the La Mesa Housing Project as a model.

Master of Science in
Information Systems
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DESIGN OF USER FRIENDLY PROTOCOL TO EFFECT A TRANSPARENT INTERNETWORK TRANSACTION FACILITY THROUGH SPLICE AND THE DEFENSE DATA NETWORK

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This thesis explores transparent internetwork connectivity requirements for SPLICE (Stock Point Logistics Integrated Communications Environment). SPLICE nodes shall be interconnected via the DDN (Defense Data Network) to form a wide area network supporting distributed processing. Implementation problems, short and long-term requirements for user terminal to server host transparent connectivity, electronic mail, and process to process internetworking connectivity are presented. Distributed processing through implementation of a DDS (Directory/Dictionary System) is explored. MILSTRIP requisition referral by Stock Points through distributed processing is presented. Implementation of Tandem Corporations's EXPAND/X.25 protocols versus DDN TCP/IP and higher level DDN protocols are discussed. Packet switching, the CCITT X.25 and X.75 protocol standards, and an overview of the DDN TCP/IP protocols are offered in the Appendices.

Master of Science in
Information Systems
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A MICROCOMPUTER TUTORIAL ON SPREADSHEETS AND DATABASES WITH A SIMULATED BUDGET PREPARATION

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The objective of this thesis is to illustrate to financial managers in the Practical Comptrollership Course (PCC) some of the potential for microcomputers in budget preparation and execution. This will be accomplished through the use of a tutorial on electronic spreadsheets and databases, and a simulated budget generated using an electronic spreadsheet. The background of microcomputer implementation into the federal government and commerical industry and the problems encountered in this implementation are presented. The theory of tutorial development, along with a methodology which uses a layered procedure is discussed and used to develop the tutorial which resulted from this thesis. The tutorial manual is enclosed as Appendix A and the program is enclosed as Appendix B. It is recommended that this tutorial be included as a requirement for all PCC students.

Master of Science in
Information Systems
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MANAGING COMPUTER SYSTEMS DEVELOPMENT: UNDERSTANDING THE HUMAN AND TECHNOLOGICAL IMPERATIVES

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This paper examines the human and technological issues that are often encountered during the development of modern computer information systems. People and technical constraints, including suggestions for minimizing negative consequences, are illustrated throughout the development life cycle. Special emphasis is placed on strategic planning, end user involvement in the requirements definition phase, and user-oriented software. The research consists of a review of current literature concerning techniques, methods and methodologies that are the basis for managing computer information system development. It is a collection of bits and pieces of wisdom by experts from all disciplines within the computer and management fields. These techniques can be tailored to various scale projects having myriad objectives. The theory and practice of management methods included in this paper can be applied universally to computer projects. However, the study is directed at all U.S. Navy managers who are, or will be, involved in the transition to modern computer information systems.

Master of Science in
Information Systems
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BENCHMARK EVALUATION OF PC SIMSCRIPT

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As senior defense managers increasingly rely on models and simulations to justify major programs, greater attention is focused on the models and how they were constructed and validated. The SIMSCRIPT language has become the language of choice for military simulations and modeling primarily due to its readability and "world view" use of processes and events to model the interaction of entities, attributes and sets. This thesis reviews the personal computer release of SIMSCRIPT which was made available during late 1984. Topics include results of hands-on testing, feasability as a teaching tool at the Naval Postgraduate School, evaluating transportability of programs between different releases of SIMSCRIPT, and benchmark time trials when programs are run on different machine configurations.

Master of Science in
Information Systems
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USE AND DESIGN OF AN ACTIVE DATA DICTIONARY FOR LOCAL VALIDATION OF INPUT DATA

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This thesis addresses the problem of small user groups being forced to use input data collected and processed by sources outside their span of control. Specifically, the use of an active data dictionary to locally validate such input data is examined. The thesis proceeds from a general review of data validation techniques and criteria, through an examination of data dictionaries, to an illustration of how an active data dictionary can be configured to act as a "data filter" for input data.

Key initial planning and design steps are set forth, including requirements analysis, data definition, and initial logical design. A checklist of questions to answer during each of these activities is included.

The concepts discussed in the paper are then applied to a specific case (DCSPLANS Branch, U.S. Army Military Personnel Center, Alexandria, VA) resulting in a "data filter" structure diagram that is tailored to the DCSPLANS' environment and their unique validation needs.

Master of Science in
Information Systems
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DATA DICTIONARY/DIRECTORY SYSTEMS, A TOOL IN SYSTEMS DEVELOPMENT LIFE CYCLE

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Although data resources have some common characteristics with other corporate resources, such as people, goods or money, they do not have two specific characteristics. They are not relatively scarce, nor are they inherently allocatable. However, they do have value, both positive or negative. The value is derived from the fact that the entire enterprise depends on their availability for the proper management of all the other resources. Organizations are now beginning to treat data as a resource, which requires the same degree of administration and control as is involved in the management of other resources. A key component in this management and control is the Data Dictionary/Directory System. It is a useful tool, throughout a System Development Life Cycle.

Master of Science in
Information Systems
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MICROCOMPUTER NETWORKS: INVESTIGATION AND IMPLEMENTATION

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This thesis presents an overview of microcomputer networks in general, and the Lattice Net Microcomputer Network in particular. The Lattice Net is a network which has as its ultimate goal the use of power lines as a medium of transmission. The program presented herein is part of an on-going project to implement this system. The program works in conjunction with the code presented in another thesis, "Microlan File Transfer Program for Microprocessors" by Roger D. Jaskot and Harold W. Henry.

Master of Science in
Information Systems
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MICROCOMPUTER MANAGEMENT POLICY FOR U.S. NAVAL FORCES

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Microcomputers have become an integral part of business life in America and in the U.S. Navy. They can be used as stand-alone processors, components of a network, or terminals to more powerful mini- or mainframe computers. Microcomputers are a valuable resource and should be treated accordingly. The proliferation of microcomputers cannot go unchecked by management. There must be a plan that will channel the power of the microcomputer towards the goals and objectives of the organization. The Navy is no exception. It too must deal with the proliferation of a new technology. The Navy must establish hardware and software standards for use throughout the fleet. These standards must be incorporated in fleetwide training plans so that fleet personnel can apply the standards in the accomplishment of their tasks. Through a comprehensive microcomputer management policy, the power of microcomputers can be used to accomplish the Navy's mission.

Master of Science in
Information Systems
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CONCEPT DEVELOPMENT OF A MANPOWER PROGRAMMING AND BUDGETING SYSTEM FOR HEADQUARTERS, UNITED STATES MARINE CORPS

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Captain, United States Marine Corps
B.S., University of Dayton, 1979

This paper documents a Concept Development Phase analysis conducted for the Manpower Plans, Programs, and Budget Section of Headquarters, U.S. Marine Corps. The study fulfills the requirements of Marine Corps Order P5231.1, Life Cycle Management for Automated Information Systems (LCM-AIS). The study analyzed the users' functional requirements and produced documention required for Concept Development of a Marine Corps Class II automated information system. A Mission Element Need Statement (MENS), Requirements Statement, Feasibility Study, and Economic Analysis were produced.

The recommendation was to continue development and begin the Detailed Design phase of the system life cycle. The recommended alternative was for a distributed architecture comprised of microcomputers linked by a local area network to provide resource and data sharing. Access to a mainframe processor for support of large database functions will be provided by leased communications lines and remote terminal sessions using the microcomputers.

The importance of a high level information resource management plan was stressed for successful implementation.

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Administrative Sciences

DISCUSSION OF A LOCAL AREA NETWORK FOR THE MARINE CORPS INFANTRY BATTALION

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This paper discusses the possibility of implementing a Local Area Network (LAN) within the Marine Corps Infantry Battalion. The idea of a LAN is proposed as an automated alternative to the status quo. As a mechanism of Distributed Data Processing (DDP), the LAN is used to highlight one possible migration path along which the Battalion Consolidated Administration Center (BCAC) concept may evolve technologically. Current problems and functional requirements are identified and they provide the foundation upon which the LAN topology is based. Implementation guidelines and related issues are included in the discussion. A LAN benefits-analysis is presented in order to demonstrate obtainable productivity gains in dollar terms. Finally, this thesis should stimulate thought for developing a Battalion-Regiment-Division network and illuminate the feasilibity of automating other battalion-like units within the Marine Corps.

Master of Science in
Information Systems
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Administrative Sciences

ISSUES IN MANAGING THE MICROCOMPUTER INFORMATION RESOURCES IN THE NAVAL AVIATION COMMUNITY

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The proliferation of microcomputer systems within Naval Aviation organizations in this decade has forced managers to rethink the role of information production. This thesis addresses the interaction of the organization process on information production, which Navy managers must be aware of in order to perform their job. The role of information management is examined to allow management to use existing microcomputer information systems capabilities more effectively. Discussion includes the impact of microcomputer systems on the flow of information, and microcomputer assistance to management in planning, problem solving, and decision making. Research findings indicate that management of microcomputers has increased the actual time and cost of information flow within organization units. Security of classified materials processed on microcomputers and training of user skills are deficient. Organizations need to incorporate a specialized computer manager.

Master of Science in
Information Systems
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AN EVALUATION OF INDUSTRIAL FUNDING FOR MARINE CORPS NON-DEPLOYABLE ADP ASSETS

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Captain, United States Marine Corps
B.S. Villanova University, 1973
M.B.A., University of Miami, 1974

This thesis examines the effect an industrical funded chargeback system would have on management and control of Marine Corps non-deployable ADP resources. Within this framework, current Marine Corps ADP structure and planning is discussed, along with regulatory, organizational, and economic issues. The Naval Data Automation Command (NAVDAC) experience with industrial fund implementation is reviewed and a Marine Corps proposal for industrial funded ADP is developed. While this thesis does propose a method for implementation of industrial funding, it also points out concerns which remain unresolved. Accordingly, it does not conclude that industrial funding is the best solution, only that it is possible, has much to offer, and therefore warrants consideration.

Master of Science in
Information Systems
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EXAMINATION OF RETINAL PATTERN THRESHOLD LEVELS AND THEIR POSSIBLE EFFECT ON COMPUTER ACCESS CONTROL MECHANISMS

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The advent of multi-programming and the proliferation of shared computer systems has increased the need for greater computer security. Computer security can be segmented into six categories: physical, hardware, software, personnel, communications and procedures. Embedded into software security are those features which protect the system against both unauthorized access and denial of service to authorized users. Another term for this is access control. Access control mechanisms verify an individual's identity via three distinct methods: 1) something an individual knows, 2) something an individual possesses or 3) something about the individual. One device which keys on something about the individual is a retinal scan system. This system utilizes the retinal blood vessel pattern as a unique identifier.

This thesis studies one such retinal pattern recognition device. For the purposes of this study, an experiment was designed and conducted which determined the reliability of this system as a function of various tolerance levels, as well as its applicability as a computer systems access control mechanism. The Eye Dentify 7.5 system by Eye Dentify Inc., of Portland, Oregon, proved to be a fairly expensive, highly reliable access control device. It's probability for false recognitions is far better than most other known devices. It can be used as a physical access device at virtually any military installation where access devices are used.

Master of Science in
Information Systems
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COMPUTER AIDED INSTRUCTION DESIGN ISSUES: THE DEVELOPMENT OF A PORTABLE MICROCOMPUTER-BASED CAI FOR STATISTICS INSTRUCTION

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The primary focus of this thesis is the development of a portable microcomputer-based software package to aid in the instruction of a graduate level introductory statistics course. In order to accomplish this objective, an exploration of various conventional Computer Assisted Instruction (CAI) techniques is necessary to determine which methods are readily adaptable for use with portable microcomputers. Many of the design issues normally associated with the development of CAI packages are exasperated by the current physical limitations of portable microcomputers. This thesis will discuss general CAI design issues and related compromises and trade-offs needed to successfully implement some of these designs in a portable microcomputer-based system. A systematic methodology for designing simple paired-associate learning (Drill and Practice) software is presented, which incorporates many of the lessons learned in the development of the included statistics software package.

Master of Science in
Information Systems
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A PROPOSAL FOR A COMPUTER-BASED SYSTEM TO SUPPORT THE CHINESE MARINE CORPS FIELD MANEUVER CONTROLLING AND EVALUATION OPERATION (FIOP)

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This thesis addresses IBM's Business Systems Planning (BSP) methodology to design a computer-based information system for the Chinese Marine Corps Field Maneuver Controlling and Evaluation Operation (FIOP).

It initially describes the current manual system by identifying each organizational group and the functions each performs. BSP is then defined including its background, underlying concepts and potential benefits. Finally, the BSP methodology is applied to FIOP resulting in a list of data classes, a process/data class matrix and an information flow diagram.

The conclusion is that a computer-based system for FIOP is both feasible and worthwhile. The recommendations are that a steering committee of major FIOP users be formed to devise obtainable and measurable objectives; that a BSP expert be hired to act as a consultant/coordinator for this project and finally, that the implementation plan be reviewed annually to ensure its continued cost effectiveness.

Master of Science in
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PROPOSED DATA ADMINISTRATION STRATEGY FOR THE U.S. COAST GUARD

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M.B.A., Arizona State University, 1976

The purpose of this thesis is to provide the Coast Guard with an introduction to Data Administration (DA) concepts so that it may be better prepared to enter the fifth stage, the Data Administration stage, of Nolan's model of data processing growth. A brief history of data processing activities in the Coast Guard is presented followed by an overview of current Coast Guard efforts related to DBMS's. Issues related to data dictionaries (DD's) and data dictionary/directory systems (DD/DS's) are then presented including: the uses and benefits of DD's and DD/DS's and broad planning guidelines on how to implement a DD or DD/DS. The final two chapters are general recommendations to the Coast Guard on how to best prepare for data administration. These recommendations include developing: a central data dictionary, a DA charter, DA standards and in-house training for general DA concepts and DBMS-specific topics.

Master of Science in
Information Systems
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Advisor: N.R. Lyons
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Administrative Sciences

COMPUTER-BASED TRAINING FOR THE U.S. COAST GUARD STANDARD TERMINAL MICROCOMPUTERS: A BASIS FOR IMPLEMENTATION UTILIZING THE ELABORATION THEORY OF INSTRUCTIONAL DESIGN

Steven E. Johnson
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B.S., United States Coast Guard Academy, 1976

Various factors concerning the U.S. Coast Guard Standard Terminal microcomputer, including the large number of installation sites, steady turnover of user personnel, and conflicting demands of operational commitments indicate that computer-based training is a desirable approach for indoctrinating new users of the computer system. Any such instructional computer program developed for this purpose should consider the characteristics of the trainee audience, particularly the varied levels of procedural detail desired and constraints on time available for training.

The Elaboration Theory of Instructional Design provides an excellent framework for creating a viable computer-based course of instruction. A Pascal computer program and demonstration lesson modules utilize the macro-strategy components of Elaboration Theory in an introductory course on computer procedures. Course presentation is controlled by special characters imbedded in the lesson text files and interpreted by the program.

Master of Science in
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DSS/MIS DESIGN AND IMPLEMENTATION FOR LAMPS MK III UTILIZING A MICROCOMPUTER AND A MAINTENANCE PERSONNEL ASSIGNMENT PROGRAM

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B.S., Virginia Polytechnic Institute, 1970

John E. Dolenti
Lieutenant Commander, United States Navy
B.S., Jacksonville University, 1976

This thesis is intended to act as an aid in the incorporation of a microcomputer into the daily activities of a LAMPS Mk III helicopter squadron; specifically HSL-43. It includes an application program utilizing a Pascal driver interfacing with a DBMS (Database Management System) to optimize the assignment of maintenance personnel to deploying detachments subject to time constraints. Several future Management Information Systems (MIS) and Decision Support Systems (DSS) applications are addressed, but not specified, in hopes that other individuals will investigate and expand on this preliminary effort.

Master of Science in
Information Systems
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DATA ADMINISTRATION AND ITS ROLE AT NAVAL SUPPLY SYSTEMS HEADQUARTERS

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As many organizations transit through Nolan's phases of ADP evolution, the process of designing systems to satisfy their data needs has become extremely complex. Application-oriented design techniques have given way to data-oriented concepts such as Information Engineering. One of the primary tools of Information Engineering is the group of management functions known as Data Administration. Naval Supply Systems Command (NAVSUP) has established a data administration branch in an attempt to integrate three logistic information systems: SUADPS REAL-TIME, UADPS-SP and UICP.

Master of Science in
Information Systems
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Administrative Sciences

THE DESIGN OF NATURAL LANGUAGE INTERFACES

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One of the possible solutions to the problem of designing effective man-machine interfaces seems to be the use of natural languages.

This thesis examines the principles of design of effective man-machine interfaces, the role of natural languages in achieving effective man-machine communication and the implementation issues and techniques for their use as interfaces.

Master of Science in
Information Systems
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A SYSTEMS DEVELOPMENT LIFE CYCLE STUDY OF THE INFORMATION CENTER

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End user computing has penetrated most large organizations in an uncontrolled fashion. The newness of the technology, the lack of management expertise, and the inability to gain corporatewide control under the traditional organizational structure have often resulted in inefficiency, incompatibility, and missed opportunities. One solution to this situation is the Information Center (IC). ICs are centralized coordination centers for end user computing and offer end user computing expertise. ICs may be any combination of consulting services, training services, mainframe computer terminals, or microcomputers. This thesis examines the IC concept from the viewpoint of the manager tasked with implementation and provides a methodology, the Systems Development Life Cycle, to evaluate and implement an IC. Each phase of the methodology is explained and some innovative ideas on IC implementation and operation are provided. Examples of past successes and mistakes are also presented.

Master of Science in
Information Systems
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THE DEVELOPMENT OF A STANDARD DATABASE FOR THE REPUBLIC OF KOREA'S ARMY LOGISTICS SUPPORT SYSTEM

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B.A., Korea Military Academy, 1974

Song, Wha Dal
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In order to effectively command and control the logistics of the ROK army, the commander must know the status of his resources accurately and in a timely manner. The database processing can increase productivity, enable work to be done more effectively, and increase combat capability.

This thesis presents a sample database system for inventory status of the ROK Army 2nd Logistics Support Command with relational model.

Database design is a two-phased process, and both logical and physical database design processes are examined here. These processes are an iterative process to get optimal design. Normal forms can be applied to decrease inefficiency of the relational database model in the system design process.

A sample database using dBASE II is implemented with IBM PC, and is designed for the user who has no computer experience.

Master of Science in
Information Systems
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A METHODOLOGY FOR NAVAL BASES AND STATIONS REQUIREMENTS ANALYSIS: THE CASE OF THE NAS MOFFETT FIELD

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This research proposes a methodology for designing an information systems architecture for Naval Bases and Stations--the Naval Information System Methodology (NISM). The proposed methodology is developed from the Business Systems Planning (BSP) and Structural Analysis and Design Technique (SADT) approaches. It allows a naval base to develop organizational information models, determine command information requirements, and assess information and organizational structures. Additionally, NISM serves as a framework for defining the prototype architecture. An analysis of the NAS Moffett Field is used as an illustration. It helps shed insights into information resource management of naval bases, such as an ADP strategy for the future.

Master of Science in
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NAVY MILITARY STANDARDS FOR TECHNICAL SOFTWARE DOCUMENTATION OF EMBEDDED TACTICAL SYSTEMS; A CRITICAL REVIEW

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This thesis critically reviews the Navy's embedded tactical software development methodology as defined in DOD-STD-1679A(Navy). The emphasis of the thesis is on the documentation produced as a result of following that methodology. Both the development methodology, and the documentation produced are compared to management and content recommendations provided by the National Bureau of Standards and academic/commercial publications. The conclusion reached is that DOD-STD-1679A(Navy) is adequate for its purpose. However, problems in documentation develop as a result of management's misinterpretation of the phased life-cycle development methodology described in DOD-STD-1679A(Navy) and the importance of a continuous documentation effort.

Master of Science in
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THE FEASIBILITY OF IMPLEMENTING AN EXPERT SYSTEM FOR AIRCRAFT MAINTENANCE DISCREPANCY SCHEDULING WITH THE NAVAL AVIATION LOGISTICS COMMAND MANAGEMENT INFORMATION SYSTEM (NALCOMIS)

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The feasibility of developing an expert system to support the scheduling of discrepancies in Maintenance Control is examined. A general review of expert systems and NALCOMIS is presented. An in-depth analysis of the scheduling and planning process is made. This analysis is based on interviews with several experts. The ability of NALCOMIS to support an expert system and discussion on whether such a system is warranted for this problem domain conclude the thesis.

Master of Science in
Information Systems
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SHIPBOARD NON-TACTICAL COMPUTER SYSTEMS OF THE U.S. NAVY

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James J. Richards
Lieutenant Commander, United States Navy
B.A., Wayne State University, 1971

This thesis reviews the development and application of current non-tactical shipboard ADP systems in the U.S. Navy, and provides an analysis of each systems' strengths and weaknesses. The primary focus of this review includes Perq/ZOG, WANG installations, and SNAP II. The methodologies of procurement, development and implementation vary as widely as the scope and complexity of the various systems. This analysis provides insight into some primary management issues, limitations, and constraints encountered in providing non-tactical automatic data processing to the fleet.

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Administrative Sciences

PRELIMINARY INVESTIGATION INTO THE COMPUTER-ASSISTED GRAPHIC TECHNOLOGY FOR COAST GUARD LAW ENFORCEMENT MISSIONS

Harold B. Morton
Lieutenant Commander, United States Coast Guard
B.B.A., University of Corpus Christi State, 1977

Analyzing the Coast Guard's law enforcement data poses a difficult and unwieldy process. The Coast Guard possesses such a vast amount of law enforcement information in computer storage that it often overwhelms managers and analysts. Properly designed graphic tools provide a bridge between the manager and the vast stores of data. Computer assisted graphic systems offer pictorial representations of data allowing a manager to better understand the meaning and significance of the information.

This thesis investigates the graphic needs of the Coast Guard law enforcement mission. After investigation, this thesis evaluates three alternative graphic technologies for their ability to provide effective and efficient graphic services to the law enforcement mission. A recommendation for a particular graphic technology occurs based upon the ability of a graphic system to display many thousands of maps and its consideration for human design factors.

Master of Science in
Information Systems
March 1985

Advisor: N.R. Lyons
Department of
Administrative Sciences

AN AUTOMATED QUALITY ASSURANCE SURVEILLANCE PLAN FOR ADP OPERATIONS UNDER THE NAVY'S COMMERCIAL ACTIVITIES PROGRAM

Howard E. Morton
Lieutenant, United States Navy
B.S., Humboldt State University, 1976

This thesis documents the process whereby a Navy Regional Data Automation Center implements an automated quality assurance program to ensure proper performance of a commercial service contract by a civilian contractor. The feasibility of implementing MIL-STD-105D on microcomputers is examined, along with the software tools necessary for that implementation. Finally, a system design and programs to effect such an implementation are proposed.

Master of Science in
Information Systems
December 1984

Advisor: D.C. Boger
Department of
Administrative Sciences

PROTOTYPING WITH DATA DICTIONARIES FOR REQUIREMENTS ANALYSIS

Alan F. Noel
Major, United States Army
B.A., University of Florida, 1973

The analysis of software system requirements is to develop a complete, consistent and unambiguous statement for what the software will do, but not how. Failure to correctly elicit requirements is cause for difficult and expensive correction efforts during later phases of system development. An alternative approach to interviewing and textual document preparation is the use of a functionally limited model, a prototype.

This thesis will examine the feasibility of using prototypes accompanied with data dictionaries as a more effective means of communicating with users and, therefore, more correctly eliciting requirements. It will include development of a relational based, prototype data dictionary using the dBASE II database management system. The dictionary is for use by the Deputy Chief of Staff for Plans, U.S. Army Military Personnel Center, Alexandria, Virginia.

Master of Science in
Information Systems
March 1985

Advisor: D.R. Dolk
Department of
Administrative Sciences

COMPUTER PERFORMANCE MODELING TOOL (CPMT)

Karen A. Pagel
Lieutenant, United States Navy
B.A., Yale University, 1978

The Computer Performance Modeling Tool (CPMT) is a discrete event simulation program designed to model computer systems. It is written in PASCAL for the VAX-11/VMS environment. CPMT uses the concepts of queueing theory to model computers as a network of server groups through which job events are processed. The interactive program provides the user the capability to update an indexed sequential data base of simulation model specifications and to execute simulation runs of computer system models contained in the data base. Simulation model runs produce output statistics on the performance of the modeled computer system. The thesis documentation includes a User's Manual; information on computer system model design; CPMT data base and program specifications; program test and verification results; and enhancement possibilities to be included in the ongoing CPMT development project.

Master of Science in
Information Systems
December 1984

Advisor: A.A. Ross
Department of
Administrative Sciences

COMMUNICATIONS PROTOCOLS FOR MICROCOMPUTER-BASED WORKSTATIONS: DESIGN AND IMPLEMENTATION OF AN ELECTRONIC BULLETIN BOARD SYSTEM (NPS-BBS)

Park, In Seop
Captain, Republic of Korea Army
B.S.E.E., Kwang-Woon University, Seoul, 1979

The area of research for this thesis is to develop communications protocols required to support electronic mail and data transfer service through voice graded telephone lines using modems. This thesis concentrates on prototyping an IBM-PC based Electronic Bulletin Board System (NPS-BBS). Major features of NPS-BBS include electronic mail and data transfers as well as electronic notepad, on-line conversation, and running BBS under a multitasking operating system with MultiLink between remote and distributed microcomputer based workstations.

Master of Science in
Information Systems
September 1985

Advisor: T.X. Bui
Department of
Administrative Sciences

INCREASED SURVIVABILITY OF THE NATIONWIDE EMERGENCY TELECOMMUNICATIONS SYSTEM (NETS) THROUGH REDUNDANT ROUTING

Carl R. Pierson
Lieutenant Commander, United States Navy
B.S., Oakland University, 1973

The survivability of the Public Switched Network (PSN) during various emergency situations is based, in part, upon a high degree of redundancy of routing in the network. In the PSN the redundancy exists in two forms, the multiple geographical routing of calls and the multiple types of media between the PSN switching offices. A measure of survivability, for the PSN based upon these type of redundancies was determined.

This thesis augments the Nationwide Emergency Telecommunications System (NETS) studies of the National Communications System by developing a model for determining the effects of redundant routing on NETS survivability. The model examines possible geographical and media variables in representative sets of links and nodes for PSN class 3, 4, and 5 offices. This thesis presents a methodology for determining the survivability of NETS.

Master of Science in
Information Systems
March 1985

Advisor: J.W. LaPatra
Department of
Administrative Sciences

DESIGN AND IMPLEMENTATION OF THE COMPUTER SYSTEMS DESIGN ENVIRONMENT NETWORK

James L. Poole
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1976

This thesis develops and implements a computer network for the Computer System Design Environment (CSDE). The CSDE network is based upon the use of the Zenith-100 (Z100) computer as an intelligent workstation. The Z100 provides direct communication with the Vax 11/780 mainframe and Prolog computer systems. Included on line in the Z100 workstation is a users manual which describes network operations. The users manual is designed to take the first-time CSDE user through all phases of the CSDE process in a step-by-step manner.

Master of Science in
Information Systems
March 1985

Advisor: A.A. Ross
Department of
Computer Science

N.F. Schneidewind
Department of
Administrative Sciences

A DECISION SUPPORT SYSTEM FOR COST-EFFECTIVENESS ANALYSIS FOR CONTROL AND SECURITY OF COMPUTER SYSTEMS

Emmanuel A. Prevenas
Lieutenant, Hellenic Navy
B.S., Naval Academy of Greece, 1973

The increasing number of computer failures and crimes has forced managers to tighten the control procedures of their EDP systems. However, the cost of an exhaustive control strategy is often very expensive, and its effectiveness is not guaranteed. This study designs and implements a Decision Support System that helps determine optimal control procedures for EDP systems (CEA-DSS).

The model base of the proposed DSS consists of various techniques for estimating computer exposures. The latter can be interactively analyzed via a Dialogue interface that supports tabular and graphic outputs. CEA-DSS also provides extensive database management capabilities to keep track of the diverse control problems. It is implemented in Pascal for the IBM-PC.

Master of Science in
Information Systems
September 1985

Advisor: T.X. Bui
Department of
Administrative Sciences

IMPLEMENTATION OF A PROPOSED SYSTEM FOR AUTOMATED MICROCODE GENERATION

Marcia E. Provance
Lieutenant, United States Navy
A.B., Pennsylvania State University, 1978

This thesis develops an automated microprogramming system. This system is designed around the goals of usefulness, usability, and security. The problem of mutually-dependent fields in a vertically formatted microinstruction is addressed, and a solution to this problem is presented. The proposed microprogramming system is organized around a series of menus which are presented to a microprogrammer so that microroutines can be built by working on each microinstruction at a highly abstract level.

Master of Science in
Information Systems
December 1984

Advisor: A.A. Ross
Department of
Computer Science

ATTACKING SOFTWARE CRISIS: A MACRO APPROACH

Tahir N. Qureshi
Lieutenant Commander, Pakistan Navy
M.B.A., University of Karachi, 1983
L.L.B., University of Karachi, 1977

This thesis attempts to provide solutions to overcoming the software crisis. The basic premise of this thesis is that unless the problems at the software industry level are solved, no number of technical and project management tools can be of much help in overcoming the software crisis. The author examines the existence of the software crisis, its causes and its serious impact on every walk of life. The nature of software development is discussed, considering it as a craft and as an engineering discipline. After evaluating various alternatives, a managerial approach is emphasized. Issues like education, professionalization, programmer's productivity, and human factors are discussed. Action on these recommendations requires crossing organizational boundaries, and viewing the problem from a macro perspective.

Master of Science in
Information Systems
March 1985

Advisor: C.A. Peterson
Department of
Administrative Sciences

EVALUATION OF A DATA DICTIONARY DURING APPLICATION PROGRAM DESIGN BASED UPON THE FOCUS DBMS

Robert C. Repp
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1974

This thesis considers the design and uses of a data dictionary within the FOCUS DBMS package. The thesis details the background and design considerations of an application program for the Director of Admissions at the Naval Postgraduate School. The program will aid in the assignment of an Academic Profile Code (APC) for newly commissioned Naval Officers. A data dictionary is designed and implemented, and its use during application program development is discussed. Features from commercial DBMSs, fourth generation languages, and data dictionaries are compared and their impact on information systems considered.

Master of Science in
Information Systems
September 1985

Advisors: D.R. Dolk
N.R. Lyons
Department of
Administrative Sciences

CONCEPT DEVELOPMENT OF THE U.S. MARINE CORPS PERSONNEL CASUALTY REPORTING SYSTEM

Karen E. Riecks
Major, United States Marine Corps
B.A., Westminster College, 1967
M.Ed., University of Pittsburgh, 1970

Douglas A. Musil
Captain, United States Marine Corps
B.A., University of Mississippi, 1978

This thesis encompasses the documentation required for the Concept Development phase of the Life Cycle Management for Automated Information Systems. The documents were produced during a requirements analysis conducted for the Casualty Section of Headquarters, U.S. Marine Corps in Arlington, Virginia during 1984 and 1985. The analysis concentrated on the information processing requirements of the Casualty Section during sustained operations and wartime. The purpose of this document is to influence the decision-makers to authorize continued development of an automated system to support personnel casualty reporting, notification, assistance, and recording for the U.S. Marine Corps.

Master of Science in
Information Systems
March 1985

Advisor: W.J. Haga
Department of
Administrative Sciences

A PRODUCTIVITY ENHANCEMENT STUDY FOR THE U.S. ARMY INFORMATION SYSTEMS ENGINEERING COMMAND

Timothy F. Robertson
Captain, United States Army
B.S., Arizona State University

A productivity enhancement study for the U.S. Army Information Systems Engineering Command (ISEC) is described. Recommendations for improvement and further study are provided. ISEC has an important mission with regard to managing the Army's information resources. ISEC is tasked with developing and maintaining the Standard Army Multi-command Management Information Systems (STAMMIS). Because of resource constraints and increased mission requirements, it is essential that ISEC increase productivity to meet the information needs of the Army.

Specifically, this thesis: 1) evaluates the traditional software life cycle in contrast with prototyping and evolutionary development; 2) discusses project management issues; 3) explains the need for integrated software tools; 4) discusses human factors in the software development process; and 5) proposes a system for capturing and measuring productivity.

Master of Science in
Information Systems
September 1985

Advisors: N.R. Lyons
D. Whipple
Department of
Administrative Sciences

A PERFORMANCE EVALUATION MODEL FOR THE STOCKPOINT LOGISTICS INTEGRATED COMMUNICATION ENVIRONMENT (SPLICE)

Jonathan B. Schmidt
Lieutenant Commander, United States Navy
B.A., University of Missouri, 1971

This thesis investigates ways of improving the real-time performance of the Stockpoint Logistics Integrated Communication Environment (SPLICE). Performance evaluation through continuous monitoring activities and performance studies are the principal vehicles discussed. The method for implementing this performance evaluation process is the measurement of predefined performance indexes. Performance indexes for SPLICE are offered that would measure these areas. Existing SPLICE capability to carry out performance evaluation is explored, and recommendations are made to enhance that capability.

Master of Science in
Information Systems
September 1985

Advisor: N.F. Schneidewind
Department of
Administrative Sciences

FUNCTIONAL MANAGERS' GUIDE TO INFORMATION SYSTEMS DEVELOPMENT

William B. Shaner
Naval Weapons Center
B.A., Sacramento State College, 1967

The development of large integrated information systems has had a spotty success record. This thesis investigates the role of the user-manager team in the development of these systems and what principal problems the organization must face. The study recommends that the user is the individual with ultimate responsibility for the development of the system. Further, the problems that must be faced, in descending order of importance are 1) the organization power structure, 2) the people in the organization, and 3) the technical issues of data processing.

Master of Science in
Information Systems
September 1985

Advisor: D.C. Guyer
Department of
Administrative Sciences

THE IMPLEMENTATION OF A COMPUTER SCHEDULING SYSTEM WITHIN NAVAL SHIPYARDS

Kennis L. Sigmon
Commander, United States Navy
B.S., Old Dominion University, 1971

In this research, the author addresses the challenge of implementing a Fundamental Automated Scheduling System into the Naval Shipyards. The problem considered is that of how to most effectively integrate a new computerized system into the existing shipyard arrangement. The author first profiles the mission, organization, duties and constraints of a Naval shipyard, then develops the background information concerning the requirements and system description of the new scheduling system. The discussion then shifts to a description of the implementation plans developed by three Naval shipyards and the required management considerations. The research concludes with a summary of recommended implementation approaches and suggestions for further research.

Master of Science in
Information Systems
September 1985

Advisor: M.P. Spencer
Department of
Administrative Sciences

MICROCOMPUTER-BASED DETACHMENT, ADMINISTRATIVE MANAGEMENT SYSTEM FOR THE LAMPS COMMUNITY -- A REQUIREMENTS ANALYSIS

Gregory F. Smith
Lieutenant, United States Navy
B.S., U.S. Naval Academy, 1977

This thesis presents a requirements analysis of a microcomputer-based system to be used by sea-going Light Airborne Multi-purpose System (LAMPS) detachments for administrative data management and recurring reports generation. Included are the results of user interviews which were conducted to determine possible system functions. These functions, through analysis, are presented in a hierarchical charting with data flow diagrams and accompanying processing narratives. System data is then presented in data dictionary format. Recommendations are made as to possible system implementation and design.

Master of Science in
Information Systems
September 1985

Advisor: J.W. LaPatra
Department of
Administrative Sciences

A METHOD FOR THE DESIGN AND IMPLEMENTATION OF A LOGISTICS MANAGEMENT INFORMATION SYSTEM FOR THE INDONESIAN DEPARTMENT OF DEFENSE LOGISTICS STAFF

Dwi Nugroho Soeroso
Lieutenant Commander, Indonesian Navy
B.S., Indonesian Naval Academy, 1970

Deradjatun Soetisna
Lieutenant, Indonesian Navy
B.S., Indonesian Naval Academy, 1974

This thesis addresses an appropriate methodology to design and implement a Computer-Based Information System for the Indonesian Department of Defense Logistics Office. It initially describes the existing logistics MIS support, discusses current MIS methodologies and finally examines and evaluates an appropriate methodology. The method will be presented by developing an application of the small arms inventory system, as an example case.

The recommendations and conclusions offered are based on an extensive literature search of existing material on topics concerning MIS Design, Data Dictionary/Directory Systems, and methods which enhance heavy user environments. Any resulting model must be appropriate to the Indonesian Department of Defense environment.

Master of Science in
Information Systems
March 1985

Advisor: B.A. Frew
Department of
Administrative Sciences

AN EVOLVING DIGITAL TELECOMMUNICATIONS INDUSTRY AND ITS IMPACT ON THE OPERATIONAL ENVIRONMENT OF THE NATIONWIDE EMERGENCY TELECOMMUNICATION SYSTEM (NETS)

Richard J. Stahel
Lieutenant, SC, United States Navy
B.S., California State University, Hayward, 1976

Following a national disaster, a Nationwide Emergency Telecommunications System (NETS) would be created by combining the existing telecommunications capabilities of government, public carriers and private networks. This thesis addresses an evolving digital telecommunications industry and its impact on the operational environment of NETS. It contains a comparison of analog and digital capabilities, reviews the digital telecommunications industry and analyzes the impact of a changing digital technology upon the desired features of a pre-emergency network.

Master of Science in
Information Systems
March 1985

Advisors: J.W. LaPatra
C.R. Jones
Department of
Administrative Sciences

A PROTOTYPE DATABASE MANAGEMENT FOR THE BUDGETING SYSTEM OF THE DEPARTMENT OF DEFENSE AND SECURITY OF THE REPUBLIC OF INDONESIA

Mohammad Subekti
Captain (E), Indonesian Navy
B.E., Naval Electronic School, 1972

Widhya Bagya Prawiraatmadja
Captain (Inf), Indonesian Army
Armed Forces Military Academy, 1973

The management in the Department of Defense and Security of the Republic of Indonesia (DODS) needs relevant, up-to-date information in query type processing to manage the Budgeting System in the DODS. The budget planning cycle and the budget management cycle are presented briefly in order to define the system requirement for the budgeting system in the DODS. Based on that requirement, the discussion of the data base management system includes the general structure of data, the impact of the data base development to the DODS management, and a cost benefit analysis concept.

Master of Science in
Information Systems
September 1985

Advisor: M.P. Spencer
Department of
Administrative Sciences

INITIAL DESIGN OF RELATIONAL DATABASE SYSTEM FOR NPS COMPUTER ASSET IDENTIFICATION AND VALUATION FOR RISK ASSESSMENT

Fred W. Thompson, Jr.
Lieutenant Commander, United States Navy
B.A., Vanderbilt University, 1974

Relational database technology is examined as a means to support computer Risk Assessment at the Naval Postgraduate School. The current methodology for conducting computer Risk Assessment within the Department of the Navy is used to construct an initial design for a relational database system. The initial design focuses on computer asset identification and valuation as the first step of the computer Risk Assessment process.

Master of Science in
Information Systems
March 1985

Advisor: N.R. Lyons
Department of
Administrative Sciences

USERS GUIDE TO APPROXIMATE REASONING AND THE REVEAL SOFTWARE SYSTEM

Douglas W. Verhagen
Lieutenant, United States Navy
B.S., University of Wisconsin, 1976

This thesis introduces the reader to some of the principles of fuzzy set theory and approximate reasoning. Sample applications are discussed with possible military situations outlined. The REVEAL software package is reviewed and its relationship with fuzzy set theory and approximate reasoning discussed. This thesis is designed to be used as a tutorial for REVEAL.

Master of Science in
Information Systems
March 1985

Advisor: P.S. Fischbeck
Department of
Operations Research

SOFTWARE MAINTENANCE RELATING TO THE INPUT TRANSLATOR AND Z80 REALIZATION VOLUME OF THE COMPUTER SYSTEMS DESIGN ENVIRONMENT

Robert R. Vogel
Lieutenant, United States Navy
B.S., United States Naval Academy, 1977

This thesis corrects the discrepancies between the input Translator and the Z-80 Realization Volume of the Computer System Design Environment (CSDE). It also demonstrated, for the first time, complete processing of a problem through CSDE. CSDE is a computer-aided design system for real time controllers. The Translator takes as input, a Computer System Design Language (CSDL) problem and generates a primitive list. Each primitive is matched to identically named primitive realizations in the Realization Volume. The final outputs are hardware and software listings to implement the initial design.

Master of Science in
Information Systems
March 1985

Advisors: A.A. Ross
Department of
Computer Science

N.F. Schneidewind
Department of
Administrative Sciences

A PRELIMINARY SOFTWARE DESIGN FOR A PERSONAL COMPUTER-BASED ANTISUBMARINE WARFARE TACTICAL FLIGHT SIMULATOR

Harold R. Whalen, III
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1976

This thesis provides a preliminary software design for an Antisubmarine Warfare Tactical Flight Simulator. The simulation uses AN/ASN-123 Tactical Navigation Set (TACNAV) display symbology and selectable graphic functions to track and localize a single fully-evasive submarine. The primary design objectives are flexibility, utility, and understandability. A composite design methodology including levels of abstraction, information hiding, coupling, and cohesion as modularization criteria is used to effect a top-down modular decomposition of the simulation. A hierarchical structure is developed and modular packaging is discussed. Some aspects of physical implementation are also discussed and appropriate recommendations made.

Master of Science in
Information Systems
September 1985

Advisors: R.C. Marshall
J.W. LaPatra
Department of
Administrative Sciences

CONCEPTS OF A MANPOWER REPLACEMENT SYSTEM FOR A MARINE AIR GROUND TASK FORCE IN A DEPLOYED/TACTICAL ENVIRONMENT

William C. Johnson
Captain, United States Marine Corps
B.S., North Carolina A&T State University, 1975
M.S., University of Southern California, 1983

*Jan Williams
Captain, United States Marine Corps
B.S., North Carolina A&T State University, 1976
M.B.A., Pepperdine University, 1980

This thesis is designed to illustrate concepts of a manpower replacement system for a Marine Air Ground Task Force in a deployed/tactical environment. In this environment, the Administrative Officer (G-1) is tasked with the responsibilities of coordinating all efforts associated with personnel replacements. Presently, there are no systems responsive enough to handle personnel replacements in an efficient manner. The first part illustrates the need for such a system. The second part discusses the requirements for such a system including data elements and data flow requirements of the system. The third part explores several alternative ways of satisfying this requirement. The recommended alternative utilizes distributed processing over packet radio networks linked to the defense data network via gateways or tactical radio links. Applicable attributes of both the DDN and Packet Radio technologies are discussed extensively.

*Master of Science in Information Systems
March 1985

Advisor: N.F. Schneidewind
Department of
Administrative Sciences

A DESIGN METHODOLOGY AND PROTOTYPE FOR THE RESERVE TRAINING SUPPORT SYSTEM

Michael J. Winslow
Lieutenant Commander, United States Navy
B.A., Holy Cross College, 1974

Howard C. Seeger
Lieutenant, United States Navy
B.S., United States Naval Academy, 1978

There is so much to be done to update the Naval Reserve automated information systems to 1980's technology. This thesis analyzes the Naval Reserve's automated information system--the Reserve Training Support System (RTSS). It presents the system's background and specifications, its problems and the Reserve's own plan to resolve these problems. After a discussion on the characteristics of an effective automated information system, RTSS is critiqued. The key issue is the obsolescence of the hardware and software being used. To alleviate their information problems, the Reserves must develop a plan to implement new hardware and software technology in a coordinated fashion. An alternative is presented to the traditional system development process: prototyping. Relational database theory is briefly discussed. ORACLE, a relational database management system, is used to implement the database prototype that serves as an example of how current technology can be used to eliminate many of the Naval Reserve's information problems.

Master of Science in
Information Systems
March 1985

Advisors: R.B. Kurth
Department of
Computer Science

M.P. Spencer
T.G. Swenson
Department of
Administrative Sciences

DEVELOPMENT OF IS-2000, AN INFORMATION SYSTEMS LABORATORY

Charles S.D. Witten
Lieutenant, United States Navy
B.S., United States Naval Academy, 1978

On the premise that fundamental concepts and uses of microcomputers can be better taught in a hands-on environment, the Administrative Sciences Department Instructional Laboratory was established. IS-2100, an Information Systems Laboratory, uses these facilities to reinforce material taught in the first two quarters of the Computer System Management Curriculum. Its purpose and objective is to develop computer literacy and introduce the student to microcomputers and the facilities of the developing laboratory. This thesis is the report of the development of IS-2100 as first taught during Winter 1985.

Master of Science in
Information Systems
March 1985

Advisor: N.F. Schneidewind
Department of
Administrative Sciences

SECURITY REQUIREMENTS AND ORGANIZATION FOR NON-TACTICAL ADP SYSTEMS ON SMALL SURFACE SHIPS

Joseph E. Zavodny
Lieutenant, United States Navy
B.B.A., University of Notre Dame, 1978

This thesis investigates the problem of non-tactical ADP system security requirements and security organizations on small surface vessels of the U.S. Navy. It presents an overview of ADP security at the levels of the Federal government, Department of Defense, and Department of the Navy. The author researches the questions of whether there is a need for an abbreviated security manual for non-tactical ADP systems on small surface ships, the level of detail required for such a manual, and the type of security organization which might be required on a small surface ship. Conclusions are drawn which present the need for a security manual which pertains to specific ship types and classes, a possible outline for this security manual, and a possible shipboard security organization which is simple and effective.

Master of Science in
Information Systems
September 1985

Advisor: B.A. Frew
Department of
Administrative Sciences

MASTER OF SCIENCE

IN

MANAGEMENT

AN ANALYSIS OF INTERNAL CONTROLS FOR MATERIAL MANAGEMENT OPERATIONS WITHIN NAVY MEDICAL COMMAND ACTIVITIES

Ronald L. Adams
Lieutenant, Medical Service Corps, United States Navy
B.S., George Washington University, 1980

Theodore E. Warywoda
Lieutenant, Medical Service Corps, United States Navy
B.S., Iowa State University, 1974

The requirement for strong internal controls to eliminate waste, fraud, abuse, and mismanagement in the Federal Government has been mandated by law and Presidential policy. However, there are events which indicate that there may be important weaknesses in the internal controls for medical supply operations within Navy Medical Command activities. This thesis describes a research effort which evaluates the control system to determine if there are areas in which stronger controls could result in improved effectiveness, efficiency and economy of operations within medical material management operations. The major approach is an analysis of the existing control systems as compared to a "good" control system which is based on management control literature. The conclusions and recommendations reached on the basis of research and analysis are provided.

Master of Science in Management
December 1984

Advisor: D.R. Whipple
Department of
Administrative Sciences

AN ANALYSIS OF THE POTENTIAL USE OF CORPORATE TRADE PAYMENTS BY THE NAVY

Frederick C. Alke
Major, United States Marine Corps
B.B.A., University of Georgia, 1979

Corporate Trade Payments (CTPs) are a recent development in electronic funds transfer (EFT) technology. Essentially, they are a commercial payment system that replaces paper checks with electronic data which are transmitted via the automated clearing house system. This thesis analyzed the potential use of CTPs by the Navy for making vendor payments. The thesis reviewed EFT in general and CTPs in particular. It performed a cost comparison between checks and CTPs, and predicted whether using CTPs would be cost beneficial to the Navy. A survey of private sector companies was conducted to solicit primary market data about using CTPs. The respondents' data were statistically tested to identify possible vendor concerns and needs.

Master of Science in Management
December 1984

Advisor: J.M. Fremgen
Department of Administrative Sciences

HOW DIFFERENT KINDS OF COMMUNICATION AND THE MASS MEDIA AFFECT TOURISM

Said A. Aly
Major, Egyptian Armed Forces
B.S., Egyptian Military Academy, 1972

Mahmoud Z. Goher
Major, Egyptian Armed Forces
B.S., Ain Shams University, 1975

This study attempts to investigate the impact of the mass media and other kinds of communication in terms of making American tourists aware of Egypt as a desirable place to visit and helping them to decide to come to Egypt. The study concentrates on American tourists, since they constitute--and are likely to be--the largest nationality visiting Egypt.

Five hundred and forty-three American tourists from those who visited Egypt during 1981 and the winter of 1982 have been studied for a cross-section of these groups during this time period.

A case study and sample survey appeared to be the most suitable methodologies to use. It is a pilot study in that no previous research has been undertaken dealing with mass communication and the increase of tourism in Egypt.

Master of Science in
Management
December 1984

Advisor: K.T. Said
Department of
National Security Affairs

SWOPATH: AN INTERACTIVE NETWORK FLOW MODEL SIMULATING THE U.S. NAVY SURFACE WARFARE OFFICER CAREER PATHS

Richard B. Amirault
Lieutenant Commander, United States Navy
B.S., Boston College, 1973

This thesis presents an interactive computer model designed to examine the Surface Warfare Officer (SWO) Career Path. The Model called SWOPATH is designed to provide the manpower managers with a fast, user friendly analytical tool. The model is derived from a network representation of a SWO career path, the rows representing the billet activities, the columns, the tours of duty. Career paths are represented by arcs between the nodes in the network. The model allows the manager to display current data and evaluate the effect of altering career paths by changing assignment tour lengths, transfer percentages from assignments to assignments, and accessions to the SWO community. The model's speed allows the manager to evaluate several scenarios, providing an ability to quickly forecast results of policy changes on the SWO community.

Master of Science in Management
September 1985

Advisor: P.R. Milch
Department of Operations Research

CULTURE IN JAPANESE LABOR RELATIONS: A COMPARISON WITH WESTERN INDUSTRIAL NATIONS

Yang Hong, Bae
Major, Republic of Korea Army
B.S., Korea Military Academy, 1977

Ge Ho, Lee
Major, Republic of Korea Army
B.S., Korea Military Academy, 1977

Japan's economic development during the twentieth century, despite overpopluation and poor resources, has attracted the interest of world scholars.

The issue of this thesis is to demonstrate that management styles in any nation are deeply rooted in the historical and religious origins of the nation's culture, customs, and traditional social values, as well as in its economic and social system.

We have attempted to bring together under one cover a distillation and synthesis of a large number of scholarly works covering the effect of Confucianism, Shintoism, Taosim and Buddism upon Japanese management culture.

A successful management-labor relationship must be tailored to the customs and culture of a country. Cultural attributes, management ideology, characteristics of management style, and management-labor relation are compared between Japan and Western countries.

Master of Science in Management
December 1984

Advisor: W.J. Haga
Department of Administrative Sciences

THE QUEST FOR POWER IN EFFECTIVE LEADERSHIP

Baek, Kyu Tae
Lieutenant Colonel, Republic of Korea Army
B.S., Korea Military Academy, 1972

This research paper reviews our knowledge of power to date and places it into several conceptual categories by providing tentative answers to the following three questions:

1. Why are the dynamics of power necessarily an important part of managerial processes?
2. How do effective commanders acquire power?
3. How and for what purposes do effective commanders use power?

The following are the key conclusions drawn from this literature review:

1. Commanders are dependent upon subordinates and others to accomplish their tasks, and power is the fuel that generates their results.
2. Effective commanders are very sensitive to developing all their sources of power.
3. They use their power for the good of the whole organization rather than for personal aggrandizement.

Master of Science in Management
December 1984

Advisor: E. Hamilton
Department of
Administrative Sciences

A COST EFFICIENCY STUDY OF AVIATION OFFICER CAREER PATTERNS AND PERMANENT CHANGE OF STATION MOVEMENTS

W. Thomas Ballew
Commander, U.S., Navy
B.S., Purdue University, 1969

This thesis presents an analysis of the professional career development of Naval Aviation Officers with respect to their Permanent Change of Station (PCS) movements. A network of representations of both successful and unsuccessful career paths of aviation officers is presented. Actual aviation assignment tour length time-on-station statistics showed decreasing officer tour lengths and, as a result, increased personnel turbulence within the Aviation Community over the period 1980 to 1984. Aviation officer retention rates were varied, along with Fleet Squadron tour lengths in a sensitivity analysis using the manpower model, "Aviation Officer Requirements". This analysis showed the optimal tour lengths for the Fleet Squadron tours with respect to aviation officer PCS requirements. Recommended alterations to the aviation officer career development paths were made to reduce the number of officer PCS movements without penalty to individual members' careers.

Master of Science in Management
December 1984

Advisor: P.R. Milch
Department of Administrative Sciences

CONSIDERATIONS FOR THE DESIGN AND IMPLEMENTATION OF A MANAGEMENT SUPPORT SYSTEM FOR THE ELECTRONIC WARFARE SYSTEM SUPPORT LABORATORY

Harry G. Banks III
B.S., California Polytechnic State University, 1974
M.S., California State University, 1975

This thesis presents a review of current literature on management support system development, some current management philosophy, and an organizational analysis of the Electronic Warfare System Support Laboratory located at the Pacific Missile Test Center, Pt. Mugu, CA. Using the knowledge gained on management system development and the organizational analysis, appropriate objectives and requirements for a management system were developed for the laboratory.

Master of Science in Management
June 1985

Advisor: J.W. Creighton
Department of
Administrative Sciences

AN ANALYSIS OF THE ADVICE CODES AND PRIORITIES PLACED ON 2Z COGNIZANCE REQUISITIONS

Linda J. Bird
Lieutenant Commander, SC, United States Navy
B.A., Western Washington University, 1973

Robert R. Bird
Lieutenant Commander, SC, United States Navy
B.S., University of South Carolina, 1971

This thesis evaluates the priority and advice code placed on 2Z cog material requisitions in an attempt to determine the magnitude of the impact the lack of spares for 2Z cog material can have on fleet support and the mission capability of fleet units. As the inventory manager for 2Z cog material, NAVELEX's investment in sufficient spares for principal items is constrained by the NAVCOMPT budget policy. This policy severely restricts the number of spares that can be procured to provide support for recurring demand from the fleet. The shortage of spares is accentuated when the end user, due to a survey for loss or damage, does not have a carcass to turn in for repair. Recommendations for enhancing support are given. They include a change to NAVCOMPT's budget policy, a redefinition of principal and secondary items, better utilization by NAVELEX of the Total Carcass Tracking System, and aggressive support by NAVELEX of the stock coordination process.

Master of Science in Management
December 1984

Advisor: A.W. McMasters
Department of
Administrative Sciences

ACQUISITION STRATEGY DEVELOPMENT AT PROGRAM INITIATION: CONCEPTS, REALITIES, AND METHODOLOGY

Bruce E. Bissett
Captain, United States Marine Corps
B.S., Trenton State College, 1975

One of the most important tasks faced by a Program Manager at the initiation of a major systems acquisition program is the formulation of the program's acquisition strategy. In this study, the researcher identifies the principal characteristics of an acquisition strategy, discusses the constraints and limitations which must be considered in its development, and considers the realities involved in the formulation process. The study also investigates the concept of strategic planning and its applicability in the major systems acquisition process. In Chapter V, the study develops a methodology for the formulation of an acquisition strategy at program initiation. The study concludes that in the major systems acquisition process there exists a lack of a clear distinction between acquisition strategies and acquisition plans, a lack of long range planning, and a failure of higher levels to clearly communicate overall strategies, policies, and priorities which will have impact on the program.

Master of Science in
Management
December 1984

Advisor: D.V. Lamm
Department of
Administrative Sciences

FINANCIAL MODEL ANALYSIS FOR NAVY FLYING CLUBS

Barry B. Boyd
Lieutenant, United States Navy
B.S., East Carolina University, 1973

This thesis identifies the factors contributing significantly to the revenues and expenses at Navy Flying Clubs. A model illustrating the relationships among these factors is proposed. A methodology for determining the magnitude of the factors within the model is suggested.

Master of Science in Management
September 1985

Advisor: L. Darbyshire
Department of
Administrative Sciences

FACTORS INFLUENCING MILITARY AFFILIATION INTENTIONS OF FIRST TERM ARMY ENLISTED

James W. Boyle, Jr.
Captain, United States Army
B.S., University of Pennsylvania, 1974

This thesis examines the military affiliation intentions of first term Army enlistees with less than one year remaining on their active duty obligations. The influence of demographic, experience, economic, and alternative employment factors on affiliation intentions was explored. Results indicated that insights into understanding military turnover can be gained by expanding traditional analysis, wherein active duty reenlistees are contrasted with non-reenlisting peers, to include reserve military service as an option available to soldiers facing the reenlistment decision.

Master of Science in Management
December 1984

Advisor: G.W. Thomas
Department of Administrative Sciences

COST ACCUMULATION WITHIN THE PUGET SOUND NAVAL SHIPYARD

Terry A. Bragg
Lieutenant, United States Navy
B.A., Appalachian State University, 1978

The purpose of this research project is to examine the cost accounting and reporting structure used by Naval shipyards. The investigation focuses on developing an understanding of the degree to which the data collected by this system fulfills the requirements of the Department of Defense (DoD) uniform cost accounting system as set forth in the Depot Maintenance and Maintenance Support Cost Accounting and Production Reporting Handbook (DoD instruction 7220.29-H).

To satisfy this requirement, this thesis provides the reader with the information necessary to understand the depot maintenance reporting system, introduces the historical significance and importance of a uniform cost accounting system, and provides insight into the performance of depot maintenance in the system of Naval Shipyards. Investigation focuses on the cost accumulation system used by Puget Sound Naval Shipyard to determine how this system satisfies DoD requirements.

Master of Science in Management
June 1985

Advisor: K.J. Euske
Department of
Administrative Sciences

MANPOWER FOR THE ROYAL THAI NAVAL FLEET: A DEVELOPMENT OF PETTY OFFICER RECRUITMENT AND RETENTION

Joomphon Buasap
Commander, Royal Thai Navy
B.S., Royal Thai Naval Academy, 1966

Parallel with the development of National Defense and Security, the Royal Thai Navy has planned to build many ships equipped with modern weapon systems. To prepare the petty officers for operating and maintaining these new ships, the Royal Thai Navy faces several problems which have not yet been solved.

This thesis studies manpower requirements for the Operating Fleet. The first part of the thesis determines the factors which cause the problems. The second part examines the factors and trends affecting petty officer recruiting and retention. The third part examines policy options to raise the quantity, quality, and skills of petty officers.

Master of Science in Management
June 1985

Advisor: J.W. Creighton
Department of
Administrative Sciences

MILITARY SEALIFT COMMAND TANKER MARKET FORCES AND COST FACTORS

David P. Burnette
Lieutenant Commander, U.S. Navy
B.A., University of South Carolina, 1973

As the United States Navy operating agency for ocean transportation, the Military Sealift Command (MSC) operates a fleet of tankers to supply the military petroleum needs of Defense Department units around the world. To fulfill Defense requirements, MSC maintains a controlled fleet of approximately thirty tankers that are either owned by the government or are chartered on a long term basis from commercial shipping companies. This thesis attempts to analyze those market forces a. cost factors that contribute to the charter rate structure that has such a significant impact on MSC operating costs. The market forces analyzed are the worldwide demand for oil, the location of refineries, advancing technology, and legislation. The tanker cost factors discussed are operating, voyage, and capital costs.

Master of Science in Management
December 1984

Advisor: D.C. Boger
Department of Administrative Sciences

LINKING THE APADE AUTOMATED PROCUREMENT SYSTEM TO THE EDMICS DATA RETRIEVAL NETWORK THROUGH SPLICE

Kevin R. Carman
Lieutenant Commander, United States Navy
B.A., University of Massachusetts, 1972
M.B.A., National University, 1981

Edwin N. Hart
Lieutenant Commander, United States Navy
B.S., Central Michigan University, 1970

This thesis examines the feasibility of networking the EDMICS technical data system with the APADE system to accomplish goals of the Buy Our Spares Smart Program. Furthermore, this study provides a model that networks the Automated Procurement and Data Entry (APADE) system with the Engineering Data Management Information Control System (EDMICS) for the Navy Field Contracting System utilizing the Stock Point Integrated Communications Environment (SPLICE) hardware.

Master of Science in Management
June 1985

Advisor: D.C. Guyer
Department of
Administrative Sciences

A NEW DEVICE FOR ESIMATING LOCAL AREA ENLISTMENT MARKET POTENTIAL

Gregory D. Citizen
Captain, United States Army
B.S., McNeese State University, 1976

This thesis investigates an alternative method for estimating enlistment market potential. The method proposed is based upon survey respondents' stated intentions to join the military obtained from the Youth Attitude Tracking Study (YATS). Local area estimates of application potential are determined for general military service and for each of the four larger branches, i.e., Army, Navy, Air Force and Marine Corps.

The main conclusions of the study are: a) Reasonable estimates of enlistment market potential can be obtained via a method which is relatively independent of past accessions, and b) Separate estimates of local area market potential should be determined for racial and age subgroups.

Master of Science in
Management
June 1985

Advisor: J.I. Borack
Department of
Administrative Sciences

ESSENCE OF EXCELLENCE LESSONS FROM NAVAL EXECUTIVES ABOUT SUPERIOR PERFORMING TACTICAL AND READINESS STAFFS

Homer J. Coffman
Lieutenant, United States Navy
B.S., University of Southern Mississippi, 1979

This study identified the conditions and attributes associated with excellent surface tactical and readiness staffs. These attributes were derived from the expressed opinions by more than one hundred flag officers, commodores and their staff members. These attributes, the Seven C's for Staff Success, which comprise the foundations of staff excellence are: communication, climate, consistency, competence, coaching, conceptualization and credibility. Each attribute is discussed and illustrated from the experiences of senior naval officers.

Master of Science in
Management
June 1985

Advisors: R.T. Harris
E.V. Haag
Department of
Administrative Sciences

AN ANALYSIS OF THE NAVY CONVENTIONAL GUN AMMUNITION INVENTORY MANAGEMENT SYSTEM

Harold D. Covert
Lieutenant Commander, United States Navy
B.A., University of Kansas, 1973

Management of the Navy's Conventional Gun Ammunition System involves a logical progression of decisions regarding procurement, distribution, warehousing, maintenance, and consumption or disposal. The logistical problems associated with this management are complicated by the fact that this ordnance has a limited shelf life, and primarily for physical security reasons, requires detailed end item visibility throughout its life cycle. This research reviews the ammunition management organization as it is designed to operate, then examines the actual operation of this system, highlighting problem areas that inhibit efficiency. Finally, improvements are suggested that should result in cost savings to the Navy.

Master of Science in Management
June 1985

Advisor: A.W. McMasters
Department of
Administrative Sciences

A PROPOSAL FOR QUALIFICATION STANDARDS AS A CONTRACTING OFFICER IN THE NAVAL FACILITIES ENGINEERING COMMAND

Gregory A. Dalke
Lieutenant Commander, CEC, United States Navy
B.S.M.E., University of Arkansas/Fayetteville, 1972

The Naval Facilities Engineering Command is responsible for all phases of the life cycle of public works and public utilities of the Naval Shore Establishment. This tasking includes the authority to contract for services from the private, civilian sector, as may be required. Contracting is performed through an agent of the Federal government referred to as the contracting officer. This thesis analyzes the experience, education and training criteria found in law, regulation, and existing programs in the Government. Then, by analogy, it develops a model of standards which might prove beneficial to those individuals who will be appointed contracting officers for the Naval Facilities Engineering Command. The study recommends the use of personal qualification standards to guide the military officer or civil service employee through a defined procedure of required training, required experience, tours of duty, and formal education. It also addresses the issues of establishing a maintenance training program and a certification program to provide periodic refresher courses and for oversight and review of individual contracting officer performance.

Master of Science in Management
June 1985

Advisor: W.R. Talutis
Department of
Administrative Sciences

A FEASIBILITY STUDY OF THE ASSIGNMENT OF WOMEN TO DD-963 (SPRUANCE) CLASS DESTROYERS

Stephen W. Deutermann
Lieutenant Commander, United States Navy
B.A., Marquette University, 1974

This thesis examines the issue of the feasibility of assignment of women to the DD-963 (Spruance) class destroyer. The author has gathered published information in the general topic areas of "women in the military" and "gender integration in the Navy", as well as information on the ship itself in order to form a framework for analysis. Work related standards of strength and physical ability are examined, as well as attitudinal data collected from various surveys on the subject of integration of women into ships.

The author concludes that there is a basis for support of the experimental assignment of women to the Spruance class destroyer. Although current laws and policies prohibit the assignment of female crewmembers to this ship class (on other than a temporary basis), the ship's unique characteristics (e.g., enhanced habitability, automation and modular systems), increase the feasibility of full-time service by females and nullify many of the long-standing arguments used to restrict participation by women. Further, there is evidence of a growing acceptance of the concept of "women at sea" among naval personnel, policymakers, and the general public.

With the growth in the size of the Navy's fleet to six-hundred ships and the projected decline in the available pool of eligible 17-23 year-old males through the mid-1990s, the increased demand for talented youth in both the Armed Services and the private sector leads to an examination of "non-traditional" sources for qualified accessions. Among these are women, reserves, civilians, and male conscripts. This thesis focusesonthemore effective and expanded useofwomen,mademore possib e nowbecause of technological advancement and ashiftinpublic attitudes.

Master of Science in
Management
December 1984

Advisor: M.J. Eitelberg
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OVERHEAD MANAGEMENT GUIDE FOR AEROSPACE PROCUREMENTS

Daniel D. Dietze
Lieutenant Comander, United States Navy
B.S., University of Nebraska, 1974
M.M., Aquinas College, 1980

Kenneth F. Walter
Lieutenant Commander, United States Navy
B.S., Jacksonville University, Florida, 1976

This thesis focuses on the management emphasis concerning overhead cost control. Senior personnel within the Naval Air Systems Command (NAVAIR) review a multitude of cost information. Due to the nature and complexity of these costs, it is extremely difficult to analyze and interpret cost data, and more specifically, to use these data as a basis for the management of cost control.

This study focuses on overhead costs, their impact on total costs, and an analysis of management indicators deemed most useful in controlling overhead costs. Findings of the study include: administrative indicators, variance analysis, base forecasting, comparison of dollar amounts, comparison of ratios and a new tool called Overhead Cost Analysis Package.

Master of Science in Management
December 1984

Advisor: D.V. Lamm
Department of
Administrative Sciences

PREPARATION COSTS OF STEP TWO SPECIAL PROJECT SUBMISSIONS AT NAVY PUBLIC WORKS CENTERS

Kenneth W. Dressel
Lieutenant, Civil Engineer Corps, United States Navy
BCE, Georgia Institute of Technology, 1979

This thesis compares the cost to the government of contracting out Special Project Step Two submissions versus the cost of preparing Step Two submissions with in-house government employees. Data from 80 Step Twos prepared at two Navy Public Works Centers was collected and analyzed. The results indicate conclusively that Step Two preparation by in-house employees is much less costly than contracting out Step Two preparation. In addition to the cost comparison, predictive models were developed for Step Two preparation cost, based upon certain characteristics of the Special Project for which the Step Two is being prepared. The thesis contains background information on the Naval Facilities Engineering Command, Navy Public Works Centers, the Special Project program, and the negotiated architectural and engineering contract process. Possible alternatives to the current Step Two preparation process are presented and discussed.

Master of Science in
Management
December 1984

Advisor: P.M. Carrick
W.R. Talutis
Department of
Administrative Sciences

AN ANALYSIS OF GOVERNMENT CONTRACT TERMINATIONS

James R. Duke, Jr.
Lieutenant, SC, United States Navy
B.A., University of Louisville, 1970

Thomas W. Hughes
Captain, Air Defense Artillery, United States Army
B.S., Murray State University, 1977

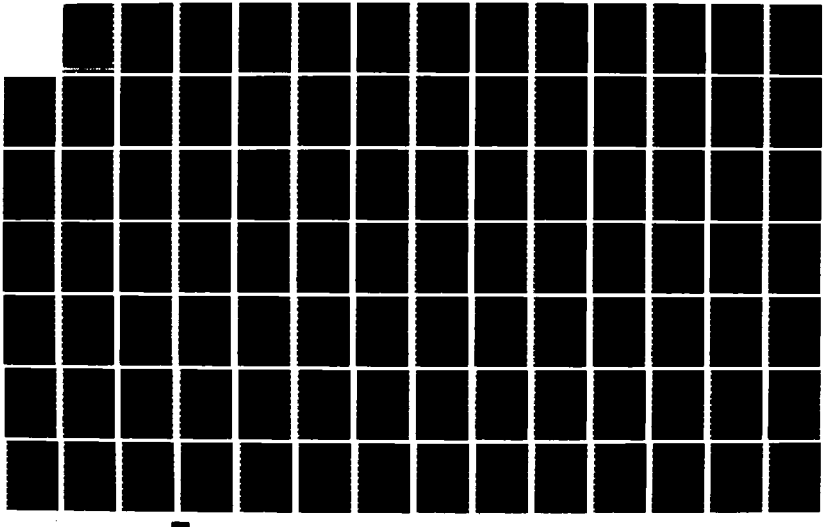
The purpose of this thesis is to investigate if the Federal Government could realize cost savings through an analysis of contracts that have been terminated. A sampling of contracts from various Federal Government agencies was gathered and divided into two categories: terminations for financial reasons and terminations for non-financial reasons. Terminations for financial reasons were analyzed with a bankruptcy prediction model, while a qualitative analysis was performed on terminations for non-financial reasons. From the bankruptcy prediction model analysis, it was apparent that the model was only somewhat useful as a predictor of termination for default. It was shown from the qualitative analysis that the Federal Government was predominantly at fault in terminations for convenience (95% of the analysis sample) and that 66% of the terminations for convenience in the sample were for reasons that the Federal Government could have controlled.

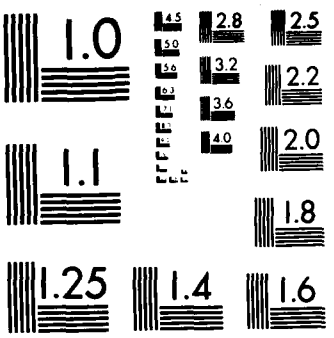
Master of Science in Management
June 1985

Advisor: S.S. Liao
Department of
Administrative Sciences

AD-A174 869 COMPILATION OF ABSTRACTS OF THESES SUBMITTED BY CANDIDATES FOR DEGREES(U) NAVAL POSTGRADUATE SCHOOL MONTEREY CA 30 SEP 86 NPS-012-86-004 4/7

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MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

AN ANALYSIS OF THE ECONOMIC IMPACT OF THE AN/APS-134 FLAR RETROFIT ON COAST GUARD HC-130 AIRCRAFT

Robert E. Dunn
Lieutenant, United States Coast Guard
B.S., Kansas State University, 1972

Concern over the growing drug smuggling problem and improved national defense capability are manifest in the need for a new forward looking airborne radar (FLAR) for Coast Guard HC-130 aircraft, with a capability of detecting a target of 1 square meter radar cross section. This thesis reexamines the analysis that selected the AN/APS-134 FLAR over other contenders based on mission need, radar performance and life cycle cost criteria. This thesis presents a better understanding of the resulting HC-130 force structure based on the impact of FLAR technology.

Master of Science in Management
December 1984

Advisor: P.M. Carrick
Department of Administrative Sciences

A PRACTICAL HEADQUARTERS BUDGET EXERCISE FOR FINANCIAL MANAGEMENT STUDENTS AT THE NAVAL POSTGRADUATE SCHOOL

Ann J. Eidson
Lieutenant, United States Navy
B.S., Illinois State University, 1974

This thesis develops a practical headquarters level budget exercise designed for students of financial management at the Naval Postgraduate School. The exercise is centered at the Navy Comptroller's (NAVCOMPT) Office of Budgets and Reports (OBR or NCB). It is designed to familiarize the financial management student with the structure of the NAVCOMPT organization and the procedures followed in preparation of the annual Navy budget package for submission to the Secretary of Defense (SECDEF). This is accomplished through active participation in a gaming simulation. Student work involves familiarization with an organizational budget submission, preparation of paperwork for NAVCOMPT budget analyst hearings, and role-playing a formal NCB review. Results of an application of this exercise to a class of financial management students are included and future use of the exercise is discussed.

Master of Science in Management
December 1984

Advisor: F.E. Royer
P. Bromiley
Department of Administrative Sciences

CASH MANAGEMENT IN THE UNITED STATES MARINE CORPS

Jon W. Farmer
Major, United States Marine Corps
B.S., Texas A&M University, 1970

For most of the history of this country, cash management within the Federal government consisted primarily of accounting for receipts and expenditures. With the significant increase in Federal spending in the last few decades, a need for tighter controls and greater effectiveness in financial management policies has developed. In the late 1970's, the Treasury Department, supported by the Office of Management and Budget, endeavored to improve cash management within the Federal sector. The result was a myriad of directives and circulars requiring agencies to tighten the control and expedite the processing of Federal receipts and expenditures.

The purpose of this thesis is twofold. First, to provide a general overview of current Department of the Treasury requirements and the current status of Marine Corps efforts in implementing policy to satisfy those requirements. And second, it will bring under one cover, the historical background, directive literary references, current requirements, and current Marine Corps policy for use as an all-encompassing reference for future Marine Corps graduates in Financial Management.

Master of Science in
Management
December 1984

Advisor: J.G. San Miguel
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USING INCENTIVES TO IMPROVE MAINTAINABILITY

Laurence Farmen, Jr.
Captain, United States Marine Corps
B.A., Texas Christian University, 1974

The objective of this study is to determine if contract incentives are appropriate for use in Department of Defense contracts for the purpose of motivating defense contractors to improve the maintainability of weapon systems under design. To accomplish the objective it was necessary to review the components of maintainability to determine appropriate targets for the incentives and to study the concepts and issues involved in the use of incentives to motivate contractor performance. The conclusions were based in part on the responses obtained during interviews conducted with Government representatives and engineering, contracting, and corporate and program management personnel from the defense industry. In addition, the incentive program in the case of the F/A-18 aircraft was reviewed and analyzed to determine the reason for its success. The study concluded that incentives were appropriate for use in maintainability improvement and that in structuring the incentive program the award fee method of contracting was the most suitable.

Master of Science in Management
December 1984

Advisor: D.V. Lamm
Department of
Administrative Sciences

EXCELLENCE IN TACTICAL FIGHTER SQUADRONS

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B.S., Purdue University, 1976
M.A., Webster College, 1979

The purpose of this research is to identify the attributes of excellence in tactical fighter squadrons and how that excellence is achieved. The research question was: do the top performing tactical fighter squadrons share common attributes of excellence? If so, what are those attributes?

The research followed a two part qualitative methodology. Part I consisted of interviews with 51 general officers and colonels currently assigned to key leadership positions in Tactical Air Command. Each officer was asked for his definition of an excellent tactical fighter squadron, and to identify squadrons he considers to be excellent. The research indicates the TAC's senior officers have a clear consistent vision of excellence, which goes beyond the quantitative monthly statistics. The senior officers, in defining excellence, also focus on a range of qualitative issues. Chapters II to V, "The Excellence Criteria" focuses on these issues.

All senior officers agreed that the level of performance among all squadrons in TAC is extremely high, nevertheless, there are some squadrons which are clearly outperforming the others. Based on their nominations, seven excellent squadrons were identified. Four were visited and a cross section of their personnel interviewed. This research identified certain common attributes among these four excellent squadrons. These are summarized in Chapters VII to XII, "The Story of Excellence."

Findings indicate that some items of a non-quantifiable nature are extremely important in recognizing, achieving and maintaining excellence in the tactical fighter environment.

Master of Science in
Management
June 1985

Advisor: R.T. Harris
Department of
Administrative Sciences

REVIEW AND EVALUATION OF PLANS TO INCORPORATE NAVSTAR GLOBAL POSITIONING SYSTEM USER EQUIPMENT ON MILITARY SEALIFT COMMAND SHIPS

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Lieutenant Commander, United States Navy
B.S., Ohio State University, 1971

The NAVSTAR Global Positioning System (GPS) is a space-based navigation system scheduled to be fully operational by 1990. GPS User Equipment (UE) is scheduled for installation on Navy ships commencing 1987. This thesis examines plans to incorporate GPS UE on Military Sealift Command (MSC) ships. The Naval Fleet Auxiliary Force and Special Mission Support ships have been funded and scheduled for military GPS UE. Plans for Strategic Sealift and Miscellaneous Service Support ships have not yet been made. Alternatives for equipping these ships with either commercial or military GPS UE are examined. Primary recommendations for MSC ships when GPS is operational with two-dimensional coverage (by the end of 1987) are:

(1) equip Strategic Sealift ships with military GPS UE,

(2) include GPS navigation equipment in ship enhancement programs, and,

(3) require GPS UE in MSC time and voyage charters.

Master of Science in Management
December 1984

Advisor: W.H. Cullin
Department of Administrative Sciences

AN ORGANIZATIONAL DEVELOPMENT HANDBOOK

Deborah A. Gallo
Lieutenant, United States Navy
B.S., Southern Connecticut State College, 1976

This thesis is a compendium of some of the theories, models, and tools of Organizational Development (OD) and serves as a guide for the author. It represents the current state in the author's quest to apply these theories to the Navy's environment and operational commitments.

The OD Handbook starts with a definition and purpose of OD. A list of consultant competencies and behaviors are then generated along with marketing techniques and consultant ethics. Diagnostic models to assist in analysis of the organization are presented. "Consultant Tools" are discussed in terms of transition workshop, hints on data gathering and feedback, strategic planning packages, guidance on contracting, and the stages of group development.

Master of Science in
Management
September 1985

Advisor: R.A. McGonigal
Department of
Administrative Sciences

INTERNATIONAL STUDENTS' PERCEPTIONS OF THE NAVAL POSTGRADUATE SCHOOL

Jose Pedro Pereira Goncalves
Lieutenant Colonel, Portuguese Air Force
B.S., Portuguese Military Academy, 1966

International students' perceptions of the Naval Postgraduate School (NPS) were ascertained by a survey conducted among current and former international students. A statistical analysis was conducted to evaluate the responses and to try to find those variables which "best" explain academic satisfaction and general satisfaction with NPS. A majority of the survey population are (were) satisfied with their stay at NPS and feel (felt) that their careers are going to be positively affected by their stay here. Significant departures from the general models were noted when analyzed separately by service, rank, field of service, and geographic region.

Master of Science in Management
December 1984

Advisor: R.A. McGonigal
Department of
Administrative Sciences

MANAGEMENT CONTROL OF AVIATION FLEET MAINTENANCE FUNDS IN A STOCK FUND ENVIRONMENT

Richard J. Gough
Captain, United States Marine Corps
B.A., Michigan State University, 1975
M.A., Pepperdine University, 1980

The purpose of this study is to evaluate the existing Aviation Fleet Maintenance (AFM) funds control system utilized by the aviation Type Commanders and to assess impact of the stock funding of aviation depot level repairables (AV-DLRs) on this system. This is accomplished in three phases: (1) a literature search of management control theory, from which a set of management control principles are distilled; (2) employment of a case study approach designed to contrast field study findings to these principles; and (3) submission of findings, conclusions, and recommendations.

This study concludes that the existing AFM funds control system lacks the fundamental control principles which are necessary to facilitate efficient funds expenditure in a stock fund environment. It is suggested that the absence of a management control system will result in suboptimal AFM funds expenditure and a reduction in aircraft readiness. The adoption of a comprehensive management control system is proposed.

Master of Science in
Management
December 1984

Advisors: S.L. Ansari
F.E. Royer
Department of
Administrative Sciences

A MODEL FOR EVALUATING VENDOR BIDS FOR STOCK REPLENISHMENT OF AN ITEM

Richard D. Gray
Lieutenant Commander, SC, United States Navy
B.A., University of Massachusetts, 1974

The Ships Parts Control Center (SPCC) Uniform Inventory Control Program (UICP) wholesale replenishment model for 1H cognizance symbol (consumable) material is an order quantity-reorder level or (Q,r) model. A stocked item's order quantity and reorder level are established in large part by the unit price and procurement lead time forecasted for it. When a replenishment is needed, the order quantity is specified and the procurement officer requests bids from vendors. These bids include both a unit price and an estimate of production lead time. The thesis examimes the impact of differences between the forecasted and actual values for lead time and price on the optimum total annual cost of stocking the item as computed by the UICP model. A modification of the model for comparison of the total annual cost associated with the lead time and price combination of each vendor bid is developed. Some expected effects of implementing the model are discussed and areas requiring further research are identified.

Master of Science in Management
December 1984

Advisor: A.W. McMasters
Department of
Administrative Sciences

STANDARIZATION OF MANAGEMENT CONTROL/FINANCIAL MANAGEMENT SYSTEMS UTILIZED FOR THE O&M, NR APPROPRIATION

Terry M. Grieninger
Lieutenant Commander, United States Naval Reserve
B.S., Embry-Riddle University, 1972

Rhonda J. Shaffer
Lieutenant, United States Naval Reserve
B.B.A., New Mexico State University, 1977

This thesis provides an overview of the management control and financial management systems currently utilized within the Naval Reserve Claimancy for management of the Operation and Maintenance, Naval Reserve (O&M,NR) Appropriation. An analysis of these systems and identification of control and performance weaknesses resulting from their utilization provides the basis for development of a standardized financial management system. The standardized financial management system developed by the authors is detailed in the enclosed handbook for use by operating budget holders and OPTAR holders in the Naval Reserve Claimancy.

Master of Science in
Management
June 1985

Advisors: F.E. Royer
K.J. Euske
Department of
Administrative Sciences

DOCUMENTATION AND EVALUATION OF DEPOT MAINTENANCE COST SYSTEM CODING AND REPORTING BY DEPARTMENT OF DEFENSE DEPOTS

Harry S. Guess, Jr.
Lieutenant Commander, SC, United States Navy
B.A., Vanderbilt University, 1972

The purpose of this research project is to document and examine the coding processes used by depots in accumulating cost data reported to the Office of the Assistant Secretary of Defense for Manpower, Installations, and Logistics (OASD,MI&L).

The analysis in this study is based on information obtained from on-site visits to the Sacramento Air Logistics Center, Sacramento, California, and the Naval Air Rework Facility, North Island, San Diego, California.

The results of this study indicate that the coding processes used by both depots generate data variations and biases in the OASD (MI&L) Depot Maintenance Cost System. In addition, the study revealed that variations do not occur on a consistent basis and therefore, methods need to be developed to identify and segregate the effects of different coding processes used by depots.

Master of Science in Management
December 1984

Advisors: S.L. Ansari
K.J. Euske
Department of Administrative Sciences

ANALYSIS OF SOVIET MILITARY MANPOWER

Cem Gurdeniz
Lt.Jg, Turkish Navy
B.S., Turkish Naval Academy, 1979

The effectiveness of any military force can be determined by the capabilities and reliability of its individual members. This has always been the primary concern for military strategists and decisions makers. Prediction of human performance is still a problem for the administrative science area as well as the military manpower area. Having such a large armed forces unit, the Soviet Union confronts manpower problems which can affect overall military effectiveness. This thesis investigates the qualitative and quantitative problems of Soviet military manpower. It looks at Soviet demography, manpower availability, ethnic issues, training and education. It also attempts to appraise the performance of the Soviet soldier.

Master of Science in
Management
December 1984

Advisor: D.C. Daniel
Department of
National Security Affairs

INCIDENCES OF THE RESTRICTION OF THE BUREAUCRATIC EXPENSE IN THE VENEZUELAN PUBLIC SECTOR (A CONCRETE CASE-- THE VENEZUELAN AIR FORCE)

Pedro Gutierrez
Colonel, Venezuelan Air Force
B.S., School of Military Aviation, 1978

During the past 30 years, the Venezuelan Air Force has evolved into a very professional, well trained and highly educated organization. The Air Force is not only responsible for the maintenance of a sophisticated arms system, but also for the maintenance and operation of an efficient peace force. As a result of the Bolivar's devaluation this year, the Venezuelan Air Force must now continue to maintain its high performance standards in the face of budget cuts.

The aim of this thesis is to present an analysis of how economic measures taken by the government have produced cutbacks of both professional and technical civilian personnel in the Venezuelan Air Force. The thesis presents possible solutions of an institutional nature which would allow this organization to meet its objectives.

It is first necessary to present an overall understanding of the Venezuelan State's economic and social situation, its administration apparatus, administrative reforms and their interrelationship with the policies, standards and laws that are necessary for the achievement of those objectives.

Master of Science in Management
December 1984

Advisor: R.A. McGonigal
Department of Administrative Sciences

PERSONALITY CHARACTERISTICS OF EFFECTIVE ORGANIZATIONAL EFFECTIVENESS CONSULTANTS IN THE U.S. NAVY

William S. Hackett
Lieutenant Commander, United States Navy
B.S., Auburn University, 1973

John F. McInerney
Captain, United States Army
B.S., DePaul University, 1976

This study examines the relationship between personality variables and the effectiveness of U.S. Navy Organizational Effectiveness (OE) consultants. The hypothesis of the study is that personality characteristics of effective OE consultants differ significantly from those of less effective consultants. The corollary hypothesis is that consultant knowledge is a factor contributing to consultant effectiveness.

The sample, which consists of 102 U.S. Navy OE consultants from five CONUS based OE Centers, was administered four personality instruments to measure personality variables and a knowledge test. Additionally, a superior and peer rating instrument were administered to measure effectiveness. The research includes a statistical analysis of the data. The consultants are divided into top, middle, and bottom sections based on a combined superior-peer ratings score. T-Tests are conducted on the top and bottom groups to determine the extent to which these groups differ in regard to personality characteristics.

Master of Science in Management
December 1984

Advisor: E. Hamilton
Department of Administrative Science

A STUDY FOR DEVELOPMENT AND MANAGEMENT OF A MAINTENANCE MANAGEMENT INFORMATION SYSTEM FOR NAVY AIR LAUNCHED MISSILES

Richard B. Hancock
Pacific Missile Test Center
B.A., Laverne University, 1976

This thesis examines the maintenance information system for the Navy's air launched missiles, draws conclusions and makes recommendations on how a new information system should be developed and managed to enhance the capability of the Naval Air Systems Command to manage and support the maintenance of air-launched missiles.

Master of Science in Management
June 1985

Advisor: J.W. Creighton
Department of
Administrative Sciences

AN ANALYSIS OF YOUTH LABOR FORCE TRANSITION PROBABILITIES

Douglas W. Harris
Lieutenant, United States Navy
B.A., University of New Mexico, 1978

Much of the enlisted supply research to date focuses on the transition of individuals from high school to the military. Little is known of those who have chosen other options, such as further education, employment, or to remain out of the labor force completely. With the decline of the 17-21 year old male population, research must be directed towards the entire labor market. This research uses data from the National Longitudinal Survey of Youth to estimate the transition probabilities among seven possible states for individuals aged 17-22. The states are high school, college, active service, employment full time, employment part time, unemployment, and out of the labor force. Tests are made to determine if the transition probabilities are stable across and independent of time. It was found that the system was generally stable across time but was not independent of age and labor force history.

Master of Science in Management
December 1984

Advisor: G.W. Thomas
Department of Administrative Sciences

AN INVENTORY MODEL FOR THE PAKISTAN NAVAL STORE DEPOT

Ahmad Hayat
Commander, Pakistan Navy
B.S., Pakistan Naval Academy, 1969
M.B.A., Golden Gate University, 1985

The complications involved in maintaining at least five diverse inventories from five different countries is a gigantic task for the Pakistan Navy. This task can be considerably eased by the introduction of a forward looking and a scientific inventory management approach to systemize the Pakistan Navy's inventory management requirements. This thesis offers a simplified version of the consumable inventory model used by the United States Navy inventory system with modifications to make it appropriate for the Naval Stores Depot of the Pakistan Navy. Emphasis has been placed on minimizing the sum of the average annual costs of ordering, carrying and shortages. The procedures for determining the optimal order size and reorder point for an item are provided, along with the steps for implementing the model.

Master of Science in
Management
June 1985

Advisors: A.W. McMasters
Department of
Administrative Sciences

FACTORS INFLUENCING THE CAREER ORIENTATION OF JUNIOR OFFICERS IN THE UNITED STATES ARMY

Lewell P. Hayden
Major, United States Army
B.A., Augusta College, 1977

This thesis investigates the factors influencing the occupational decisions of junior Army officers in the combat, combat support, and combat service support occupational groups.

Cross tabulation, multiple regression, and discriminant analysis are utilized to examine the potential motivational factors involved in making career decisions. Comparisons of military and civilian job attributes and satisfaction with military life are found to be important variables affecting the career decisions of junior officers. This study should provide personnel managers and policy makers with a better understanding of those factors which influence the career decisions of junior officers within and among occupational groups.

Master of Science in Management
March 1985

Advisor: G.W. Thomas
Department of Administrative Sciences

THE MARINE CORPS WEST COAST COMMISSARY COMPLEX: AN EX POST EVALUATION

Daniel S. Hemphill
Major, United States Marine Corps

The Marine Corps West Coast Commissary Complex was established in 1979 in response to Congressional and Department of Defense pressures to improve the efficiency of commissaries in all military services. The Complex consolidated the functions of personnel management, procurement, accounting, and distribution of non-perishable goods in support of six previously independent stores, and incorporates a system of automated communication and data processing.

This study evaluates the advantages of consolidation, which include economies of scale, enhanced management, and improved inventory and cash flow management and customer service. The performance of the Complex is compared with other military commissary systems and with commercial food retailers, and suggestions made for further improvements in commissary operations.

Master of Science in Management
June 1985

Advisor: P.M. Carrick
Department of
Administrative Sciences

MARITIME OPTIONS FOR THE FUTURE--THE MEANS TO REVITALIZE THE U.S. MERCHANT MARINE

Ronald C. Hessdoerfer
Lieutenant Commander, United States Navy
B.A., Miami University, 1972

This study examines current options facing legislators and policy makers who make decisions regarding the United States merchant marine and its related industrial support base, the shipbuilding industry. Included is a brief history of the merchant marine and the effects of past legislation, leading to the current environment faced by the members of the maritime industries. A brief review of the current government programs in the area of strategic sealift is addressed as well. The analysis includes the opinions and impressions of various representatives of the maritime industry, shipbuilders and ship operators, as well as government officials. This study culminates with a discussion of the current options being addressed in Congress. Conclusions and recommendations are drawn based on the author's findings and opinions.

Master of Science in Management
December 1984

Advisor: D.C. Boger
Department of Administrative Sciences

THE SKIPPER FACTOR: ANALYSIS OF THE COMMANDING OFFICER'S IMPACT ON SHIPBOARD REENLISTMENT RATES

Ronald E. Hewett
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1971

A logistic function was used to generate probabilities of reenlistment among sailors who were assigned to 17 San Diego based fast frigates from FY77 through FY83. These probabilities were compared to reenlistment behavior and the means of their residuals plotted on time lines. The graphs were then mapped against commanding officer tenures to determine if there was any correlation between the arrival of a new commanding officer and subsequent retention aboard that vessel.

The plots indicated that some commanding officers may precipitate an actual 40 percent increase or decrease in retention rates adjusted for various factors. To obtain a 40 percent increase in reenlistment rates with monetary incentives, a pay raise of 20 percent would be required. The use of reenlistment rates as an indicator of a commands retention ability was determined to be valid 85 percent of the time.

Master of Science in Management
December 1984

Advisor: P.J. Hoffman
Department of Administrative Sciences

CONDUCTING INTEGRATED LOGISTICS OVERHAULS FOR PHASED MAINTENANCE SHIPS HOMEPORTED IN THE WESTERN PACIFIC WITH EMPHASIS ON THE USS STERETT

Dennis W. Hillegas
Lieutenant, SC, United States Navy
B.S., United States Naval Academy, 1976

This thesis addresses the problem of conducting highly compressed Integrated Logistics Overhauls (ILOs) during four month docking selected restricted availabilities for phased maintenance program ships homeported in the Western Pacific Ocean. Current ILO policies and procedures are discussed as well as the Western Pacific ILO site capabilities and plans for the USS Sterett ILO scheduled to commence in September 1985. The salient issues surrounding the ability of Western Pacific ILO sites to accomplish highly compressed ILOs are analyzed and evaluated. Specific recommendations are provided to improve the effectiveness of the USS Sterett ILO and the capabilities of the Western Pacific sites to provide ILOs to phased maintenance program ships.

Master of Science in Management
December 1984

Advisor: A.W. McMasters
Department of Administrative Sciences

CAPITAL INVESTMENT MOTIVATIONAL TECHNIQUES USED BY PRIME CONTRACTORS ON SUBCONTRACTORS

Keith S. Holtsclaw
Lieutenant, United States Navy
B.S., University of Maryland, 1975

The current Acquisition Improvement Program (AIP) has focused a great deal of attention on many of the perceived management problems in the federal acquisition process. Included among these are the motivation of contractors to make productivity enhancing capital investments. Although this problem has been addressed previously by profit policy, the effect has been minimal. Most efforts have been directed at the prime contractor level with little effect to date. This research examines the complex array of factors which result in productivity enhancing capital investment and raises the question of what has been accomplished at the subcontractor level.

The research, through the use of a subcontractor survey, determined that little if any effort was expended at the prime contractor level to motivate subcontractors to invest in productivity enhancing capital equipment. Until recently, subcontractors have been excluded from DoD efforts to incentivize capital investment.

Master of Science in Management
December 1984

Advisor: D.W. Lamm
Department of Administrative Sciences

THE EFFECT OF PCS POLICY CHANGES ON SURFACE WARFARE OFFICER CAREER DEVELOPMENT

Robert H. Howe
Lieutenant Commander, U.S. Navy
B.S., U.S. Naval Academy, 1972

This study conducted a critical review of professional development requirements in the Surface Warfare Community to maximize the use of increasingly scarce permanent change of station (PCS) funds. Seven network representations of career pathways were constructed to encapsulate the career paths Surface Warfare Officers (SWOs) actually pursue. Four focal points of professional development were determined to provide the basis for these pathways. These four are the major command tour, the commander command tour, the executive officer tour and the department head tour. Naval Officer Billet File data and information from the Naval Military Personnel Command's Officer Manning Plan model were used to determine the geographic locations and respective numbers of SWO billets. Officer Longitudinal Master File data were used to determine historical tour lengths of Surface Warfare Officers. Analyses were conducted for key developmental tours and for the type of tour assignment (sea or shore, and geographic location). The interrelationships between tour length, billet opportunity and selectivity are discussed. The above considered, two additional career pathways were developed which improve the efficiency of the SWO career path and potentially save PCS funds.

Master of Science in Management
December 1984

Advisor: P.R. Milch
Department of Administrative Sciences

METHODOLOGY FOR THE CONDUCT OF A SEISMIC RISK MITIGATION STUDY

Mark D. Huntzinger
Lieutenant, Civil Engineer Corps, United States Navy
B.S., New Jersey Institute of Technology, 1976

The author presents a methodology for evaluating the seismic vulnerability of a bases facilities. The methodology starts with the determination of the "mission important" facilities to a base, the foundation of which is the importance of the missions they house. The results of which are used to determine the facilities that should be studied for their seismic vulnerability under contracts administered by Naval Facilities Engineering Command Engineering Field Divisions. The methodology presents alternatives for evaluating the results of the engineering and seismic studies, culminating in a rank ordering of the seismic upgrading projects developed by these studies.

Master of Science in Management
June 1985

Advisor: P.M. Carrick
Department of
Administrative Sciences

USE OF A BINARY CHOICE MODEL TO DETERMINE MARINE OFFICER ATTRITION

Stephen F. Hurst
Lieutenant Colonel, United States Marine Corps
B.B.A., Wichita State University, 1969

Thomas E. Manion
Captain, United States Marine Corps
B.S., Widner University, 1977

The ability to predict Marine officer attrition continues to be a significant obstacle to accurate manpower planning at Headquarters Marine Corps. This paper expands on a previous study which used unemployment in a linear regression model to predict attrition. Through the use of a binary choice model, this study incorporates a number of additional variables, principal of which is a performance index score to measure promotion potential. The logit function was employed to evaluate the inherent causal relationships and to further define the ability of statistical analysis techniques to predict officer attrition.

Master of Science in Management
June 1985

Advisor: D.C. Boger
Department of Administrative Sciences

DEVELOPMENT OF THE MARINE CORPS LOGISTICS BASE ALBANY REPLENISHMENT SPARE PARTS BREAKOUT PROGRAM

William F. Johnson
Captain, United States Marine Corps
B.S., University of Arizona, 1975

This study was undertaken to determine DoD and Marine Corps objectives and requirements for replenishment spare parts breakout, analyze current directives and procedures, and prescribe a comprehensive approach for implementing an effective replenishment spare parts breakout program at Marine Corps Logistics Base (MCLB) Albany, Georgia.

During the course of this study it was found that (1) the DAR Supp.6 DoD Replenishment Spare Parts Breakout Program is focused on actions during replenishment while effective breakout is dependent on actions early in the systems acquisition process; (2) DAR Supp. 6 does not provide guidance for acquisition personnel whose actions are crucial to effective breakout; (3) the DAR Supp. 6 breakout process sufficiently captures the factors in the breakout decision but is too complex, and is inefficient for day-to-day use by breakout technicians.

The major contribution of this study was the prescription of an effective replenishment spare parts breakout program for MCLB Albany, Georgia.

Master of Science in Management
December 1984

Advisor: D.V. Lamm
Department of
Administrative Sciences

A SYSTEMS ENGINEERING METHODOLOGY FOR THE ADVANCED TACTICAL AIRCRAFT

Stephen J. Kapurch
B.S., Mechanical Engineering, Worcester Polytechnic Institute, Worcester, MA, 1979

The increasing specialization of the aerospace industry coupled with the technical complexity of new systems has caused emphasis to be placed on a systematic and logical methodology to design, develop, and produce new products. A systems engineering model to integrate functional management areas with organizational activities in the Advanced Tactical Aircraft program is presented. Special emphasis is placed on applying this systems approach throughout the life cycle of a project. A general methodology and synopsis of principles are provided which might be utilized in the development of a systems engineering program.

Master of Science in Management
September 1985

Advisor: J.W. Creighton
Department of Administrative Sciences

A PROPOSAL OF LOGISTICS DEVELOPMENT FOR THE REPUBLIC OF KOREA ARMY

Kim, Tae Kyo
Major, Republic of Korea Army
B.S., Korea Military Academy, 1976

Kim, Young Hoo
Major, Republic of Korea Army
B.S., Korea Military Academy, 1975
M.B.A., University of Korea, 1979

The main objective of this research is to propose some directions concerning logistic development for the Republic of Korea Army (ROKA). In particular, it concerns modern concepts such as integrated logistics support (ILS). Traditionally, Korean logistics has been treated as secondary. But, in the current situation, attention must be placed on logistics.

This thesis introduces historical and geographical circumstances of the Korean peninsula and appraises military problems, especially logistics. It compares South and North Korea's military powers and then analyzes the relationship between ROK and US. It proceeds with setting the concept of modern military logistics and explaining some ILS aspects concretely. It gives insights into logistics in the system life cycle, including approaches to the cost-side as well as to effectiveness. For the decision-maker, the life-cycle cost (LCC) model should be considered during the acquisition cycle to assure proper logistics development.

Master of Science in Management
December 1984

Advisor: M.G. Sovereign
Department of
Administrative Sciences

COMPARISON OF THE METRIC AND HEURISTIC N.P.S. INVENTORY MODELS

Ko, Kyung Yoon
Major, Korea Air Force
B.S., Korean Air Force Academy, 1977

Because of the desire to improve operational readiness and to simultaneously reduce support costs, there is a great deal of interest in the military services in implementing multi-echelon models for determination of adequate but economical stocking levels for spare parts. Two models presently used--METRIC and MOD-METRIC--are inefficient and require excessive time for computation. In an attempt to save these deficiencies a heuristic model was developed at the Naval Postgraduate School. The main purpose of this thesis is to compare the characteristics and performance of the simple heuristic model with the METRIC solution.

Comparisons with METRIC revealed that the heuristic model was much more efficient computationally, but the solution was frequently far inferior to that obtained by METRIC. The comparison indicates strongly that base (Shipboard) stock levels as determined by existing allowance models are larger than are needed in an integrated system.

Master of Science in Management
June 1985

Advisor: F.R. Richards
Department of Operations Research

A JOB SURVEY OF THE MANPOWER, PERSONNEL AND TRAINING ANALYSIS COMMUNITY IN RELATION TO THE NAVAL POSTGRADUATE SCHOOL CURRICULUM

Dixie E. Kopfler
Lieutenant Commander, United States Navy
B.A., Mary Washington College of the University of Virginia, 1967

Leda B. Wingast
Lieutenant Commander, United States Navy
B.A., San Diego State College, 1971
M.S., University of Southern California, 1972

The role of the Manpower, Personnel and Training Analysis (MPTA) subspecialist is becoming increasingly more important in the Navy, although not all MPTA billets are filled by subspecialists. This study surveyed both designated and non-designated subspecialist incumbents of MPTA billets by means of a questionnaire to ascertain whether the Naval Postgraduate School MPTA curriculum prepares its graduates adequately for the wide spectrum of manpower billets. The study considered specific areas of work, skills required to perform satisfactorily in the billets, the relationship of the Educational Skill Reguirements of the NPS curriculum to the billet work requirements, and the perceived usefulness of required curriculum courses to billet incumbents. The key attitudinal response to the questionnaire was a need for specificity of institutional knowledge. Recommendations for course and curriculum content are offered as a result of the study.

Master of Science in Management
June 1985

Advisor: R.A. Weitzman
Department of
Administrative Sciences

AN ANALYSIS OF INTERNATIONAL AIR FREIGHT FORWARDING SUPPORT FOR THE UNITED STATES NAVY

Robert H. Lake, Jr.
Lieutenant, United States Navy
B.S., Towson State University, 1976

The Navy Material Transportation Office (NAVMTO) is the Airlift Clearance Authority (ACA) for the Navy and, as such, is responsible for the movement of Navy material by air. This study reviews the air freight industry and analyzes the use by the Navy of commercial international air freight forwarders in the shipment of material to overseas and deployed units to see if there could be better utilization. The author used Burlington-Northern International Air Freight, Inc. as a representative of the industry. The author's conclusion is that commercial international air freight forwarders could be better utilized by the Navy.

Master of Science in Management
June 1985

Advisor: D.C. Boger
Department of Administrative Sciences

DOCUMENTATION AND ANALYSIS OF THE "MISCELLANEOUS" ACCOUNT CATEGORY WITHIN THE DOD INSTRUCTION 7220.29-H DEPOT LEVEL MAINTENANCE COST ACCOUNTING SYSTEM

Steven E. Lehr
Lieutenant, United States Navy
B.S., University of South Florida, 1977

The purpose of this research is to examine and document the reasons why more than 40 percent of the fiscal year 1983 depot level repair costs have not been identified with a specific weapon or support system.

The analysis in this study is based on a random stratified sample of 5,082 records with the Weapon or Support System Codes 997, 998, and 999. These data records were submitted by the services to OASD (MI&L)MD for work done in fiscal year 1983.

The results of this study suggest that while there may be problems with the interpretation of the guidance provided by DoD Instruction 7220.29-H, a viable system exists which could resolve these same interpretation problems and require less work on the part of the Services.

Master of Science in Management
December 1984

Advisors: K.J. Euske
S.L. Ansari
Department of Administrative Sciences

COST ESTIMATING METHODS UTILIZED BY THE DEFENSE AEROSPACE INDUSTRY IN THE PRODUCTION OF TECHNICAL DATA

Joseph W. Lemire, Jr.
Lieutenant, United States Navy
B.B.A, University of Massachusetts, 1974

A great deal of attention is currently being focused on the Government's purchase of technical data for competitive reprocurement. Both legislative and regulatory initiatives require contractors to price data and make it available for Government purchase. This research examines the methods used by defense aerospace contractors to estimate the cost of producing their technical data.

The study, through the use of personal interviews, determined that defense aerospace contractors principally employ analog and engineering estimating methods. Parametric methods are used only for estimating the production cost of technical manuals, and as "reasonableness checks" for estimates developed by either analog or engineering means.

Master of Science in Management
June 1985

Advisor: D.V. Lamm
Department of Administrative Sciences

A COMPARISON OF THE SHIP SYSTEM ACQUISITION PROCESS
OF THE GREEK NAVY AND THE U.S. NAVY

Petros F. Lemonidis
Lieutenant Commander, Hellenic Navy
B.S., Naval Academy of Greece, 1972
B.S., University of Athens, 1976

The above thesis is an attempt to improve the existing policy and procedures for acquiring major weapon systems by the Greek Navy.

This thesis focuses on existing procedures in the U.S. Navy and similar policies followed by the Greek Navy. In compiling this study, the author attempts to include an analysis of the constraints faced by the Greek Navy, such as the lack of an adequate industrial base to construct major weapon systems, although the necessary scientific personnel are available.

The entire policy/plan is based on a comparison between the two examined procedures, noting their similarities and differences.

Master of Science in
Management
December 1984

Advisor: J.E. Ferris
Department of
Administrative Sciences

A MODEL OF CAREER ORIENTATION FOR MILITARY NURSE CORPS OFFICERS

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B.S.N., Loyola University, 1967
M.S.N., University of Illinois, 1973

The purpose of this thesis is to investigate whether the perception of alternative job factors affected the career orientation of military Nurse Corps officers in both their initial and non-initial period of service obligation. The sample was selected from the 1978 Department of Defense Survey of Officer and Enlisted Personnel conducted by the Rand Corporation. Nurses were divided into career orientation groups according to years of service intended. The groups were homogeneous with respect to demographic and current job characteristics. Stepwise discriminant analyses were performed to select the set of alternative job attributes which best discriminated between each career orientation group. Discriminant analyses were also performed on each individual alternative job attribute to determine the single best discriminator. Knowledge of the perception of alternative job factors will provide manpower planners with useful information to evaluate the effect of personnel policies on the stay/leave decision of junior Nurse Corps officers.

Master of Science in Management
December 1984

Advisor: G.W. Thomas
Department of
Administrative Sciences

MANAGEMENT CONTROL OF AIRCRAFT MAINTENANCE IN THE INDONESIAN AIR FORCE'S LOGISTICS SYSTEM

Mukhtar E. Lubis
First Lieutenant, Indonesian Air Force
B.S., Indonesian Air Force Academy, 1977

Parallel with the development of National Defense and Security (in the third of the Five-Year Development Plans), the TNI-AU (Indonesian Air Force) purchased many types of aircraft weapon systems. To maintain these new aircraft, the Indonesian Air Force faces several problems which have not yet been solved.

This thesis analyzes the aircraft maintenance logistics system. The first part of the thesis concentrates on the factors which cause the problems. The second part consists of proposals to standardize maintenance procedures for all types of aircraft and the third part is a proposal to automate the inventory control system.

Master of Science in Management
March 1985

Advisor: D.C. Boger
Department of Administrative Sciences

HUMAN RESOURCE ACCOUNTING

Joaquim C. Martins
Commander, Portuguese Navy
B.S., Portuguese Naval Academy, 1965

Human Resource Accounting means accounting for people as an organizational asset. It is the measurement of the cost and value of people to the organization.

In the Portuguese Navy, budgets are roughly 60% devoted to manpower and 40% to material. The Navy onboard strength is about 15,000 men, 12,000 sailors and 3,000 marines.

The manpower policy is conducted by the Personnel Department with several branches, one for officers, another for petty-officers and seamen, and yet some others like Training, Welfare and Health Support branches.

The Navy as an organization is personnel intensive and the Navy management has been increasingly aware of the significance of manpower policies and their corresponding costs.

The goal of this thesis is to help the Portuguese Navy in formulating a formal and coherent approach to its human resource accounting, and in so doing, allow its management to realize the extent of loss and damage that can hurt the organization if the human resource assets are not addressed.

This thesis concludes with a tentative application of the normative economic valuation model to a sector of the Portuguese Navy.

Master of Science in Management
December 1984

Advisor: R.A. McGonigal
Department of
Administrative Sciences

THE HUMAN RESOURCE MANAGEMENT INFORMATION NETWORK (HRMIN): A COST COMPARISON IN ACCORDANCE WITH OFFICE OF MANAGEMENT AND BUDGET (OMB) CIRCULAR NO. A-76, OF 5 APRIL 1979

Gary M. Matyas
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B.S., North Carolina State University at Raleigh, 1973
M.S., University of Southern California, 1980

The Human Resource Management Information Network (HRMIN) was conceived and developed "in-house" by the Navy Military Personnel Command (NMPC) and the Navy Personnel Research and Development Center (NPRDC). This report is an attempt to ascertain the compliance of this in-house development with the Office of Management and Budget policy on the acquisition of commercial or industrial products and services needed by the government. A cost comparison of the in-house performance cost and the contract-out cost of providing the services required of HRMIN indicate that the present in-house performance is tne most cost effective alternative. Therefore, conversion to a contracted-out performance should not be undertaken.

Master of Science in Management
December 1984

Advisor: N.R. Lyons
Department of
Administrative Sciences

MAJOR CURRENT ISSUES IMPACTING GOVERNMENT CONTRACTING AND ACQUISITION

Chris R. McKelvey
Lieutenant, SC, United States Navy
B.S., University of Idaho, 1976

The main objective of this research was to assemble and review those issues currently affecting the acquisition process in Federal Government, with emphasis on the Department of Defense. The individual topics discussed are: The Acquisition Process, Competition in Acquisition, The Federal Acquisition Regulation, and the Weapon System Warranty. In addition, a chapter is dedicated to conclusions and recommendations regarding the selected issues. A formated Appendix is provided for inclusion into the Manual of Acquisition Topics, September 1983 edition, compiled by the Naval Postgraduate School, Monterey, California. The Appendix will add the topics discussed in this research to this most useful publication, bringing it up-to-date with current acquisition policy.

Master of Science in Management
December 1984

Advisors: J.E. Ferris
R.G. Dreher
Department of Administrative Sciences

AN ANALYTICAL MODEL FOR THE STUDYING OF THE RELATIONSHIPS BETWEEN NAVAL MEDICAL DEPARTMENT RESOURCES AND EFFECTIVENESS

Thomas D. McMahan
Lieutenant, United States Navy
B.S., Western Washington State College, 1977

The management of Naval Medical Department resources takes place in a very complex environment. The Naval Medical Department has been given a dual mission of providing Beneficiary Health Care and being prepared for Contingency for War. Many would claim that these two roles are imcompatible. Nonetheless, the job of a manager is to transform the resources provided into the desired outcomes.

What this thesis proposes to do is build an analytical model for studying the relationships between resources and outcomes. Once a manager is equipped to study these relationships, transforming the resources into the desired outcomes can be accomplished with more certainty than without this understanding. This model will provide direction and guidance in studying these relationships.

Master of Science in Management
December 1984

Advisor: T.G. Swenson
Department of
Administrative Sciences

THE CONCEPT OF MATERIALITY AND ITS APPLICATION TO THE REQUIREMENTS OF THE FEDERAL MANAGERS' FINANCIAL INTEGRITY ACT

David M. Mitchell
Lieutenant, United States Navy
B.S.B.A., Franklin University, 1978

This thesis provides a review of the process of evaluating internal control systems for the Federal Managers' Financial Integrity Act and the application of the concept of materiality to that process.

Topics considered include: internal control in the Federal Government; internal control evaluation in the Federal Government; the concept of materiality in the private sector and the Federal Government; and guidelines for determining material weaknesses in internal control systems. The conclusion was reached that with additional training in the area of materiality, and supported with a material weakness checklist, managers in the Federal Government can better fulfill their requirements for internal control evaluation.

The research consisted primarily of a detailed search and evaluation of the literature in the area of internal control evaluation in the Federal Government and the concept of materiality both in the private sector and the Federal Government.

Master of Science in Management
June 1985

Advisors: J.G. San Miguel
S.S. Liao
Department of Administrative Sciences

COUNSELING IN THE ARMY

Robert H. Mortenson
Major, United States Army
B.S., North Dakota State University, 1971

This thesis examines the effectiveness of the U.S. Army's policy and system of providing counseling assistance to the soldier who has a personal problem. It provides a brief background on why soldiers experience personal problems, how counseling is beneficial, and why the Army should be concerned. A description is provided of the counseling system available at the installation level. The data to determine system effectiveness is obtained in two ways. The first is a questionnaire that was completed by an Army battalion. It provides perceptions from the soldiers and the unit leaders about the counseling system. The second effort consists of a series of interviews of the counselors that work on the installation. Analyzing both sources provides the information on how the system is currently working. Based on this, recommendations are made that will improve the counseling system.

Master of Science in
Management
June 1985

Advisor: W.R. Bishop
Department of
Administrative Sciences

INVESTIGATING THE FEASIBILITY OF ESTABLISHING A NAVAL SPECIAL WARFARE RATING

Gerald M. Moy
Lieutenant Commander, United States Navy
B.S., University of Colorado, 1973

This thesis investigates the feasibility of creating a Naval Special Warfare (NSW) rating. It discusses the history and evolution of the NSW community, as well as the mission and training of NSW enlisted personnel. It delves into the manpower requirements of Seal teams, which comprise the majority of enlisted personnel within the NSW community, and evaluates existing manpower models within the Navy with the intent of modifying an existing model to accomodate Seal team manpower requirements. A recent approved expansion by the Chief of Naval Operations of NSW billets for POM 86 is addressed, as well as how the expansion affects the NSW community. Historical data concerning the creation of a NSW rating is discussed, and arguments for and against the creation of a NSW rating are evaluated.

Master of Science in Management
March 1985

Advisor: D.E. Neil
Department of Operations Research

NAVY DELAYED ENTRY PROGRAM ATTRITION ANALYSIS

Margaret M. Murray
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B.A., University of California, Los Angeles, 1977

This study was conducted to identify various personal and organizational predictors of Navy enlisted personnel Delayed Entry Program (DEP) attrition. Every non-prior service male recruit who entered DEP in Fiscal Years 1980 through 1983 was tracked for 12 months from initial enlistment, to determine if he accessed or attrited from the Delayed Entry Program. Five models predicting attrition were developed, using logistic regression analysis. Two models were based on personal characteristics of DEP members, including age, educational status at DEP entry, mental category and race. A third model looked at the personal characteristics and amount of time spent in DEP. The fourth model was based on the size of the Navy's DEP pool, time in DEP and recruiting area. The fifth model looked at all the above variables. All the variables mentioned, with the exception of race, were found to be highly significant in predicting DEP attrition. This information should aid Navy managers in predicting and reducing DEP attrition.

Master of Science in
Management
June 1985

Advisors: R.A. Zimmerman
T.S. Swenson
Department of
Administrative Sciences

THE IMPACT ON MILITARY CONTAINERIZATION OF A TREND BY THE CIVILIAN SECTOR TOWARDS 40 FOOT CONTAINERS

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Lieutenant Commander, United States Navy
B.A., North Dakota State University, 1971

This thesis examines the impact on the use of containerization by the U.S. military for peacetime and contingency resupply operations of a trend by commercial shippers to move towards 40 foot containers. A brief history of containerization and its development in the commercial and military sectors is followed by a discussion of current trends in the use of containerization. Such items as the economic relationship between the shipper and the ship owner, the impact of container development on ship design, and military use of containers in peacetime and contingency operations are examined. The evidence of a trend by the commercial sector to move towards the 40 foot container is explored and its possible impact on the military is discussed. A study designed to assess the impact of this trend on the military and to determine the feasibility of using 40 foot containers in military resupply operations is developed. Additionally, alternate solutions are presented. The final chapter provides an analysis of the solutions presented and recommendations are made.

Master of Science in Management
December 1984

Advisor: D.C. Boger
Department of
Administrative Sciences

EXCELLENCE WITHIN THE NAVY HEALTH CARE SYSTEM

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The purpose of this study was to find Naval Hospitals that were the embodiment of superior performance, and then to tell their stories--what they look like, what they emphasize, and why they manage and lead the way they do.

This project was approached by identifying Naval Hospitals that should be studied, based on subjective opinions of eighteen senior Naval Medical Department Officers.

After soliciting the senior officers' views on hospital excellence, the next step was to ask them to identify hospitals that personify excellence as they had described it. Based on these lists, visits were made to the three commands most often acknowledged as being excellent. This study then outlines those indicators of excellence that such commands emphasize which have made them the best that we have to offer. From these findings, recommendations are made regarding the usefulness of this study in the Navy Medical Department.

Master of Science in Management
December 1984

Advisor: R.T. Harris
Department of
Administrative Sciences

A CRITICAL ANALYSIS OF U.S. ARMY ACCESSIONS THROUGH SOCIOECONOMIC CONSIDERATIONS BETWEEN 1970 AND 1984

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Major, Republic of Korea Army
B.A., Korea Military Academy, 1977

Pyung Gyu, Lee
Captain, Republic of Korea Army
B.A., Korea Military Academy, 1978

Socioeconomic representativeness is very important because it is one of the major equity issues in manpower procurement, and it influences military effectiveness. The U.S. Army, in the light of socioeconomic considerations, has had more severe problems than other services since the start of the All-Volunteer Force (AVF).

This thesis examines the socioeconomic characteristics of Army personnel who enlisted during the period between July 1, 1970 and September 30, 1984. The purpose was to determine if any trends in the socioeconomic characteristics were apparent during that period. This period includes the transition from the draft to the AVF. The socioeconomic characteristics of 1982 Army enlistees were compared with the U.S. population of 1982. This was done to determine the socioeconomic representativeness of the Army's enlistees in that particular year. In addition, the socioeconomic overview of the Republic of Korea in the military is presented in Appendix A. In conclusion, this study indicates that the Army's active duty force has improved overall since 1979.

Master of Science in
Management
June 1985

Advisors: W.J. Haga
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Department of
Administrative Sciences

DOCUMENTATION AND EVALUATION OF COMPARABILITY OF OVERHEAD COSTS REPORTED FOR DEPOT LEVEL MAINTENANCE

William T. Parker
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B.S., Old Dominion University, 1971

The purpose of this research project is to document and evaluate the comparability of overhead costs reported for depot level maintenance at Naval Air Rework Facilities and Air Force Air Logistics Centers. The study specifically focuses on the ability to make useful comparisons of relative efficiency between activities and activity groups.

The analysis in this study is based on information obtained from on-site visits to Naval Air Rework Facility, North Island and Ogden Air Logistics Center, and by analysis of five years of depot cost data contained in Table 6 of the 7220.29H annual report.

The results of this study suggest the existence of a relationship between total overhead cost and direct labor hours for depot maintenance activities which permits limited comparisons of relative efficiency. Aggregating production indirect and general administrative costs as reported in Table 6 of the annual report is recommended for comparisons across services. Systematic differences in identification of costs as either production indirect or general administrative preclude meaningful comparisons at the more detailed level.

Master of Science in Management
December 1984

Advisors: S.L. Ansari
K.J. Euske
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EXCELLENCE IN THE SURFACE COAST GUARD

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Lieutenant Commander, United States Coast Guard
B.S., United States Coast Guard Academy, 1973

Robert L. Porter, Jr.
Lieutenant Commander, United States Coast Guard
B.S., United States Coast Guard Academy, 1974

"Excellence in the Surface Coast Guard" was examined by interviewing eighteen senior Coast Guard officers, and then going aboard two cutters that they nominated as being excellent. The interviews with the senior officers revealed that there is a solid consensus among them about the vision of excellence. It includes such factors as the commanding officer setting the tone, operational accomplishment, and training the troops. In chapters I through VI we describe what these senior officers said. Aboard the cutters we learned that excellence is attainable, and that common characteristics did exist among the two cutters. They are: the commanding officer is the driver, the unit family, pride at all levels, and consistent management. We describe these attributes in chapters VII through X. In our concluding chapter we offer recommendations on what can be done to further expand the study, and on ways that our findings can be used in the Coast Guard.

Master of Science in
Management
December 1984

Advisor: R.T. Harris
Department of
Administrative Sciences

EFFECT OF PERMANENT CHANGE OF STATION (PCS) POLICY CHANGES ON NURSE CORPS CAREER DEVELOPMENT

Edith A. Poland
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B.S., University of Utah, 1977

The increasing concern regarding escalating Permanent Change of Station (PCS) costs within the Navy has prompted this examination of the U.S. Navy Nurse Corps (NC) career development as it pertains to three types of PCS moves, Operational, Rotational, and Training. Five network representations encompassing the two NC career pathways, Management and Clinical Practice, were constructed with respect to these three types of PCS moves. Utilizing the Officer Longitudinal Master File, historical tour lengths were analyzed from 1952 through 1983 with emphasis placed on the most recent five year period. Although tours of duty at a variety of medical care facilities are necessary for the development of the registered nurse as a Naval officer and as a military nurse, the approximately 350 billets located outside of the contiguous United States were viewed as the primary driving force of NC PCS moves. The variable tour lengths based upon duty station location and accompanied/unaccompanied status were identified as potential problems in projecting the effects of PCS policy changes.

Master of Science in Management
December 1984

Advisor: P.R. Milch
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WARRANTIES IN DEFENSE ACQUISITION: THE CONCEPT, THE CONTEXT, AND THE CONGRESS

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The purpose of this research is to examine recent legislation mandating warranties in Defense Acquisition. The examination comprised three discrete phases; 1) the definition of Defense warranties and a comparison with standard commercial warranties, 2) examination of several contextual relationships affecting the acquisition environment, and 3) a review of legislative developments occurring between the Spring of 1983 and the Summer of 1984.

As a result of this analysis it is concluded that the issue of Defense warranties is more complex than initially recognized by Congress, the life cycle cost implications of Defense warranties are poorly defined, and the intent of the initial warranty legislation was poorly conceived and conveyed. This study recommends that comprehensive examination of Defense Warranty Cost behaviors and enforcement practices be conducted in order to determine the most effective structures to implement the requirements of the legislation.

Master of Science in Management
December 1984

Advisor: D.V. Lamm
Department of Administrative Sciences

AN ANALYSIS OF U.S. NAVY LEVERAGED LEASING

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B.S., University of Montana, 1971

In 1984, the United States Navy began closing the largest leveraged lease agreement ever undertaken. The cost and structural complexity of that transaction, and the use of tax benefit transfers to partially pay for ship charters have made it one of the most controversial defense programs in recent years.

This study examines the controversial issues which have surrounded the Navy's leveraged lease transaction. It also compares that lease with leasing practices in the private sector. In addition, the guidelines and legislation enacted by Congress prescribing procedures to be used by the Department of Defense when considering similar transactions in the future are examined.

Finally, several lessons learned from the Navy's leveraged lease transaction are reviewed to better understand the basic issues which precipitated the initial controversy, and to provide a framework for future Department of Defense long-term leasing agreements.

Master of Science in Management
December 1984

Advisor: J.G. San Miguel
Department of
Administrative Sciences

THE INTEGRATED DISBURSING AND ACCOUNTING FINANCIAL MANAGEMENT SYSTEM (IDAFMS): AN OVERVIEW OF THE SYSTEM, ITS IMPLEMENTATION, AND THE EMPLOYMENT OF MICRO-COMPUTERS IN SUPPORT OF IDAFMS

James S. Rountree
Lieutenant Commander, SC, United States Navy
B.S., Georgia Institute of Technology, 1972

This thesis investigates the Integrated Disbursing and Accounting Financial Management System (IDAFMS), the primary supporting sub-system for the Navy's Integrated Disbursing and Accounting Financial Information Processing System (IDAFIPS). Past deficiencies of Navy financial management systems and the benefits of integrated, real-time systems are discussed. The four sub-systems comprising IDAFIPS are described in general terms. IDAFMS' capabilities and the enhanced control it brings to Navy financial managers are reviewed in detail. The employment of microcomputers by Navy financial managers and as an integral component of IDAFMS is investigated. Opportunities for employment of microcomputers in training applications and the considerations for development of computer based instruction are discussed. The Installation and Implementation Plans for IDAFMS are analyzed, particularly with respect to implementation training. Recommendations are offered to enhance IDAFMS training programs and implementation plans.

Master of Science in Management
March 1985

Advisors: J.W. LaPatra
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Department of Administrative Sciences

AVIATION WARRANTIES: THE COSTS AND RISKS

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B.S.E.E., University of New Mexico, 1975
M.P.A., National University, 1982

Thr purpose of this research is to determine the types and characteristics of warranties used in commercial and military aircraft procurements. The research also includes a brief history of warranty development and Congressional legislation. The cos'ts and risks associated with the use of warranties is discussed in generic form from the viewpoint of the Government and the contractor. Several warranty pricing models are presented, including the free-replacement warranty and the pro-rata warranty as viewed by the buyer and the seller, the rebate model, the prorated rebate model, and a look at using learning curves as a warranty support predictor.

The study concludes that (1) across-the-board application of commercial aviation warranties to military aircraft procurements may not be proper, (2) no one warranty type is cost effective for every aircraft procurement, and (3) there is no standard pricing model that will work for every warranty situation.

Master of Science in Management
September 1985

Advisor: D.C. Boger
Department of
Administrative Sciences

INITIAL PROVISIONING OF SECONDARY ITEMS--A RECOMMENDATION FOR THE NORWEGIAN NAVY

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Initial provisioning of secondary spare parts is an important process in the acquisition of a weapon system. It has a direct and powerful impact on system effectiveness and on future inventory costs. This thesis presents and analyzes existing models for secondary item provisioning and makes a recommendation for provisioning policies in the Norwegian Navy. The mean supply response time model is found to be the most appropriate model both for provisioning as well as for replenishments at periodic reviews. The model will also serve as a valuable tool in the budgeting process as it relates budget levels and their respective performance levels.

Master of Science in Management
December 1984

Advisor: A.W. McMasters
Department of Administrative Sciences

DEVELOPMENT OF A NEW SCREENING TABLE FOR SEA/AIR MARINERS

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B.A.A., Auburn University, 1968

The purpose of this thesis is to examine the attrition behavior of the first accessions, fiscal year 1984 accessions, into the Sea/Air Mariner (SAM) program, and to develop an improved screening table for SAM applicants. Data files of active Navy, Ready Mariner, and SAM personnel were used as the basis for applying statistical methods to develop an improved screening table.

Master of Science in Management
June 1985

Advisor: R.A. Zimmerman
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Administrative Sciences

THE EVOLUTION OF THE U.S. HELICOPTER INDUSTRY

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The first production helicopter in the United States was produced by Sikorsky Aircraft (now a division of United Technologies) in 1941 as a direct result of a U.S. Army Air Corps requirement. Helicopter technology advanced rapidly, driven mainly by U.S. Department of Defense research and development funding. The business base expanded as commercial operators become more aware of helicopter capabilities made available through advancing technology. Many competitors were attracted to the industry, including a number from overseas. This thesis examines the growth of the U.S. helicopter industry and explores the issues that have led to the success or failure of the industry's competitors. A particular issue addressed is the role the Department of Defense has played in shaping the industry. The work concludes with an analysis of the current state of the industry and the prospects for its future.

Master of Science in Management
December 1984

Advisors: D.C. Boger
J.E. Ferris
Department of Administrative Sciences

EXCELLENCE IN THE VP NAVY

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B.B.A., University of Houston, 1971

"Excellence in the VP Navy" is examined, first by providing the views of various senior naval officers at the functional and operational wing level; then, four squadrons considered excellent by these senior officers are examined to determine how they go about achieving excellence.

Master of Science in Management
December 1984

Advisor: R.T. Harris
Department of Administrative Sciences

EXCELLENCE IN THE COMBAT ARMS

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Major, United States Army
B.S., United States Military Academy, 1973

Herbert L. Frandsen
Captain, United States Army
B.S., Auburn University, 1974

David A. Hoopengardner
Captain, United States Army
B.S., United States Military Academy, 1976

Why are certain battalions better than all others? Three Army officers conducted a search for excellent combat arms battalions. As a result of their study, they developed a list of eight attributes common to excellent combat arms battalions. The officers visited three corps, five divisions, and seven battalions located at four different Army posts.

The study was divided into two phases. Phase I captures the thoughts of corps and division commanders and their staffs when asked to define excellence in the combat arms. In Phase II seven of the best battalions in the U.S. Army were visited, and the observations were compiled into the Eight Pillars of Excellence. These eight charactersitics are indicative of the current leadership and management practices of the Army's best battalions. This thesis tells the story of those excellent battalions.

Master of Science in
Management
June 1985

Advisor: R.T. Harris
Department of
Administrative Sciences

A TECHNIQUE FOR EVALUATING VENDOR BIDS FOR STOCK REPLENISHMENT OF A CONSUMABLE ITEM

Joshua Steinberg
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B.S., Ben Gurion University, Israel, 1978

The Ships Parts Control Center (SPCC) Uniform Inventory Control Program (UICP) wholesale replenishment model for 1H cognizance symbol (consumable) material is an order quantity-reorder level or (Q,r) model. A stocked item's order quantity and reorder level are established in large part by the unit price and procurement lead time forecasted for it. When a replenishment is needed, the order quantity is specified and the procurement officer requests bids from vendors. These bids include both a unit price and production lead time. This thesis analyzes the influence of different bids with different unit price and different lead time on the future optimum total annual cost of stocking the item as computed by the UICP model. Based on this analysis, a simple technique to evaluate those bids is developed and steps to implement this technique are suggested.

Master of Science in
Management
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Advisor: A.W. McMasters
Department of
Administrative Sciences

THE APPLICATION OF MICROCOMPUTER SPREADSHEETS TO PRODUCE THE U.S. ARMY FIVE YEAR FIELD GRADE OFFICER PROMOTION PLAN

Howard T. Styron
Captain, United States Army
B.S., United States Military Academy, 1975

This thesis has two specific objectives. The first is to document and explain the mathematical computations and logic used in the production of the Five Year Field Grade Officer Promotion Plan for the U.S. Army. The second objective is to demonstrate how microcomputers and commercially available state-of-the-art electronic spreadsheet techniques can be used to produce the Five Year Promotion Plan and the flexibility this technique provides the force planner and personnel manager.

The thesis proposes that the advantages of automating the promotion plan production process are significant and persuasive. Microcomputers and commercial software programs are powerful tools which can drastically increase the productivity of force planners and personnel managers at all levels. These tools will reshape the way problems are forecasted, alternatives developed, solutions analyzed, programs implemented and feedback processed to optimize the outcomes.

Master of Science in
Management
December 1984

Advisor: P.R. Milch
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Operations Research

MOTIVATIONS FOR FIRST TERM RESERVE REENLISTMENT

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This thesis was an exploratory research effort that determined the differences and similarities in reenlistment factors for prior active service (PAS) and non-prior active service (NPAS) reservists. Reenlistment models, using a breadth of reenlistment factors elicited by the Rand Corporation's 1979 reserve force studies surveys, were developed for first-term PAS and NPAS reservists of grade E-3 or E-4 who were within 18 months of ETS and who had entered the military after the start of the All Volunteer Force (June 1973). Reelistment factors examined were: demographic, tenure, cognitive/affective orientation, family income, civilian work environment, and perceived alternative job opportunities. The results of this study indicate that the qualitative aspects of the reserve job and the civilian employer's attitude towards reserve participation are important variables to both groups of reservists. Satisfaction with pay, problems associated with obtaining transportation to and from drill sites, the amount of time spent on reserve duties, and the length of time to promotion are also important factors considered by the reservist in making the reenlistment decision.

Master of Science in
Management
June 1985

Advisors: G.W. Thomas
J.I. Borack
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Administrative Sciences

A STUDY OF INTERNAL REVIEW IN THE FLEET MARINE FORCE PACIFIC AND HOST ACTIVITY COMMANDS

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Major, United States Marine Corps
B.S., Southern Colorado State College, 1973

Internal review, the Marine Corps commander's in-house audit function, is an element of internal control within a command that can aid the commander in his/her management of resources in pursuit of his/her readiness objective. This thesis discusses the background of internal review and its potential importance in contributing to improved economy, efficiency and effectiveness of operations. A model is developed from current authoritative Marine Corps directives and preferred practices from the private sector to be used as a standard in the study. A survey of the Fleet Marine Forces Pacific (FMFPAC) and host activity commands was conducted to gather data to determine the degree of compliance with the standard model. The causes for non-compliance are discussed and recommendations for improvement are presented for areas where significant findings resulted.

Master of Science in Management
June 1985

Advisor: J.M. Fremgen
Department of Administrative Sciences

AN APPLICATION OF AMORE (ANALYSIS OF MILITARY ORGANIZATIONAL EFFECTIVENESS) TO THE CHARLES F. ADAMS CLASS GUIDED MISSILE DESTROYER

Paul K. Susalla
Lieutenant, United States Navy
B.S., United States Naval Academy, 1978

The purpose of this thesis is to apply the U.S. Army AMORE (Analysis of Military ORganizational Effectiveness) Model to the Charles F. Adams Class Guided Missile Destroyer. This model was used to analyze the inport and underway manpower requirements by simulating personnel manning under different scenarios. The model identified key personnel for meeting mission requirements under conditions that may lead to loss of personnel. AMORE is particularly useful for assessing potential benefits from cross-training.

Master of Science in Management
December 1984

Advisor: G.W. Thomas
Department of
Administrative Sciences

AN ANALYSIS OF THE MATERIEL FIELDING PLAN FOR THE SINCGARS RADIO

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B.S., United States Military Academy, 1978

This thesis is an analysis of the Materiel Fielding Plan (MFP) for the Army's Single Channel Ground and Airborne Radio System (SINCGARS). Objectives of the study are to identify major potential problem areas in the Materiel Fielding Plan, and to generate recommendations for resolving these problems. The study involves a specific analysis of the maintenance and supply support aspects of the MFP within the context of the Major System acquisition framework. Research included extensive field interviews with personnel in the functional management areas of the Communications and Electronics Command (CECOM), the Project Office, and the Department of Army Staff. Potential problems identified concern the redistribution of VRC-12 series and PRC-77 radios, the imbedded COMSEC modification, and the issue of warranties. Recommendations include purchasing a warranty for the original production contract, improving the planning for redistribution of old radios, and providing strict control over the design of the imbedded COMSEC modification.

Master of Science in Management
December 1984

Advisor: D.V. Lamm
Department of Administrative Sciences

DOCUMENTATION AND EVALUATION OF UNIFORM COST ACCOUNTING FOR THE F-14 AIRCRAFT IN FISCAL YEAR 1983

Walter D. Vandivort
Commander, United States Naval Reserve
B.S., United States Naval Academy, 1967

The purpose of this research is to evaluate the capability of the Uniform Cost Accounting System to fully capture depot level repair costs by weapon system through an examination of the F-14 aircraft depot level repair costs for Fiscal Year 1983.

The analysis in this study is based on information obtained by on-site visits to Naval Air Rework Facility, North Island, California and Naval Air Rework Facility, Alameda, California and by analyzing seven thousand Uniform Cost Accounting Records for work done in Fiscal Year 1983.

The results of this study indicate that Uniform Cost Accounting depot level repair costs are being properly identified to the F-14 for the aircraft repair program and the engine repair program. However, the cost of repairing F-14 depot level components, although captured, is not identified as being part of the F-14 program. This study found that if the Special Material Identification Code is used to code Uniform Cost Accounting Records, additional component repair costs can be identified to the F-14.

Master of Science in Management
December 1984

Advisors: S.L. Ansari
K.J. Euske
Department of Administrative Sciences

SELECTION OF ORGANIZATION STRUCTURES WITHIN THE NAVAL FACILITIES ENGINEERING COMMAND

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B.S., University of Kansas, 1977

This thesis proposes a method of selecting organization structures for the Naval Facilities Engineering Command. Multiattribute utility measurement, a quantitative methodology, is used to select the best structure from among five possible organization structures. To determine the best structure organization, attributes are identified and weighted. Each alternative is given a utility value for each attribute, which when summed provides a quantitative evaluation of the alternative organization structures.

Master of Science in Management
June 1985

Advisor: W.R. Talutis
Department of Administrative Sciences

QUALITY ASSURANCE/RISK MANAGEMENT IN THE NAVAL MEDICAL COMMAND

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Commander, United States Navy
B.S., George Washington University, 1976

James L. Dillard
Lieutenant, United States Navy
B.S., University of Oregon, 1978

The purpose of this thesis is to assess the Naval Medical Command Quality Assurance/Risk Management Program. As part of this analysis the authors have conducted an extensive literature review of quality assurance publications. An indepth analysis of the Naval Medical Command quality assurance instruction is provided. The Joint Commission on Accreditation of Hospitals quality assurance publications were compared with the Naval Medical Command Quality Assurance instruction. The authors noted deficiencies in the Naval Medical Command instruction with respect to meeting Joint Commission on Accreditation of Hospitals quality assurance program accreditation standards. Additionally, suggestions have been included to improve the overall effectiveness of the Naval Medical Command quality assurance instruction. A set of "key variables" were developed as a means for assessing the adequacy of an existing Navy military treatment facility quality assurance program.

Master of Science in Management
September 1985

Advisor: D.R. Whipple, Jr.
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TO MAKE OR TO BUY - AN APPROACH TO MAKING THAT DECISION WITH REGARD TO NATIONAL WEAPONS ACQUISITION

Richard E. Walters
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The smaller sophisticated nations have to decide where to procure their weapons systems. Though these smaller countries are probably capable of designing and manufacturing their own systems, this is not necessarily the most economically efficient use of their resources. This paper canvasses some of the issues involved in a make or buy decision. It then suggests a cost/benefit analysis as one way of applying a value to the pros and cons of the alternatives of make; buy; or varying shades of a mixture of the two. It further suggests that the whole of life costs, rather than the acquisition costs, should be the basis for the decision process and then that the alternative with the highest net present value should be the one selected.

Master of Science in Management
December 1984

Advisor: C.A. Peterson
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Administrative Sciences

IDENTIFICATION OF CASH MANAGEMENT OPPORTUNITIES IN THE NAVY INDUSTRIAL FUND

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Mark W. Balmert
Lieutenant, United States Navy
B.S., University of Notre Dame, 1977

The Navy Industrial Fund is a revolving fund used to provide working capital for industrial and commercial-type activities in the Department of the Navy. At the present time there are 49 NIF activities with a combined annual revenue projected to be $14.5 billion for FY 1985.

The authors researched the background of the NIF and its management, focusing on the organizational structure and policies affecting the Navy Industrial Fund's cash position. Thr purpose of this thesis is to identify cash management opportunities for the NIF.

Numerous opportunities, not presently included in existing Federal cash management programs, were observed which would enable the NIF to better manage its cash. Eight specific opportunities are identified and explored, and recommendations are provided to improve the NIF's cash position.

Master of Science in Management
June 1985

Advisor: J.G. San Miguel
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CASH MANAGEMENT IMPROVEMENT IN THE NAVY TRAVEL ADVANCE SYSTEM

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B.A., California State University, Long Beach, 1968

This thesis contains an investigation of alternate methods of providing travel advance funds to travelers within the Department of the Navy. Current private sector and public sector travel advance methods are discussed. Particular emphasis is placed on (1) the timing of Treasury fund disbursements, (2) the convenience of the method for travelers, and (3) whether or not the method provides an incentive for travelers to file travel claims expeditiously.

The author concludes that there are potential benefits to be gained through implementation of charge cards and/or travelers checks. The study recommends that field testing be conducted on both of these travel advance methods.

Master of Science in Management
December 1984

Advisor: J.G. San Miguel
Department of
Administrative Sciences

MINICOMPUTERS AND NAVAL MOBILE CONSTRUCTION BATTALION PRODUCTIVITY

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In 1978-1979, minicomputers were installed at the five U.S. Naval Mobile Construction Battalion mainbody deployment sites, based upon a study that projected increased productivity. This thesis examines the issue of productivity in construction battalions. It develops and tests a productivity index, and examines and tests a level of effort indicator for changes coincident with the introduction of the minicomputers.

The productivity index shows no significant differences before and after the introduction of the minicomputers. This is judged to be inconclusive however, because of the assumptions necessary in development of the index. The level of effort indicator does show a statistically significant difference.

The lack of a commonly accepted productivity index for use within the Naval Construction Force is viewed with concern; recommendations are made for the development of an objective index against which performance may be measured.

Master of Science in Management
December 1984

Advisors: D.C. Boger
K.J. Euske
Department of Administrative Sciences

AN EVALUATION OF THE AWARD FEE DETERMINATION PROCESS IN COST-PLUS-AWARD-FEE CONTRACTS IN MAJOR WEAPON SYSTEMS ACQUISITION

Terry E. Wight
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B.A., University of Washington, 1975

An evaluation of the award fee determination process in Cost-Plus-Award-Fee (CPAF) contracts is conducted in an attempt to improve the process. Improvements are needed and are possible. An analysis of pre-award activities and the development and structuring of contract elements which influence the award fee determination process is first conducted. These elements and activities include the formulation of the base fee, how the award fee pool is used, formulating the evaluation criteria, determining the length of the evaluation period, and development of an appropriate formula to compute the fee. The second step involves contract administration functions in terms of evaluation and fee determination procedures. Included is an examination of the Performance Evaluation Board composition and proceedings as well as the role and authority of the Fee Determination Official. Finally, an examiniation of data for trend analysis is conducted, concluding that award fees are generally too high.

Master of Science in Management
December 1984

Advisor: D.V. Lamm
Department of
Administrative Sciences

AN INVESTIGATION OF THE RELATIONSHIPS BETWEEN AUXILIARY EQUIPMENT READINESS AND AUXILIARY MAINTENANCE PERSONNEL CHARACTERISTICS

Clarence C. Willis
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B.S., United States Naval Academy, 1972

To evaluate the effectiveness of training similar to that associated with a proposed auxiliary equipment rating, the analysis reported here examined the relationship between auxiliary equipment readiness on eighteen FFG-7 class ships and the quality, experience, and training of the personnel assigned to the ships. More experience, higher numbers of trained personnel, and higher numbers of high school graduates were hypothesized to contribute to lower equipment downtime. Results of the analysis support this hypothesis in the case of quality and training. Increased experience, however, is found to be directly related to equipment downtime on the FFG-7 class ships. The amount of variation in total downtime attributable to personnel characteristics is small, however, when compared with that attributable to ship effects, as measured by average ship downtime. Accounting for ship effects in this study facilitated a meaningful analysis of the personnel-characteristics effects. The results of this analysis indicated that an increase in training coupled with improved selection and retention of relatively higher quality personnel would contribute to a reduction in downtime of auxiliary equipments on FFG-7 class ships.

Master of Science in Management
December 1984

Advisor: R.A. Weitzman
Department of
Administrative Sciences

MASTER OF SCIENCE

IN

MECHANICAL ENGINEERING

EFFECTS OF TEMPERATURE ON THE TENSILE STRENGTH AND ELASTIC MODULUS OF COMPOSITE MATERIAL

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B.S., Korea Naval Academy, 1972
B.S., Korea Seoul National University, 1976

An experimental investigation was made to determine the ultimate tensile strength and elastic modulus of HMF 330/34 woven style graphite epoxy exposed to elevated temperatures: (16°C, 80°C, 110°C, 140°C, and 170°C). Specimens were of three different layups: $(0/45/-45/90)_s$, $(45/0/-45/90)_s$, and $(45/90/-45/0)_s$. An instron universal testing machine with 20,000 ob maximum load capacity was used to apply the uniaxial tensile loading. A Marshall clamshell furnace was used for maintaining the elevated temperatures. Results of the investigation indicate that ultimate tensile strength decreases with temperature increase in the $(0/45/-45/90)_s$ orientation panel. For $(45/0/-45/90)_s$ and $(45/90/-45/0)_s$ orientation panels, ultimate tensile strength increases with temperature up to 140°C (284°F), and decreases above 140°C (284°F). In all cases, the elastic modulus decreases as temperature increases.

Master of Science in
Mechanical Engineering
March 1985

Advisor: D. Salinas
Department of
Mechanical Engineering

EFFECT OF TEMPERATURE AND STRAIN RATE ON MICROSTRUCTURE OF A DEFORMED, SUPERPLASTIC Al-10%Mg-0.1%Zr ALLOY

Dudley B. Berthold
Lieutenant, United States Navy
B.A., University of Louisville, 1978

Development of microstructure during thermomechanical processing of an Al-10%Mg-0.1%Zr alloy was examined in the initial portion of this research. The thermomechanical processing involved solution treating, hot working by upset forging at 440oC followed by warm rolling at 300oC to a 94% reduction. Subsequently, test specimens from this rolled material were deformed at three strain rates at temperatures of 200oC, 300oC, and 400oC and were microstructurally examined. It is found that this alloy statically recrystallizes prior to commencing a test at 400oC, the resultant grains deform by boundary sliding and there is extensive cavitation. During lower temperature deformation it was found that either continuous recrystallization or just recovery with no recrystallization occurs and little or no cavitation takes place.

Master of Science in
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June 1985

Advisor: T.R. McNelley
Department of
Mechanical Engineering

THE EFFECT OF CONDENSATE INUNDATION ON STEAM CONDENSATION HEAT TRANSFER IN A TUBE BUNDLE

Steven K. Brower
Lieutenant, United States Navy
B.S., University of Idaho, 1975

Steam-condensation heat-transfer measurements were made using a 5-tube in-line test condenser with an additional perforated tube to simulate up to 30 active tubes. Results were obtained for smooth tubes, wire-wrapped tubes and dropwise-coated tubes. The average outside heat-transfer coefficient for 30 smooth tubes was 0.64 times the Nusselt coefficient for the first tube. A total of eight wire-diameter and wire-pitch combinations were tested: 1.6-mm-diameter wire wrapped at 16 mm, 7.6 mm and 4 mm wire pitches, 1.0-mm-diameter wire wrapped at 8 mm, 4 mm and 2 mm wire pitches, and 0.5-mm-diameter wire wrapped at 4 mm and 2 mm wire pitches. The best bundle performance was obtained when the tubes were wrapped with 1.0-mm-diameter wire at a wire pitch of 4 mm. The combination resulted in an average outside heat-transfer coefficient for 30 tubes that was 1.15 times the value computed for the first tube using the Nusselt theory. The average outside heat-transfer coefficient for the 30 dropwise-coated tubes was 1.1 times the value of the heat-transfer coefficient for the first tube in the tube bundle. Utilizing either wire-wrapped tubes or dropwise-coated tubes, it is possible to significantly reduce the condenser surface area and overall size.

Master of Science in
Mechanical Engineering
June 1985

Advisors: P.J. Marto
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ROLLING CONTACT FATIGUE TESTING OF THERMOMECHANICALLY PROCESSED M-50 STEEL

Fred A. Butterfield, III
Lieutenant, United States Navy
B.S., United States Naval Academy, 1978

The influence on rolling contact fatique behavior of thermomechanical processing (TMP) to refine grain and soluble carbide size was studied in this work on VIM-VAR M-50 steel. Material was processed (austenitized and warm-rolled) following the procedures developed by Larson, with subsequent austenitization times and temperatures (for final hardening) based on Bres' data. Rolling contact fatique testing indicates virtual equivalence of the as-received (spheroidize-annealed) and TMP specimens evaluated, with the TMP material clearly no better than the as-received condition in terms of fatigue life. This is believed to be the result of one or both of the following: (a) austenitization (hardening) of TMP material at too long a holding time, with a microstructural equalization occurring between conditions; and (b) voids existing at the ends of the insoluble carbides in both as-received and TMP material, which act as possible sites for crack initiation in the matrix.

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Advisor: T.R. McNelley
Department of
Mechanical Engineering

EFFECT OF PRIOR WARM ROLLING ON THE RETAINED AUSTENITE CONTENT AND HARDENING RESPONSE OF (VIM-VAR) AISI M-50 STEEL

Nestor H. Camerino, Jr.
Lieutenant, United States Navy
B.S.M.E., United States Naval Academy, 1979

The objective of warm rolling M-50 bearing steel is microstructural refinement which may lead to increases in rolling contact fatigue life. A consequence of this refinement is that the austenitizing temperature used in the final hardening cycle should be reduced. This is because warm rolling leads to faster dissolution of finer soluble carbides at the austenitizing temperature. This thesis effort determined the temperature decrease that warm rolling allows in austenitizing to produce a microstructure of finer grain and carbide size but equivalent carbide dissolution. Here, this has been inferred by measurement of the volume fraction of retained austenite in the as-hardened microstructure, retained austenite being a function of the amount of carbides taken into solution during austenitization. It was found that the standard austenitizing temperature of 1106oC used to harden stock M-50 can be reduced by 63 centigrade degrees with warm-rolled M-50 steel.

Master of Science in
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Advisor: T.R. McNelley
Department of
Mechanical Engineering

FILM CONDENSATION OF STEAM ON EXTERNALLY FINNED HORIZONTAL TUBES

Frederick A. Flook
Lieutenant, United States Navy
B.S.M.E., Colorado State University, 1977

Filmwise condensation measurements of steam were made on horizontal finned tubes under vacuum and near-atmospheric conditions. Data were obtained for copper tubes with fins of rectangular, triangular, trapezoidal, and parabolic cross sections, and for a commercially-available finned tube. A stainless steel finned tube was also tested to investigate the effect of thermal conductivity.

Maximum enhancements of about 4.8 were obtained under vacuum conditions, and about 6.9 at atmospheric pressure, compared to a smooth tube having an outside diameter equal to the root diameter of the finned tubes. The optimum fin spacing was found to be about 2.0 mm for rectangularly shaped fins with a fin thickness of 1.0 mm, and fin height of 0.5 and 1.5 mm. Fins with a parabolic shape were shown to perform better than fins of rectangular shape, and fins were shown to degrade the performance of stainless steel tubes. The effects of vapor shear were shown to have only a small influence on the steam-side heat-transfer coefficient. A theoretical model proposed by Webb et al. [25] was found to underpredict the experimental data. Several suggestions to modify this model are described.

Master of Science in
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Advisor: P.J. Marto
Department of
Mechanical Engineering

MECHANICAL CHARACTERISTICS OF A SUPERPLASTIC ALUMINUM-10.2%Mg-0.1%Zr ALLOY

Thomas S. Hartmann
Lieutenant Commander, United States Navy
B.S., Texas A&M University, 1976

The elevated temperature mechanical characteristics of an aluminum-magnesium-zirconium alloy were studied. Thermomechanical processing consisted of solution treating and hot working at 440oC and then warm rolling at 300oC to 94% reduction. Subsequent treatments included annealing at 200oC for one hour, and recrystallizing for one minute at 440oC. Tensile testing of warm rolled, annealed, and recrystallized material was conducted at various strain rates and temperatures. The data were analyzed to determine strain-rate sensitively coefficients and activation energies, in turn to be correlated with microstructural data concurrently obtained on this superplastic alloy. This material exhibits particularly good ambient properties in addition to the superplasticity.

Master of Science in
Mechanical Engineering
June 1985

Advisor: T.R. McNelley
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Mechanical Engineering

TRAILING VORTEX ATTENUATION DEVICES

Kenneth G. Heffernan
Lieutenant, United States Navy
B.S., United States Naval Academy, 1978

Trailing vortices generated by large aircraft pose a serious hazard to other planes. Numerous studies have been carried out to destroy them either before and/or after their formation. The present investigation is a survey and critical assessment of all the known active/passive devices and wingtip modifications proposed to achieve vortex attenuation. It is concluded that some devices, such as the wing tip sails, have promise in affecting the vortex roll-up in the vicinity of the aircraft. However, more data and analysis on this and other devices are needed before they can be incorporated into existing aircraft or future designs.

Master of Science in
Mechanical Engineering and
Master of Science in
Aeronautical Engineering
June 1985

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Mechanical Engineering

A NEW METHOD FOR BOUNDARY VALUE PROBLEMS

Fernando N. Heredia
Lieutenant, Ecuadorian Navy

Large matrix storage constitutes a limitation on the applicability of most numerical techniques including the Finite Element Method, when very accurate results are required. This is particularly true when dealing with Boundary Value Problems. In order to surpass this difficulty a new method of solving these problems has been devised which does not require matrix storage while still providing the possibility of accuracy improvement.

Although restricted to one-dimensional, linear differential equations of the form $Y^{(n)}(x) = f(x)$ this new approximating technique gives acceptable results. The method will perform equally well for problems with exact or non-exact integrable forcing functions, continuous or discontinuous, or functions existing only as a set of values at discrete points.

Master of Science in
Mechanical Engineering
March 1985

Advisor: D. Salinas
Department of
Mechanical Engineering

THE EFFECTIVENESS OF HEAT EXCHANGERS WITH ONE SHELL PASS AND FIVE TUBE PASSES

Lawrence E. Hess
Lieutenant Commander, United States Navy
B.S., The Citadel, 1973

Heat exchangers with one shell pass and n tube passes are often referred to as 1-n exchangers. The heat transfer literature contains many references to studies of 1-n exchangers when n is even but apparently, other than a single study and some work pertaining to the 1-3 exchanger at the Naval Postgraduate School, little work has been done with respect to the 1-n exchanger when n is odd. This thesis expands upon the study of 1-n exchangers with n being odd.

While a completely closed form solution was found to be unfeasible, polynomial approximation has been developed that yields the effectiveness (ε) of the two possible arrangements of the 1-5 exchanger as a function of the capacity ratio (R) and the number of transfer units (N_{tu}). This will enable the analyst to consider exchangers where the inlet to and outlet from the tubes are at opposite ends of the exchanger.

Master of Science in
Mechanical Engineering
September 1985

Advisor: A.D. Kraus
Department of
Mechanical Engineering

MARINE PROPULSION LOAD EMULATION

Philip N. Johnson
Lieutenant Commander, United States Navy
B.S.M.E., Maine Maritime Academy, 1977

Improved propulsion plant control schemes for gas turbine ships can provide both economic and tactical benefits to the fleet. One way to develop improved propulsion controllers is to use a marine propulsion emulator as an implementation test bed for proposed engine control logic.

This paper describes the development and implementation of a load control system for a marine propulsion emulator which uses a water filled dynamometer and a 160 horsepower gas turbine. Steady state and transient data were collected and analyzed and a dynamic dynamometer model was developed using the Continuous System Modelling Program CSMP III. A proportional plus derivative control system was designed using the nonlinear CSMP model with a cut-and-try design approach. Hardware control elements including valve positioners and microprocessor interfaces were designed and fabricated. The microprocessor-based controller was programmed with the dynamometer control algorithm and the system was tested to verify the emulator design.

Master of Science in
Mechanical Engineering
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Advisor: D.L. Smith
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Mechanical Engineering

AN EXPERIMENTAL APPARATUS TO STUDY NUCLEATE POOL BOILING R-114 AND OIL MIXTURES

Mustafa Karasabun
Lieutenant JG, Turkish Navy
B.S., Turkish Naval Academy, 1978

In order to study the nucleate pool-boiling performance of R-114 and R-114-oil mixtures from enhanced evaporator tube surfaces, an experimental apparatus was designed, constructed and instrumented. The evaporator was made of a T-shaped Pyrex glass container. Boiling occurred from a smooth, hard-copper tube, 15.9 mm (5/8 in.) in outer diameter, 12.7 mm (1/2 in.) in inside diameter and 431.8 mm (17 in.) in length. The tube was heated using a cartridge heater, and it was instrumented with 8 thermocouples to measure the wall temperature. A Hewlett-Packard 3497A data acquisition/control unit and a 9826A computer were used to collect and process data. The condenser was cooled by an ethylene glycol-water mixture, which was maintained at about $-17^{o}C$ by means of an R-12 refrigeration system. Nine data runs were completed to de-bug the experimental apparatus and to check for reproducibility. During all data runs, especially at higher heat fluxes (greater than 10 kW/m^2), large temperature variations were observed along and around the active boiling length of the test tube. The data were compared with data found in the literature and reasonable agreement was obtained.

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Advisor: P.J. Marto
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Mechanical Engineering

UNDERWATER SHOCK-INDUCED RESPONSES OF STIFFENED FLAT PLATES: AN INVESTIGATION INTO THE PREDICTIVE CAPABILITIES OF THE USA-STAGS CODE

Nelson R. King
Lieutenant, United States Navy
B.S., Reed College, 1973

An experimental investigation was conducted to determine the dynamic responses of stiffened flat plates to impulsive loading by underwater shock waves. Air-backed flat plates with machined external stiffeners and clamped boundary conditions were subjected to shock loadings from TNT charges detonated underwater. The plates were instrumented to measure transient strains and free field pressures. Test results were compared to preshot calculations done using the USA-STAGS code. Particular emphasis was placed upon the code's ability to predict stiffener tripping and shear at plate boundaries.

Master of Science in
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Advisor: Y.S. Shin
Department of
Mechanical Engineering

AN INVESTIGATION INTO THE COMPARISONS OF THE UNDERWATER SHOCK EFFECTS ON A STIFFENED FLAT PLATE TO THE PREDICTIVE NATURE OF A COMPUTER MODEL

John R. Langan
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1975

An experiment was performed to study the effects of an underwater explosion on a submerged test panel. This is a part of an on-going research project sponsored by the Defense Nuclear Agency (DNA) to help predict the dynamic responses of naval structural members due to underwater shocks. An important element of this thesis was to validate a finite element/finite central difference computer code developed to forecast shell responses. Emphasis was placed upon attaining stiffener tripping and collecting invaluable dynamic flat plate tripping data.

Master of Science in
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Advisor: Y.S. Shin
Department of
Mechanical Engineering

ENDURANCE AND HEAT-TRANSFER PERFORMANCE OF POLYMER COATINGS FOR THE PROMOTION OF DROPWISE CONDENSATION OF STEAM

Daniel J. Looney
Lieutenant, United States Navy
B.N.E., Georgia Institute of Technology, 1978

Ten polymer coatings were evaluated for the long term promotion of dropwise condensation of steam. Four of the coatings were experimental coatings developed by the Naval Research Laboratory and six were commercial coatings. Continuous dropwise condensation in excess of 10,000 hours was obtained for several of the coatings that were applied to rough surfaces.

Three commercial coatings, in addition to an NRL fluoroacrylic coating, were evaluated for heat-transfer performance. The effects of roughness, substrate thermal conductivity, coating thickness, and vapor velocity on the heat-transfer coefficient were studied for dropwise condensation of steam on a horizontal tube. Dropwise heat-transfer coefficients were also determined for steam condensing on silver-electroplated tubes, in order to compare the results with those from the polymer-coated tubes. Heat-transfer coefficient enhancement factors of as much as 10-12 were obtained for dropwise condensation when compared to filmwise results.

Master of Science in
Mechanical Engineering
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Advisor: P.J. Marto
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Mechanical Engineering

THE USE OF AUSTENITIC STAINLESS STEEL VERSUS MONEL (NI-CU) ALLOY IN PRESSURIZED GASEOUS OXYGEN (GOX) LIFE SUPPORT SYSTEMS

Bert Marsh
Lieutenant Commander, United States Navy
B.S., Oregon State University, 1974
M.S., Oregon State University, 1975

Gaseous oxygen (GOX) must be stored at pressures up to 24 MPa (3500 psi) to provide the flow rates required to support the metabolic needs of a diver. A review of the literature concerned with materials compatibility in pressurized oxygen systems was conducted, with emphasis on metallic structural materials. Review of experimental and theoretical work on combustion of austenitic stainless steels and nickel-copper alloys revealed a consensus that Monel nominal (63% Ni - 34% Cu) is preferred in high pressure oxygen systems, when its strength and weight are acceptable. At the intermediate pressures, 0.7 to 10.3 MPa (100 to 1500 psi), the relative safety of stainless steel as a structural material is unclear. The testing methods reviewed were friction rubbing, particle impact, fresh metal exposure to heated flowing GOX, promoted ignition and resonance. An experimental apparatus was used to simulate the conditions of GOX flow found in an operational diving set and to compare the flame propagation rates for austenitic stainless steel (AISI 316), Monel (63% Ni - 34% Cu) and carbon steel (AMS 5050) tubing in this environment.

Master of Science in
Mechanical Engineering
March 1985

Advisor: T.R. McNelley
Department of
Mechanical Engineering

EVALUATION OF THE EFFECTS OF ROLL ANGLE ON THE NATURAL CONVECTION HEAT TRANSFER FROM AN ARRAY OF CYLINDRICAL SPINES

Joseph E. McClanahan
Lieutenant Commander, United States Navy
B.S., Auburn University, 1970

Experimental data has been obtained that predicts the effect of roll angle upon the natural convection heat transfer from an array of cylindrical spines or pin fins. A correlation is presented that permits evaluation of the Nusselt Modulus as a function of the Rayleigh Modulus and the roll angle and it shows that maximum heat transfer is obtained at roll angles between 20 and 30 degrees.

Master of Science in
Mechanical Engineering
December 1984

Advisor: A.D. Kraus
Department of
Mechanical Engineering

THE VARIATION IN THE SUBGRAIN SIZE IN ALUMINUM DEFORMED TO LARGE STEADY-STATE CREEP STRAINS

Paul P. Mieszczanski
Lieutenant, United States Navy
B.S., Fairfield University, 1976

Pure metals (and many alloys) deformed at high (creep) temperatures strain-harden. This hardening is associated with an increase in the density of randomly arranged (forest) dislocations and subsequent formation of a three-dimensional network of low-angle dislocation boundaries (subgrains). Eventually a material reaches a steady-state condition, and hardening and recovery processes are balanced. A controversy exists as to which of these features is primarily responsible for creep resistance or strength. During steady-state deformation, the feature responsible for creep strength is expected to be invariant with strain. Some stainless steel work suggested that the subgrain size changes during steady-state. Therefore, it was believed that subgrain strengthening is not dominant in this material. Aluminum specimens were deformed to various large steady-state strains and examined by transmission electron microscopy to determine the average subgrain size. It was found that the subgrain size was constant over a very wide ($\varepsilon \simeq 16$) range of steady-state strain.

Master of Science in
Mechanical Engineering
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Advisor: M.E. Kassner
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THE EFFECT OF PRIOR PARENT PHASE COLD WORK ON MARTENSITE TRANSFORMATION IN CU-ZN-AL SHAPE MEMORY ALLOYS

Gary E. Moore
Lieutenant Commander, United States Navy
B.S., Indiana University, 1973

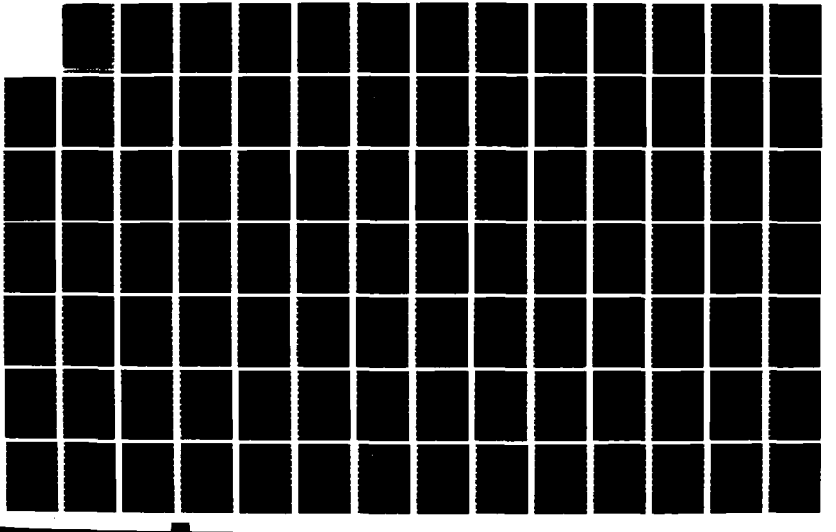
The effect of cold work upon the transformation kinetics of parent to martensite and martensite to parent was studied utilizing differential scanning calorimetry, x-ray diffraction, optical and transmission electron microscopy methods. Samples of a Cu-Zn-Al shape memory alloy were cold rolled above M_s (martensite start temperature) to varying degrees of deformation. The cold worked samples displayed various deformation morphologies. The mechanisms by which these deformation morphologies were developed and the varying morphology crystallographic features were studied and characterized using x-ray diffraction and optical and transmission electron microscopy techniques.

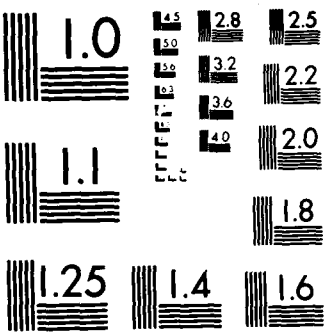
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Advisor: J.A. Perkins
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Mechanical Engineering

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THE EFFECTIVENESS OF HEAT EXCHANGERS WITH ONE SHELL PASS AND THREE TUBE PASSES

Mark S. O'Hare
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1976

Heat exchangers with one shell pass and n tube passes are often referred to as 1-n exchangers. The heat transfer literature contains many references to studies of 1-n exchangers when n is even but apparently little work has bee done with respect to the 1-n exchanger when n is odd. This thesis greatly expands the theoretical study of 1-n exchangers with n being odd. While a completely closed form solution was found to be unfeasible, a polynomial approximation has been developed that yields the effectiveness (ε) of the two possible arrangements of the 1-3 exchanger as a function of the capacity rate ratio (R) and the number of transfer units (N_{tu}). It is also shown that the effectiveness of the arrangement with two counterflow and one parallel flow tube side passes exceeds that of some of the 1-n exchangers with n even.

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Advisor: A.D. Kraus
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Mechanical Engineering

THE CHARACTER OF OBSERVED POROSITY AND ITS POSSIBLE EFFECTS ON ROLLING CONTACT FATIGUE LIFE OF M-50 STEEL

James L. Perry
Lieutenant, United States Navy
B.S., Auburn University, 1977

AISI M-50 steel was warm-rolled at 750°C (1382°F). Samples of both warm-rolled and as-received (spheroidized annealed) M-50 were austenitized at 1036°C (1897°F) for various times and subsequently tempered. The heat treated samples were subjected to rolling contact fatigue (RCF) testing. In all cases prior warm-rolling degraded the RCF life at both the L_{10} and L_{50} levels.

Scanning electron microscopy was used to examine the microstructure of the as-received and warm-rolled material between 4000X and 10,000X magnification. Voids in the 0.3 μm to 2.2 μm range were documented within the microstructures. It was found that warm-rolling increased geometric mean of the void size in the transverse direction from 0.485 μm to 0.768 μm, and from 0.629 μm to 0.882 μm in the longitudinal direction.

It is thought that the increase in the void diameters accounts for the decrease in RCF performance of warm-rolled M-50. The degraded RCF performance is due to both the increase in mean void diameter and the increase in larger sized voids that accompany warm rolling. A qualitative model was developed to account for the origin of voids in as-received material and for the increase in void diameter in warm-rolled material.

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Advisor: T.R. McNelley
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Mechanical Engineering

THE INFLUENCE OF OIL CONTAMINATION ON THE NUCLEATE POOL-BOILING BEHAVIOR OF R-114 FROM A STRUCTURED SURFACE

James T. Reilly
Lieutenant, United States Navy
B.S., U.S. Naval Academy, 1978

The external nucleate pool-boiling heat-transfer coefficient of a horizontal smooth copper tube in R-114-oil mixtures (0 to 10 percent oil) was measured for heat fluxes from 1 to 100 kW/m^2 at two different saturation temperatures (-2.2°C and 6.7°C). A copper-nickel tube coated with the Union Carbide "High Flux" coating was similarly tested. The High Flux coating was found to improve the heat-transfer coefficient by at least a factor of 7 in oil-free R-114. Oil resulted in about a 20 percent reduction of the heat-transfer coefficient of the High Flux surface at heat fluxes less than 30 kW/m^2 and up to an 80 percent reduction at heat fluxes above 30 kW/m^2 with greater than 6 percent oil. Under all conditions, the High Flux coated tube outperformed the smooth copper tube.

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Mechanical Engineering
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Advisor: P.J. Marto
Department of
Mechanical Engineering

THE EFFECT OF MOULD SIZE ON THE EXOTHERMIC REACTION AND COMPRESSIVE STRENGTH OF EPOXY RESIN CHOCKS

John D. Stalnaker
Lieutenant, United States Navy
B.S., United States Naval Academy, 1978

A study was conducted on the effects of mould size on the exothermic reaction that occurs during the curing of epoxy resin chocks. Moulds of CHOCKFAST ORANGE were cast with lateral dimensions of 3 by 3 inches, 6 by 6 inches and 9 by 9 inches, with thicknesses of 1/2, 1 and 1-1/2 inches. Results showed that the degree of exotherm increased with increased chock thickness. The 1/2 inch thick samples showed very little temperature rise, with the temperature increasing linearly with time. The 1 inch thick samples, beginning with the 6 by 6 by 1 inch sample, and the 1-1/2 inch samples experienced a two stage exothermic reaction, with temperature increasing linearly initially and then exponentially during the second stage. Stress versus strain plots revealed a significant increase in ductility with the increased exotherms, resulting in substantially higher ultimate strengths. Chock specimens experiencing the second stage, exponential temperature rise had ultimate strengths consistently in excess of 20,000 psi, compared to 16,000 to 17,000 psi to those specimens that did not.

Master of Science in
Mechanical Engineering
December 1984

Advisor: D. Salinas
Department of
Mechanical Engineering

EFFECTS OF ANNEALING TREATMENTS ON SUPERPLASTICITY IN A THERMO-MECHANICALLY PROCESSED ALUMINUM-10.2%Mg-0.52%Mn ALLOY

Alta F. Stengel
Lieutenant, United States Navy
B.A., Mankato State College, 1972
M.S., Drexel University, 1983

This research follows previous thesis work by Becker and Mills on superplastic behavior of a warm rolled Al-10.2%Mg-0.52%Mn alloy. Elongations of up to 391% were reported by them for tension testing at 300°C and a strain rate of 1.4×10^{-3} s^{-1}. In this work, material was warm rolled at 300°C to 94% reduction and then subjected to one of five subsequent annealing treatments: 1 hour at 200°C, 10 hours at 200°C, 1/2 hour at 250°C, or 1/2 hour at 440° (to recrystallize the material). Tension testing at temperatures ranging from 300°C to 425°C was then conducted. Annealing below the rolling temperature enhances superplastic behavior when compared to the as-rolled condition. For example, material warm rolled at 300°C, annealed for 1 hour at 200°C and then tested at 300°C with a strain rate of 5.6x10-3 s-1 gave a ductility of 572%. Annealing, however, for 1/2 hour at 440°C results in a recrystallized structure which is stronger than the as-rolled condition and less ductile when tested at 300°C.

Master of Science in
Mechanical Engineering
December 1984

Advisor: T.R. McNelley
Department of
Mechanical Engineering

INVESTIGATION INTO THE EFFECTS OF USING DETONATING CORD TO REMOVE A CONVENTIONAL PROPELLER FROM A WATERBORNE SURFACE SHIP

J.H. Strandquist III
Lieutenant Commander, United States Navy
B.A., Villanova University, 1975

The relation between the shock wave pressure on the propeller hub and the size of the detcord charge was determined experimentally by a series of shots conducted on a full-scale test platform. The shock-induced response of the shaft was measured directly with strain gages and accelerometers. Additionally, the experimental shock wave pressure data provided the basis for numerical prediction of the response profile of the shaft.

Master of Science in
Mechanical Engineering
December 1984

Advisor: Y.S. Shin
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Mechanical Engineering

DESIGN OF A GENERATOR FOR NEAR-TANGENTIAL TRANSONIC SWIRLING OUTFLOW

Pamela E. Thrower-LeSesne
Lieutenant, United States Navy
B.S., University of California at Los Angeles, 1978

Two computer methods for the design of radial out-flow turning vanes are described. The key requirement was for vanes with simple shapes that could be machined easily and inexpensively in-house. Two design approaches, one using circular arcs for both suction and pressure sides were developed.

Requirements for the general design procedure arose in two exploratory projects, a Rotary Detonative Wave Engine (RDWE) and a High speed Centrifugal Diffuser Test Device (CDTD). The RDWE was analyzed first and found to be potentially inefficient in its original configuration. Preliminary design for a high speed CDTD flow Generator was completed, incorporating wedge-arc radial outflow vanes. An attempt to analyze the flow through the geometry using Eidelman-Godnov-Euler (EGE) was initiated.

Master of Science in
Mechanical Engineering
December 1984

Advisor: R.P. Shreeve
Department of
Aeronautics

DETERMINATION OF THE DUCTILE TO BRITTLE TRANSITION TEMPERATURE OF PLATINUM-ALUMINIDE GAS TURBINE BLADE COATINGS

David J. Vogel
Lieutenant Commander, United States Navy
B.S., U.S. Naval Academy, 1974

A strain-to-failure method was employed with Naval Postgraduate School tensile testing equipment to determine the ductile to brittle transition temperature (DBTT) of five basic platinum-aluminide gas turbine blade coatings on a nickel-base superalloy (IN738). The results of these tests were compared to similarly formed nickel-aluminide coatings without platinum and conclusions were drawn concerning the effect of the platinum and aluminum content and structure on coating ductility.

Master of Science in
Mechanical Engineering
September 1985

Advisor: D.H. Boone
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Mechanical Engineering

COMPARISON OF THE RESPONSE OF SHAPE MEMORY ALLOY ACTUATORS USING AIR-COOLING AND WATER-COOLING

Robert E. Watson
Lieutenant, United States Navy
B.S., St. Lawrence University, 1977

Titanium-Nickel (Ti-Ni) alloy specimens with induced shape memory were subjected to various single step current inputs under water-cooled, natural convective air-cooling, and stagnant air-cooling conditions to determine cooling time constants and subsequent delay time for successive actuation. Power input, specimen recovery and reextension displacement with various loads applied to the coil shaped actuator, and temperature distributions along the coil were recorded as functions of time. Results suggested that liquid cooling was a viable method for increased actuator response time. A brief review of the phase transformations that give rise to the shape memory effect is included. Recommendations for continued research and application are discussed.

Master of Science in
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Advisor: W.G. Culbreth
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Mechanical Engineering

EXPERIMENTAL INVESTIGATION OF TURBULENT HEAT TRANSFER IN STRAIGHT AND CURVED RECTANGULAR DUCTS

Joel L. Wilson
Lieutenant, United States Navy
B.S., United States Naval Academy, 1977

An experimental investigation has been conducted to examine the convective heat transfer in straight and curved ducts of rectangular cross section. The experimental configuration was modeled as infinite parallel plates with one wall at a constant heat flux and the opposite wall adiabatic. Experiments were conducted at steady state for turbulent flow using average Nusselt numbers to compare the heat transfer characteristics of the straight and curved sections.

The development of Taylor-Gortler vortices in the curved section proved to enhance the heat transfer rate over that of the straight section. Improved heat exchanger and turbine blade design could both result from a better understanding of the effects of curvature on the rate of heat transfer.

Master of Science in
Mechanical Engineering
December 1984

Advisor: M.D. Kelleher
Department of
Mechanical Engineering

MASTER OF SCIENCE

IN

METEOROLOGY

MEAN FLOW AND TURBULENCE IN COMPLEX TERRAIN

Michael J. Buell
Captain, United States Air Force
B.S., Pennsylvania State University, 1980

Atmospheric models used to describe horizontal diffusion in the surface layer depend upon a detailed characterization of the mean flow and standard deviation of wind direction fluctuations ($\sigma\theta$). Meteorological data were collected from 12 towers located across the coastal complex terrain of Vandenberg AFB, CA from August 1983 to July 1984 in order to analyze these mean and turbulence parameters as a function of stability, time averaging, wind direction, wind speed, elevation and terrain.

Three stability cases were chosen from Richardson Number criteria and found representative of specific flow regimes. $\sigma\theta$ was a function of stability with the largest values associated with the unstable (sea breeze) case and lower values with the stable (land breeze/drainage flow) and neutral (postfrontal) cases. All three stability cases showed varying degrees of $\sigma\theta$ dependence on time averaging, wind direction, wind speed, elevation, and terrain with greater time averaging dependence found in the unstable case, greater wind direction and terrain dependence noted in the stable case, and greater lower level height dependence found in both the stable and unstable cases. In contrast to most findings over homogeneous terrain, $\sigma\theta$ dependence on wind speed was found in all three stability cases with this dependence most important in the neutral case.

Master of Science in
Meteorology
March 1985

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Physics

NUMERICAL SIMULATION OF COLD SURGES

Nancy E. Harris
Captain, United States Air Force
B.S., State University of New York College at Brockport, 1975

A global, six-level primitive equation model was numerically integrated to examine the interaction of a planetary wave with a growing mid-latitude baroclinic wave. The purpose of this study was to determine the contribution of the baroclinic wave to the initiation of a monsoon surge. Three experiments were run. Experiment I depicted the effect of the planetary wave on the southward migration of cold air. The cyclogenesis of a mid-latitude baroclinic wave was shown in Experiment II. Experiment III combined the growing baroclinic wave with the stable planetary wave in an attempt to simulate a cold surge. Characteristics of a monsoon surge were present in the numerical simulation but not to the extent or detail of observed surges. The results indicated the important role of planetary wave advections in the formation of cold surges.

Master of Science in
Meteorology
September 1985

Advisor: R.T. Williams
Department of
Meteorology

A COMPARISON OF SIX VERTICAL DISCRETIZATION SCHEMES

Mary S. Jordan
Captain, United States Air Force
B.S., University of Notre Dame, 1978
B.S., The Pennsylvania State University, 1979

Six vertical discretization schemes are compared for a linear, baroclinic, vorticity-divergence equation model. Variables are defined for two staggered and one unstaggered grids. A finite difference and a Galerkin finite element approximation are formulated for each of the three grids. The models are tested in three experiments. The largest difference between the grids occurs in the mid-atmospheric diabatic heat source experiment and the unstaggered grid provides the best results. For the staggered grids, the results of the finite element models are not more accurate than the corresponding finite difference results. Oscillations occur in the temperature profiles near the surface for both staggered finite element models.

Master of Science in
Meteorology
September 1985

Advisor: R.T. Williams
Department of
Meteorology

THE INFLUENCE OF LARGE-SCALE 200 MB TROPICAL DIVERGENCE EVENTS ON THE MIDLATITUDE ZONAL FLOW OVER THE ASIA-PACIFIC REGION DURING THE 1983-84 WINTER

Keng-Gaik Lum
Malaysian Meteorological Service
B.S. (Hons), University of Malaya, 1976

Global band analysis grid point data produced by FNOC for the 1983/1984 winter season are used to study the daily variation of the midlatitude 200 mb zonal wind in relation to the divergence field. It is found that the enhancements of tropical divergence are well correlated with the intensification of the westerly jet in the midlatitudes. Three cases of the tropical divergence events were associated with tropical storm activities. This association asserts that westerly jet intensification is, in fact, a response to the tropical divergence enhancement, accepting the view that developed tropical storms are tropically-forced systems. A case of tropical divergence enhancement was also found to be attributable to a cold surge, reaffirming the importance of the cold surge related jet acceleration. Further, the study also confirms the downstream propagation of the jet streak; the existence of thermally indirect circulations at the jet exit region of the jet, both in the time-mean and in the transient motion fields.

Master of Science in
Meteorology
June 1985

Advisor: C.P. Chang
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Meteorology

SENSITIVITY OF PLANETARY WAVES TO INITIAL CONDITIONS AND FORCING

Michael D. McAtee
Captain, United States Air Force
B.A., University of California, Berkeley, 1978

The sensitivity of planetary waves to various initial conditions and thermal forcing is examined using a linear global primitive equation spectral model.

Initial conditions are obtained by switching on an analytic heat source and then integrating the model equations out to 30 days. An averaging procedure is used to eliminate any transient modes which remained after integration so that the initial conditions represent steady state solutions. Additional integrations are performed in which 'errors' are introduced into the forcing and initial conditions.

Results of the study are examined using polar phase vs. amplitude plots (harmonic dials) of various spherical harmonics. Results indicate that planetary waves are not sensitive to errors in the forcing or initial conditions. However, this lack of sensitivity is most likely due to the simplified initial conditions used in the model rather than to the inherent sensitivity of planetary waves.

Master of Science in
Meteorology
December 1984

Advisor: R.T. Williams
Department of
Meteorology

PRECIPITATION ESTIMATION USING COLLOCATED GOES SATELLITE AND SURFACE DATA

David W. Rust
Captain, United States Air Force
B.A., University of St. Thomas, 1978

The separation of precipitation from non-precipitation events using a matrix of GOES-E digitized infrared and visual satellite data was studied. Precipitation verification was conducted with collocated surface observations. The data set consists of 70,623 surface observations, of which 29,342 have collocated satellite data.

The visual data were normalized and converted to albedos using the Muench and Keegan (1979) normalization scheme. The data set was separated into four categories (precipitation/no-precipitation, and infrared/visual) and after testing for normality, it was determined that none of the categories were normally distributed. Using histograms, a distinct separation between the peaks of precipitating and non-precipitating events was found, but some overlap does exist.

Testing of infrared/visual thresholds for precipitation/no-precipitation events used in automated cloud and precipitation research yielded a correct estimation rate of 92% when the infrared and visual thresholds were combined.

Master of Science in
Meteorology
December 1984

Advisor: C.H. Wash
Department of
Meteorology

USE OF SPACE SHUTTLE PHOTOGRAPHY IN THE STUDY OF METEOROLOGICAL PHENOMENA

Frederick J. Svetz
Captain, United States Air Force
B.A., St. Mary's College of California, 1976

Analysis of three atmospheric phenomena (squall line over the Gulf of Mexico on 9 April 1984, Hurricane Kamisy in the Indian Ocean 7-12 April 1984, and the Mauna Loa volcano smoke plume, Hawaii 7-12 April 1984) is performed using handheld-camera photographs from the Space Transportation System (STS) 41-C mission (6-13 April 1984). High resolution color photographs taken of the earth from the Space Shuttle Challenger were made available from the National Aeronautics and Space Administration (NASA) through the Space Shuttle Earth Observations Projects (SSEOP).

Comparison is made to collocated meteorological satellite images (DMSP, AVERR and GOES) and conventional meteorological data to illustrate the advantages and deficiencies of these new high resolution photographic data.

Master of Science in
Meteorology
June 1985

Advisor: C.H. Wash
Department of
Meteorology

MASTER OF SCIENCE

IN

METEOROLOGY AND OCEANOGRAPHY

VARIATION OF THE DRAG COEFFICIENT WITH WIND AND WAVE STATE

Beverly J. Byars
Lieutenant Commander, United States Navy
B.S., Kansas University, 1976

The dissipation method is used to obtain estimates for the friction velocity, U_*, as well as values for the neutral drag coefficient, C_{DN}, for data collected from a coastal tower off San Diego, California. C_{DN} is found to be independent of the ten-meter height windspeed, U_{10}, for velocities between 4-9 m/sec. Its value is estimated to be $(0.94\pm0.4)10^3$ which compares well with values by Smith (1980) and Large and Pond (1981). Definite trends in C_{DN} with fetch and sea state are also observed. Drag coefficient estimates are found to be higher for short fetch than for long fetch conditions. C_{DN} is also seen to increase sharply just before frontal passages and during sea breeze conditions when the waves are actively growing. With the windspeed and wave field reaching equilibrium, C_{DN} is found to decrease with time to a smaller and more constant value.

Master of Science in
Meteorology and Oceanography
September 1985

Advisors: K.L. Davidson
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Department of
Meteorology

UTILIZATION OF THE SEASAT SCATTEROMETER WINDS FOR OCEAN MIXED LAYER MODELING

Eric J. Coolbaugh
Lieutenant, United States Navy
B.S., Florida Institute of Technology

A study is made of the feasibility of using SEASAT Scatterometer wind measurements as the surface wind stress forcing for an ocean mixed layer model. Comparisons are made of daily SASS and FNOC winds and the respective mixed layer model results on a 2 degree latitude by 5 degree longitude grid from July 15 to August 15, 1978 in the Anomaly Dynamics Study region of the North Pacific Ocean. The direct comparison of the SASS and FNOC wind fields showed good agreement. Cases of reduced pattern correlation between the SASS and FNOC winds appear to result from periods of low percentage coverage by the SASS wind fields and the difference in spatial resolution between the SASS and FNOC winds. The results of the model comparison of the wind fields show the model's high sensitivity to the accuracy of its wind speed boundary condition. Nevertheless, the SASS and FNOC winds gave similar model results, demonstrating the potential of scatterometer wind speed measurements for use with future ocean mixed layer model prediction.

Master of Science in
Meteorology and Oceanography
December 1984

Advisor: R.W. Garwood
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AN OBJECTIVE DETERMINATION OF TROPICAL CYCLONE WARNING POSITIONS

William T. Curry
Lieutenant Commander, United States Navy
B.S., University of Utah, 1977

A technique has been developed to determine objectively the location of a tropical cyclone at warning time and reduce the short-term forecast errors due to errors in the warning position. The western North Pacific CLIPER (CLImatology and PERsistence) forecast scheme is used to generate a potential track from each fix, and a smooth curve is fit to the future and past positions. When multiple fixes are available, weighting functions are applied to account for fix platform accuracy and time of receipt. A set of 836 cases from 30 storms during 1981-1983 was evaluated. Using the objective scheme, 16 of the 30 tropical cyclones had reduced warning position errors compared to the Joint Typhoon Warning Center official warning position. For 11 of the 30 storms, the objective warning positions resulted in more accurate 24-h forecasts with the CLIPER technique than the official warning positions. This technique appears to provide an efficient, interactive tool to the forecaster to use in establishing the warning position.

Master of Science in
Meteorology and Oceanography
June 1985

Advisor: R.L. Elsberry
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WAVE AND SURF FORECAST MODEL EVALUATION FOR USE ON A MICRO COMPUTER

Lee E. Devendorf
Lieutenant, United States Navy
B.S., State University of New York at Oswego, 1977

A sea swell and surf model is implemented, tested and evaluated on a micro computer (HP-9845B). The two-dimensional model includes spectral wind-wave generation in open water, and shallow water wave transformation over irregular topography. The model predicts surf zone width, breaker lines and types of breakers. Using change in momentum flux of gravity waves (radiation stress) as forcing, the model predicts current velocities within the surf zone. The model is evaluated for the conditions over constant depths and uniform sloping beaches. The numerical results are checked against accepted theory and field observations. The model is found to overbuild wind generated sea heights for a 30 kts wind but to give expected wave heights for a 15 kts wind. The model results compare well with observed nearshore wave heights but give poor location of breaking waves. The model's nearshore current calculation is found unsuitable for the HP-9845B due to computational instability and time requirements. The sources of the model's problems are identified, and recommendations are made for future improvements of the model.

Master of Science in
Meteorology and Oceanography
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Advisor: E.B. Thornton
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Oceanography

DIAGNOSTIC VERIFICATION OF THE GLAS GENERAL CIRCULATION MODEL AS APPLIED TO A CASE OF EXTRATROPICAL MARITIME EXPLOSIVE CYCLOGENESIS

Kenneth A. Ebersole
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1976

The general circulation model from the Goddard Laboratory for Atmospheric Sciences (GLAS) is verified for a case of explosive extratropical cyclogenesis in the North Pacific. Model runs are initialized with GLAS analyses based on the First GARP Global Experiment (FGGE) Level III-b data. Mass and vorticity budget studies are performed on two separate sets of forecasts. One set (SAT) was initialized with all available FGGE data, while the other (NOSAT) was initialized with all FGGE data except satellite data.

Explosive development occurs in conjunction with zonal mid-level flow and strong jet streak interaction. The inclusion of underestimated satellite winds in the SAT initial field weakened the intensity of the jet stream and adversely affected the forecasts. The NOSAT run indicated greater surface convergence, divergence aloft, vertical motion and PVA than the SAT run. The NOSAT prognoses developed and positioned the storm more accurately than the SAT prognoses.

Master of Science in
Meteorology and Oceanography
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Advisor: C.H. Wash
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Meteorology

FORECASTING ATMOSPHERIC VISIBILITY OVER THE SUMMER NORTH ATLANTIC USING THE PRINCIPAL DISCRIMINANT METHOD

Kristine C. Elias
Lieutenant Commander, United States Navy
A.B., University of California, Riverside, 1973

This report describes the application and evaluation of the Principal Discriminant Method (PDM) in the forecasting of horizontal visibility over selected physically homogeneous areas of the North Atlantic Ocean. The main focus of this study is to propose a possible model output statistics (MOS) approach to operationally forecast visibility at the 00-hour model initialization time and the 24-hour and 48-hour model forecast projections, using as data the period 15 May--7 July 1983. The technique utilized involves the manipulation of observed visibility and the Fleet Numerical Oceanography Center's Navy Operational Global Atmospheric Prediction System (NOGAPS) model output parameters. Both two-and three-category visibility models were examined. The resulting zero-and one-class errors as well as the threat scores from the PDM model were compared with those obtained from maximum probability and natural regression studies. For the majority of the experiments performed, PDM was outperformed by the other techniques, although one trial run of an adjusted PDM technique gave results very similar to those of the maximum probability techniques.

Master of Science in
Meteorology and Oceanography
March 1985

Advisor: R.J. Renard
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Meteorology

TEMPORAL AND SPATIAL DISTRIBUTIONS OF ARCTIC SEA ICE THICKNESS AND PRESSURE RIDGING STATISTICS

Robert P. Garrett
Lieutenant Commander, United States Navy
B.A., University of New Mexico, 1976
M.M.A., University of Rhode Island, 1982

Data from the unclassified literature were reviewed to determine the regional and seasonal distributions of sea ice thickness, pressure ridging statistics, frequency of occurrence of polynyas, and keel/sail height ratios. Seasonal and regional maps and histograms of these properties were constructed. The majority of the data were obtained from submarines equipped with a narrow-beam, upward-looking sonar.

As determined from an analysis of 17 submarine cruises, the overall mean thickness of Arctic sea ice above 65°N, including both deformed and undeformed ice, is 2.9 m with a standard deviation of 1.8 m. The overall seasonal mean ranges from approximately 2.4 m in spring to 3.3 m in summer. Local mean ice thicknesses ranged from less than 1 m near the marginal ice zone to greater than 7 m to the north of the Canadian Archipelago. Histograms of sea ice thickness reflect a bimodal distribution in winter and spring, an effect of the presence of thin first year ice. Due to ice melt in summer and autumn only a single mode of much thicker multi-year ice is observed.

Master of Science in
Meteorology and Oceanography
March 1985

Advisor: R.H. Bourke
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TEST AND EVALUATION OF AN IMPROVED SEA, SWELL AND SURF PROGRAM

Michael J. Gill
Lieutenant, United States Navy
B.S., University of Washington at Seattle, 1978

A sea, swell and surf program is improved, tested and evaluated on a microcomputer (HP-9845B). Sea swell is calculated by a two dimensional spectral model. The energy balance equation is tested for different cases of wind velocities and water depths. Satisfactory agreement is observed between the offshore model and expected wave heights for a 15 knot wind, but the model overbuilds wave energy for a 30 knot wind. Wave transformation is described by a one dimensional random wave model in which the wave heights are described using the Rayleigh distribution. The obtained solution of the random wave field is used to predict the longshore currents. An empirical formula for determining the breaker parameters is developed, based on beach slope and incident wave steepness. The improved model is tested using an undulating bathymetry to validate the model physics. The model outputs of wave height and current are compared with data acquired from wave tanks and natural beaches. The model is found to accurately forecast wave heights, breaker location, breaker type and longshore currents for several sets of conditions. Model limitations are discussed and recommendations for further improvement are made.

Master of Science in
Meteorology and Oceanography
September 1985

Advisor: E.B. Thornton
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ONE DIMENSIONAL MODEL HINDCASTS OF WARM ANOMALIES IN THE NORTH PACIFIC OCEAN

Bernardino J. Jaramillo
Lieutenant Commander, United States Navy
B.S., University of Utah, 1975

Hindcasts of the development, maintenance and decay of warm anomalies in the North Pacific Ocean are attempted with the Garwood one-dimensional ocean mixed layer model. Monthly temperature analyses from the North Pacific Ocean Experiment (NORPAX) provide the initial and verifying fields, and the atmospheric forcing is derived from FNOC archived analyses. Large systematic errors in the anomaly hindcasts during the early summer are apparently due to erroneous surface heat flux specifications. Variations of the heat flux corrections proposed by Elsberry et al. (1982) are extensively tested for one warm anomaly development period. The climatology of Wyrtki (1967) is the heat flux specification most successful in simulating the observed anomaly patterns. The hindcasts demonstrate the importance of an accurate heat flux specification for correct prediction of warm anomalies.

Master of Science in
Meteorology and Oceanography
December 1984

Advisor: R.W. Garwood
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Oceanography

MESOSCALE FEATURES AND ATMOSPHERIC REFRACTION CONDITIONS OF THE ARCTIC MARGINAL ICE ZONE

James A. McNitt
Lieutenant, United States Navy
B.S., University of Idaho, 1978

The Marginal Ice Zone Experiment (MIZEX-83) conducted in the Arctic during the summer of 1983 is summarized and the mesoscale features and atmospheric refraction conditions described. The three case studies examined are: warm air advection over dense pack ice causing strong elevated ducting and subrefraction, cold air advection over relatively open water causing shallow convection and normal refraction conditions, large scale subsidence in the western quadrants of an anticyclone leading to super-refraction and weak ducting.

Developing synoptic scale cyclones adjacent to the MIZEX-83 area often determined the airflow over the region. The observed large horizontal SST gradients were the dominant forcing mechanisms on surface layer stability. Trapping layers associated with subsidence inversions can be located on satellite imagery by assuming that stratiform clouds form immediately below the inversion. Uniform cloud and refraction layers were not common during MIZEX-83 due to strong mesoscale variability. Factors affecting inversion height include subsidence and entrainment mixing. Bulk Richardson number values for locations over the open water and pack ice show significant variability in stability conditions across the MIZ.

Master of Science in
Meteorology and Oceanography
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Advisor: K.L. Davidson
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Meteorology

EVALUATION OF SURFACE EXCHANGE COEFFICIENTS FROM MILDEX OCEAN/ATMOSPHERE MIXED LAYER DATA

Hardi S. Rosner
Lieutenant, United States Navy
B.A. Eastern College, 1973
M.S., University of Southern California, 1982

A coupled oceanic-atmospheric boundary layer model which provides single-station prediction capability is evaluated relative to wind stress and oceanic mixed layer depth observations. The model is initialized and verified using data obtained during the 1983 Mixed Layer Dynamics Experiment (MILDEX). Model computation of friction velocity (u*) and oceanic mixed layer depth are compared with observations from both atmospheric frontal and non-frontal synoptic situations. Favorable results of model u* predictions are achieved although in some cases they are slightly higher than observed turbulence derived values of u*. Mixed layer predictions are very close to the observed except in frontal regions. Proper ABL/OBL model initialization of boundary layer values is critical in order to achieve favorable results.

Master of Science in
Meteorology and Oceanography
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Advisor: K.L. Davidson
Department of
Meteorology

SINGLE STATION ASSESSMENT OF ATMOSPHERIC BOUNDARY LAYER PROPERTIES IN THE EASTERN MEDITERRANEAN

Charles E. Sellers
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1975

The marine environment strongly affects the use of naval weapons and sensor systems. The ducting of electromagnetic energy is one of the most important influences on modern systems. The ability to describe the atmosphere is the first step in producing a realistic forecast. This study shows that in the eastern Mediterranean Sea the observed soundings appear to have a systematic error in the lower sections of the mixed layer. This, coupled with the synoptic scale changes in the atmosphere, causes single station forecasting scheme to fail. This thesis emphasizes two points: 1) the need for an accurate description of the atmosphere is paramount to any forecast. 2) the users of any single station forecast must use their knowledge of the models and compare the model results to the other information on hand to determine whether or not the prediction is reliable.

Master of Science in
Meteorology and Oceanography
June 1985

Advisor: K.L. Davidson
Department of
Meteorology

POSSIBLE CROSS EQUATORIAL INFLUENCE OF THE NORTHEAST MONSOON ON THE EQUATORIAL WESTERLIES OVER INDONESIA

Kathy A. Shield
Lieutenant, United States Navy
B.A., Oakland University, 1977

Objectively analysed surface, 700 and 200 mb winds of nine winters are used to study the possible cross equatorial influence of the northern winter monsoon on the zonal wind along 10°S in the Indonesia-Arafura Sea region and to prepare a nine year monthly mean climatology. Key circulation features are represented by area averaged and time composited parameters in an attempt to infer correlations between their perturbations. Specifically, the acceleration of the zonal wind along 10°S in the Indonesia-Arafura Sea region is used to define the onset of the southern summer monsoon and illustrate the timing between circulation features of interest in both hemispheres. While no conclusive results were achieved, some basic observations can be made. Mid-season active phases in the southern summer monsoon appear to be influenced by surges in the northeast monsoon in the Northern Hemisphere while late season events appear to be primarily a result of Southern Hemispheric, mid-latitude, baroclinic effects. In both cases, the meridional extent of the southern summer monsoon is limited. Even in the mid-season event, variability in area-averaged cross equatorial flow may not be indicative of the nature of forcing of the Northern Hemisphere's monsoonal winds on the southern summer monsoonal winds along 10°S.

Master of Science in
Meteorology and Oceanography
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Advisor: C.P. Chang
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Meteorology

SIMULATION OF THE COUPLED ATMOSPHERIC AND OCEANIC BOUNDARY LAYER MODEL DURING MILDEX

Joseph W. Swaykos
Lieutenant Commander, U.S. Navy
B.S., United States Naval Academy, 1976
M.S., University of Southern California, 1982

A coupled, oceanic-atmospheric boundary layer model which provides single-station prediction capability is evaluated relative to boundary layer observations. The model is initialized and verified using data obtained during the 1983 Mixed Layer Dynamics Experiment (MILDEX). Model prediction of inversion height, lifting condensation level, air and sea temperatures, specific humidity and mixed layer depth are compared with observations. A significant model shortcoming is the over-prediction of cloud thickness. Consequently, shortwave radiation at the ocean surface is too low and the predicted ocean mixed layer depths are not realistic. Oceanic predictions resulting from independent specification of surface radiation more closely resembled observed oceanic variations. Atmospheric boundary layer model reformulation is required to alleviate the cloud thickness/shortwave radiation problem.

Master of Science in
Meteorology and Oceanography
December 1984

Advisor: R.W. Garwood
Department of
Oceanography

A MODEL STUDY OF THE EQUATORIAL OCEAN SURFACE TEMPERATURE RESPONSE TO WIND FORCING DURING EL NINO

Jeroen J. Waterreus
Lieutenant, United States Navy
B.S., United States Naval Academy, 1977

The purpose of this research is to investigate specific processes that contribute to large scale equatorial SST variability and by comparison with observation, verify the realism of the model's thermal response to prescribed forcing in the atmosphere. Building on previous work, more realistic thermodynamic processes are incorporated in the ocean part of Rennick's (1985) coupled ocean-atmosphere model and an examination of its response to prescribed wind forcing is conducted.

The dynamic ocean model is based on the shallow water momentum equations forced by a surface wind stress. It is linearized about a motionless state with a zonally sloping pycnocline depth which is in balance with the surface stress caused by the zonal wind of the atmospheric basic state. This study investigates the effect of turbulent vertical mixing of heat, in contrast to horizontal advection, for the generation of SST anomalies in the equatorial region of the Pacific. Results showed that the SST anomaly produced by turbulent mixing was two orders of magnitude smaller than, and 90 degrees out of phase with, the SST anomaly generated by horizontal advection.

Although the small magnitude of the anomalous entrainment heat flux would seem to justify its neglect, the phase difference raises the question of whether it would be significant in a coupled ocean-atmosphere system. Therefore, two cases of the coupled model were designed to investigate if the different SST responses caused by turbulent mixing and by horizontal advection would cause growth of a coupled disturbance. The results were that neither ocean process causes growth.

Master of Science in
Meteorology and Oceanography
June 1985

Advisor: R.L. Haney
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Meteorology

UTILIZATION OF SATELLITE-OBSERVED CLOUD PATTERNS TO IMPROVE ANALYSES OF EXPLOSIVE EXTRATROPICAL MARITIME CYCLOGENESIS

Dock D. Williams, Jr.
Lieutenant Commander, United States Navy
B.S., University of Utah, 1975

On the basis of analysis of satellite imagery, a set of designated cloud patterns is explored to evaluate their potential for improving the forecasts of explosively deepening extra-tropical cyclones. An analysis of 23 western Atlantic Ocean cases included correlation of infrared satellite imagery with derived pressure diagrams and synoptic data. The study includes: (1) quantitative pattern definition, (2) frequency of occurrence statistics and (3) objective evaluations of usage potential. Specific findings include: (1) a high number of dual cloud element storms; (2) distinct developmental segments in pressure fall rates of the storms; (3) varying degrees of reliability for the designated cloud patterns and (4) discussion of the practicability of formulating a storm developmental analog from the designated cloud patterns.

Master of Science in
Meteorology and Oceanography
September 1985

Advisor: C.H. Wash
Department of
Meteorology

FORECASTING OF TROPICAL CYCLONE MOTION USING AN EOF REPRESENTATION OF WIND FORCING

William E. Wilson
Lieutenant, United States Navy
B.S., Presbyterian College, 1975
M.S., Clemson University, 1977

Empirical Orthogonal Function (EOF) analysis is used to represent the environmental wind forcing of selected western North Pacific tropical cyclone tracks from 1979-1983. The EOF analysis is applied separately to the zonal and meridional wind components at 700, 400 and 250 mb on a 527-point grid with 288.7 km zonal and meridional spacing that is relocated with the storm center. The 527 EOF coefficients (for each level and component) are computed for a sample of 682 cases. The coefficient vectors are truncated to the first 35 coefficients based on a Monte Carlo selection criterion. These coefficients account for at least 82 percent of the variance in each field. The EOF coefficients, along with storm movement during the past 24 hours, position, date and intensity, are then used as potential predictors in a regression analysis forecast scheme for tropical cyclone motion. The EOF-based regression equations are tested on the dependent data cases. The mean 72-hour track forecast error is between 450 and 500 km. Therefore, it appears that this regression scheme has potential for operational applications.

Master of Science in
Meteorology and Oceanography
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Advisor: R.L. Elsberry
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Meteorology

AN EVALUATION OF DISCRETIZED CONDITIONAL PROBABILITY AND LINEAR REGRESSION THRESHOLD TECHNIQUES IN MODEL OUTPUT STATISTICS FORECASTING OF CLOUD AMOUNT AND CEILING OVER THE NORTH ATLANTIC OCEAN

Michael H. Wooster
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1975

This report describes the application and evaluation of several statistical models in the forecasting of cloud amount and ceiling over selected physically homogeneous areas of the North Atlantic Ocean. The focus of this study is to evaluate the applicability of previous Naval Postgraduate School model output statistics research in the area of horizontal marine visibility to the forecasting of cloud amount and ceiling over ocean areas. The models, including minimum probable error linear regression threshold techniques, maximum conditional probability and natural regression, utilize observed visibility data and model output parameters from the Navy Operational Global Atmospheric Prediction System (NOGAPS). Results show statistically similar results for the linear regression and maximum conditional probability models. Also included is the result of additional experimentation on the application of several measures of separability and cluster analysis to predictor selection.

Master of Science in
Meteorology and Oceanography
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Advisor: R.J. Renard
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Meteorology

INTERACTION OF FRONTS WITH TOPOGRAPHY

Deborah A. Zankofski
Lieutenant, United States Navy
B.S., John Carroll University, 1977
M.S., The Ohio State University, 1979

This study examines the formation of a front over a mountain due to a pre-existing deformation field. The dependent variables are assumed to be independent of x. The hydrostatic Boussinesq equations are used with no diffusion of heat or momentum. A modified coordinate system similar to Phillips' sigma system is used. The model is bounded at the top by a rigid plane and periodic boundary conditions are used in the horizontal. The solutions show the formation of a front within a finite period of time that tilts toward the cold air. The frontogenesis experiments with a mountain of wavelength 3600 km showed negligible topographic effects.

Master of Science in
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Advisor: R.T. Williams
Department of
Meteorology

MASTER OF SCIENCE

IN

OCEANOGRAPHY

DETECTION OF SHOALS IN SEASAT SYNTHETIC APERTURE RADAR IMAGERY: SELECTED CASE STUDIES

Ronald L. Dickerman
B.A., University of Connecticut, 1978

Ocean-going vessels have increased in size and draft in recent years, making traditional waterways too shallow and dangerous for use, and new shipping methods and increased costs require shorter transit times. Therefore, as new shipping routes are being sought, limited hydrographic survey resources must be efficiently applied. This study sought to demonstrate the feasibility of synthetic aperture radar (SAR) imagery as a tool for hydrographic presurvey planning by analyzing SAR imagery of Shelikof Strait, Alaska.

Anomalous brightness patterns visible in SAR imagery were related to interactions between ocean phenomena and bathymetric features, and an analysis of wave refraction was performed using optical Fourier transform (OFT)-measured wave spectra. The study results showed surface gravity wave refraction as measured by OFT's can be used to make quantitative estimates of water depths, generally within 40% error. Also, anomalous brightness patterns visible in SAR imagery indicate possible hazards to navigation. However, the absence of an anomalous pattern does not mean a hazard is not present.

Master of Science in
Oceanography (Hydrography)
September 1985

Advisor: J.L. Mueller
Department of
Oceanography

THE EQUILIBRIUM MIXED LAYER DEPTH IN THE TROPICAL ATLANTIC: THE ROTATION STRESS AND PENETRATION OF RADIATION EFFECTS

Joaquim Filipe Figueiredo Alves Gaspar
Lieutenant Commander, Portuguese Navy

The effects of the rotation stress mechanism and the penetration of shortwave radiation below the sea-surface are examined in determining a one-dimensional equilibrium mixed layer depth. Starting with the Obukhov-scale equilibrium theory for the surface ocean boundary layer, a revised equilibrium theory, which includes rotation stress and radiation effects, is presented. This new theory is applied using climatological boundary conditions for the tropical Atlantic, and the results are compared with the observed climatological mixed layer depth.

In general, the response of the revised model is an improvement over the Obukhov theory alone. Because the quality of the results are limited by uncertainties in the boundary conditions, no detailed evaluation of the model response is justifiable. However, it is concluded here that the physical mechanisms of rotation stress and penetration of radiation are important in determining a steady-state equilibrium depth of mixing for the tropical Atlantic.

Master of Science in
Oceanography
June 1985

Advisor: R.W. Garwood
Department of
Oceanography

COUPLED MIXED LAYER-ACOUSTIC MODEL

John J. McManus
Captain, Canadian Forces
B.Eng., Royal Military College of Canada, 1976

A coupled ocean mixed layer-acoustic model is evaluated in two dimensions at a line of stations in the northeast Pacific Ocean. The Oceanic Boundary Layer Model (OBL) is initialized using bathythermograph data acquired during the 1980 Storm Transfer and Response Experiment (STREX). The OBL model was used to predict a new thermal profile after integrating in time for 20 days. This output was then compared with actual bathythermograpn data taken 20 days later. Three cases were examined: initial, model, and final data as input to the RAYMODE acoustic model. The acoustic performance for the three cases was measured using median detection range (MDR) and convergence zone range (CZR). In the absence of strong horizontal advection, over a 20 day period the OBL can predict surface temperature to within an average of 0.5°C. Therefore, the coupled models can be used effectively to help predict MDR and CZR in a tactical situation.

Master of Science in
Oceanography
September 1985

Advisor: R.W. Garwood
Department of
Oceanography

NONLINEAR PARAMETRIC WAVE MODEL COMPARED WITH FIELD DATA

Jose Luis Branco Seabra de Melo
Lieutenant, Portuguese Navy
Portuguese Naval Academy, 1979

Wave spectra calculated using the Parameterized Nonlinear Wave Solution developed by Le Mehaute et al. (1984) are compared with field data acquired at Leadbetter Beach, Santa Barbara, California. The parameterized solution satisfies the nonlinear free surface boundary conditions to a specified degree of accuracy and is expressed in terms of a converging truncated Fourier series. The wavenumber, surface profile and wave orbital velocities are determined by the wave height and wave period at the local depth of water. Spectral components are compared between the model results and field data. Good agreement is observed for waves corresponding to Ursell numbers ranging from 25 to 75. For large Ursell numbers (strong nonlinear effects) the parameterized model underestimates the data.

Master of Science in
Oceanography
June 1985

Advisor: E.B. Thornton
Department of
Oceanography

AN INVESTIGATION OF THE ATMOSPHERIC BOUNDARY LAYER OVER THE ARCTIC OCEAN USING SODAR

Etienne de Rouge
Lieutenant de Vaisseau, French Navy

An attempt to describe the atmospheric boundary layer during the MIZEX 84 from 11 July to 17 July was made using a sodar system. The computation of the temperature structure parameter CT^2 in the surface layer using *in situ* measurements allowed the calibration of the system. CT^2 was found to have the following functional dependence on the backscattered signal I:

$$\text{Log}\,(CT^2)=8.63\text{Log}(I)-25.66.$$

Time-height cross-sections showed the structure of the boundary layer very well. An especially good representation of the strength of CT^2 in the inversion layer was achieved.

A program was developed to obtain the inversion layer height Zi, where the signal reaches a maximum. The thickness of the inversion layer was also computed and used with the calibration law to compute CT^2 at the inversion layer. This allowed the computation of the jump of potential temperature and the refractive index gradient in the inversion under free convection. Refractive trapping conditions were evident on 15 July although the generally small value of the heat flux did not indicate a strongly unstable boundary layer. Comparison with two radiosonde profiles shows good agreement in one case, but does not permit a reliable conclusion to be made concerning the method. However, the procedure could be extended to other areas, especially those with strong free convection. The method should provide a good estimate of the refractive condition in the atmospheric boundary layer.

Master of Science in
Oceanography
September 1985

Advisor: W.J. Shaw
Department of
Oceanography

AN INVESTIGATION OF THE WATERS OF THE EAST GREENLAND CURRENT

Mark D. Tunnicliffe
Lieutenant Commander, Canadian Forces
B.S., McMaster University, 1972

A dense network of conductivity-temperature-depth (CTD) measurements made over the eastern Greenland continental shelf and slope between 81°N and 75°N provided new detail on the water properties and circulation on the shelf and at the adjacent East Greenland Polar Front (EGPF). The EGPF approaches the shelf break rapidly between 80°N and 78°N remaining 20 to 30 km east of it thereafter at least until 75°N. A filament of Atlantic Water (AW) was found close to the eastern side of the front which became generally cooler with decreasing latitude, suggesting that the majority of the contribution of the West Spitzbergen Current to the southward flowing Return Atlantic Current occurs north of 78°N. The portion of the shelf investigated is cut by several troughs generally oriented east-west; two of which are joined by a north-south depression west of Belgica Bank. Dynamic topography, water properties and ice movement suggest an anti-cyclonic surface circulation over this system of troughs and banks with AIW advecting up the troughs from the east.

Master of Science in
Oceanography
September 1985

Advisor: R.H. Bourke
Department of
Oceanography

MASTER OF SCIENCE

IN

OPERATIONS RESEARCH

SURVIVAL FUNCTION OF HYPO-EXPONENTIAL DISTRIBUTIONS

Ali S. Abdelsamad
Colonel, Egypt
B.S., Military Technical College, 1970

Mamdouh M. Lotfy
Lieutenant Colonel, Egypt
B.S., Military Technical College, 1972

The reliability of a system is the probability that the system will survive or complete an intended mission of certain duration.

Describing all possible ways that a system can survive a mission in reliability shorthand gives a simple approach to reliability computations. Reliability computation for a system defined by shorthand notation is greatly dependent upon the convolution problem.

Assuming constant component failure rates, this paper presents an analytical approach and a computer program for computing the reliability of any convolution of independent and exponentially distributed random variables.

Master of Science in
Operations Research
March 1985

Advisor: J.D. Esary
Department of
Operations Research

A SYSTEMS APPROACH TO INVENTORY MANAGEMENT OF REPAIRABLES IN THE NAVY

Chris L. Apple
Lieutenant Commander, SC, United States Navy
B.S., Purdue University, 1970

This thesis develops an inventory model for repairable items which integrates the shipboard protection level into the wholesale stock level computations. It uses mean supply response time (MSRT) as its measure of effectiveness and provides methods for computing either the required wholesale stock level given a MSRT goal or for minimizing the system MSRT subject to budgetary constraints. Examples are provided which demonstrate the benefit of not batching for repair or procurement and the benefit of reducing repair turnaround times. In both instances the benefit realized is a reduction in the number of each item required at the wholesale level to achieve the desired MSRT goal.

Master of Science in
Operations Research
March 1985

Advisor: F.R. Richards
Department of
Operations Research

FASTS: A RADAR SIMULATION MODEL FOR THE DEVELOPMENT AND ANALYSIS OF AIRCRAFT ANTI-SHIP TACTICS

Frank O. Barrett III
Commander, United States Navy
B.S., United States Naval Academy, 1969

This thesis describes an interactive computer program that was developed by the author. The program which is called FASTS simulates a many-on-many war-at-sea scenario involving ship based early warning radars, strike aircraft and supporting radar jammers. It provides the tactics designer with a testbed for evaluating strike tactics against a defensive radar network and for estimating the impact of environmental conditions on radar detection.

Master of Science in
Operations Research
September 1985

Advisor: R.N. Forrest
Department of
Operations Research

EVALUATION OF OPERATION PLANS USING THE JOINT THEATER LEVEL SIMULATION

Mary A. M. Barrowman
Lieutenant, United States Navy
B.S., Mississippi University for Women, 1975

The purpose of this thesis is to present a method of evaluating joint operation plans (OPLAN's) using the Joint Theater Level Simulation (JTLS), a theater-level war game which models the functions of air, ground, naval, logistics, and intelligence activities. The thesis outlines the organizaiton and function of the participants and the types of game play possible. The method proposed uses a series of two-sided war games to evaluate aspects of OPLAN's and to identify areas for resolution in new plans. Aspects of OPLAN's which are appropriate for analysis with war gaming are identified. Limitations of OPLAN evaluation using JTLS are addressed and recommended solutions are presented.

Master of Science in
Operations Research
March 1985

Advisor: M.G. Sovereign
Department of
Operations Research

A MODEL OF LEASE VERSUS BUY IN FEDERAL GOVERNMENT CONSTRUCTION DECISIONS

Jerome F. Bentler
Lieutenant, United States Navy
B.S., University of Minnesota, 1978

This thesis examines the interaction of cash flows in the construction and operation of child care centers. The cash flows under government operation are examined and compared with the cash flows where the center operated by a private contractor under a lease agreement. Background concerning general public and private leasing agreements is provided. For the cash flow analysis a net present value model is generated using a commercial interactive computer program. Sensitivity analysis by varying input parameters and risk analysis utilizing Monte Carlo simulation are performed.

Master of Science in
Operations Research
September 1985

Advisor: D.C. Boger
Department of
Administrative Sciences

AN ANALYSIS OF NAVAL OFFICER STUDENT ACADEMIC PERFORMANCE IN THE OPERATIONS ANALYSIS CURRICULUM IN RELATIONSHIP TO ACADEMIC PROFILE CODES AND OTHER FACTORS

N. William Blatt
Commander, United States Navy
B.S., Oregon State University, 1968

The ability to forecast the academic performance of Naval Officer students in the Operations Analysis curriculum is an issue of importance to the Navy. In the interest of cost effectiveness and achieving the required numbers of operations analysis graduates, this thesis studies the present student selection factors for the OA curriculum and suggests several alternative factors to improve the selection decision. An analysis of variance approach was taken to explore the relationship of the students' academic profile code and several other variables to determine their importance in explaining the OA students' academic performance. A study of 159 Navy OA students was completed. The analysis showed the students' overall total college grade point average, the time from completion of college to commencement of work in the OA curriculum (in fact performance does not decrease over time), the students' designator and his college degree to be the most important factors in explaining the variability of student performance.

Master of Science in
Operations Research
September 1985

Advisor: R.R. Read
Department of
Operations Research

AN IMPLEMENTATION OF THE PROJECTIVE ALGORITHM FOR LINEAR PROGRAMMING

Guenter W. Bretschneider
Captain, German Air Force
M.S., Aeronautical Engineering
Hochschule der Bundeswehr, Munich, 1976

An algorithm to solve linear programming problems is presented which is based on Karmarkar's projective method. The algorithm includes a practical method to project a general linear programming problem onto a unit simplex and eliminates the *a priori* need to know the optimal value of the objective function. The implementation conserves sparsity. The key part of the implementation is the solution of a linear least-squares problem to find an improving direction: a direct and an iterative method are implemented to solve this problem. The direct method employs the minimum-degree heuristic to reorder the system of normal equations, and thus conserve sparsity during the following Cholesky factorization. The iterative method uses the incomplete Cholesky factor of the normal equation matrix as a preconditioner for conjugate gradient iterations which are performed implicitly on the preconditioned matrix. The study concludes with implementation remarks, and computational results.

Master of Science in
Operations Research
September 1985

Advisor: R.K. Wood
Department of
Operations Research

A GENERALIZED APPROACH TO AIR DEFENSE COMBAT MODELING

Chung Koo Cho
Major, Republic of Korea Army
B.S., Korea Military Academy, 1977

Yong Il Lee
Major, Republic of Korea Army
B.S., Korea Military Academy, 1977

This thesis presents a critique of air defense submodels in VECTOR-2 and CORDIVEM. The critique is used to develop an improved approach to modeling air defense against overflights. The proposed model design makes extensive use of pre-processing subprograms in order to increase model resolution. It also offers the analyst a framework for constructing particular models to satisfy specific objectives.

Master of Science in
Operations Research
September 1985

Advisor: J.B. Gafford
Department of
Operations Research

SURVEY OF INVESTIGATIONS INTO THE MISSILE ALLOCATION PROBLEM

Chow Kay Cheong
Ministry of Defense, Singapore
B.S. (E.E.), Duesseldorf Technical University, West Germany, 1977

This thesis gives a description of the physical and tactical parameters pertaining to missile defense and offense, and then proceeds with an overview of the mathematical investigations done on the missile allocation problem up to the 1972 publication of the survey monograph on this subject by Eckler and Burr. Finally, it presents the results of a similar survey done by the author of later unclassified studies on the missile allocation problem.

Master of Science in
Operations Research
June 1985

Advisor: A.R. Washburn
Department of
Operations Research

ALGORITHMS AND HEURISTICS FOR TIME-WINDOW-CONSTRAINED TRAVELING SALESMAN PROBLEMS

Chun, Bock Jin
Major, Republic of Korea Air Force
B.S., Korea Air Force Academy, 1976

Lee, Sang Heon
Major, Republic of Korea Army
B.S., Korea Military Academy, 1977

This thesis reports on methods for solving traveling salesman problems with time-window constraints. Two types of time windows are considered: hard time windows, which are inviolable, and soft time windows, which are violable at a cost. For both cases, we develop several heuristic procedures, including some that are based on Stewart's [Ref. 6] effective heuristics for the traveling salesman problem without time-window constraints. In addition, we develop exact algorithms for each case, which are based on the state-space relaxation dynamic programming method of Christofides, Mingozzi, and Toth [Ref. 5]. Computational experience is reported for all the heuristics and algorithms we develop.

Master of Science in
Operations Research
September 1985

Advisor: R.E. Rosenthal
Department of
Operations Research

TACTICAL EVIDENTIAL REASONING: AN APPLICATION OF THE DEMPSTER-SHAFER THEORY OF EVIDENCE

William H. Cleckner, IV
Captain, United States Army
B.S., United States Military Academy, 1975

This thesis demonstrates the use of the Dempster-Shafer theory of evidence on the battlefield. The use of the theory in a Decision Aid or Decision Support System for the Intelligence Analyst will speed the force commander's Command and Control Cycle.

The Command and Control Cycle is modelled and a benefit of enhanced command and control is described. The Dempster-Shafer theory is discussed using tactical battlefield examples. A Dempster-Shafer Decision Aid is presented as well as methods for improving computational speed. A specific application area, Situation Development Analysis in the All Source Analysis System (ASAS) is proposed.

Master of Science in
Operations Research
September 1985

Advisor: P.S. Fischbeck
Department of
Operations Research

A MODEL FOR THE PLANNING OF MANEUVER UNIT AND ENGINEER ASSET PLACEMENT

Dean E. Craig
Major, United States Army
B.S., United States Military Academy, 1973

This thesis develops a prototypical model for the planning of maneuver unit and engineer obstacle placement for the Airland Research Model under development at the Naval Postgraduate School. The model utilizes a multidimensional network for the representation of terrain and presents two algorithms for combat planning. A mid-European scenario for a brigade in defense is used to contrast the model solution to combat planning problems with established tactical doctrine. The prototypical model demonstrates that network methodologies provide an efficient means for terrain representation in large scale combat modeling.

Master of Science in
Operations Research
September 1985

Advisor: S.H. Parry
Department of
Operations Research

A PRELIMINARY STUDY: USMC TACTICAL COMMUNICATIONS TECHNICAL CONTROL NEEDS FOR THE LANDING FORCE INTEGRATED COMMUNICATIONS SYSTEM

Donald E. Creighton
Captain, United States Marine Corps
A.S., University of Hawaii, 1973
B.S., University of Utah, 1976

This study uses a systems analysis approach to determine the communications technical control needs of the Fleet Marine Force as the transition from analog to all digital systems occurs. Introductory material is presented on the Landing Force Integrated Communications System (LFICS) and associated methods of communications system control. The decision problem is stated as a needed choice between alternatives in both near term (1987-1990) and long term (1991+) eras of service. Examined are the technical control functional requirements for both the transitional near term and the eventual long term digital systems. The study raises issues on the automation of technical control in the development of a systems engineering functional description of an "ideal" facility. Consideration is given to the many other service and industrial solutions in the formulation of twelve alternative approaches to the total solution of communications technical control in the near and long term. A qualitative ordinal valued, multicriteria decision theory model is applied to the selection between these alternatives as opposed to a more quantitative cost and operational effectiveness analysis (COEA) study approach. The decision model is fully developed for this application and for general future use by the interested reader. Conclusions and recommendations are made based on analysis of the modeling results. Appendices provide necessary supporting detail and include issues and topics for future study.

Master of Science in
Operations Research
September 1985

Advisor: J.W. LaPatra
Department of
Administrative Sciences

STEADY STATE DISTRIBUTIONS FOR MANPOWER MODELS UNDER CONDITIONS OF GROWTH

Nan B. Dupuy
Lieutenant, United States Navy
B.A., George Mason University, 1975

Markov Chain models have been used to forecast stocks in a wide range of manpower systems. Studies have been done in many areas such as education planning, hospital planning, manufacturing, private research and development, a women's military unit, the civilian work force supporting the U.S. Navy and a state police organization. This study looks at such systems under conditions of change and develops the equations that describe the steady state distribution of personnel. The conditions of change include systems where recruitment is constant, increasing (decreasing) additively, or increasing (decreasing) additively, or increasing (decreasing) multiplicatively and systems where the changes in total system size are additively or multiplicatively increasing (decreasing). Numerical examples utilizing these models are provided, along with a computer program of the formulas written in the language APL.

Master of Science in
Operations Research
September 1985

Advisor: P.R. Milch
Department of
Operations Research

THE NAVAL POSTGRADUATE SCHOOL SCHEDULING SYSTEM: A HEURISTIC APPROACH

Dietmar W. Fiegas
Captain, German Army
Dipl. Ing., Fachhochschule der Heeres Darmstadt, 1977

A heuristic approach is presented to solve the Naval Postgraduate School's quarterly scheduling problem for academic courses and final examiniations. The current scheduling system is studied and an automated system for data collection is developed and implemented. An automated system for the scheduling of final examinations is designed and implemented. Results using real data from one quarter produced feasible solutions to the final examination scheduling problem of 1700 students, 267 courses and 850 sections. The academic course scheduling heuristic is discussed including an integer linear programming approach to the timetabling and distribution problem of students among segments of the same course. An example with an optimal solution to the single course scheduling problem is presented.

Master of Science in
Operations Research
September 1985

Advisor: R.K. Wood
Department of
Operations Research

RECONSTITUTION AND RECOVERY CAPABILITY OF THE LIGHT INFANTRY COMPANY

Hirome Fujio
Major, United States Army
B.B.A., University of Hawaii, 1974

This thesis is a study of the resiliency and recoverability of the light infantry company utilizing the Analysis of Military Organizational Effectiveness (AMORE) methodology. The efficiency of the current organizational structure of the company is determined by measuring its capability against its remaining resource level after the application of degradation. A discussion of the AMORE methodology and the light infantry concept is followed by the extensive input requirements of the model. A sensitivity analysis is conducted to examine the effects of changes in input parameters on the company reconstitution capabilities. The methodology is also used to determine those personnel and materiel that contributed to low rates and levels of unit recoverability. Based on the criterion established by Science Applications, Incorporated, this study concluded that the light infantry company, as it is currently designed, exhibits adequate resiliency and recoverability at degradation levels between 10 and 50 percent.

Master of Science in
Operations Research
September 1985

Advisor: A.W. McMasters
Department of
Operations Research

ANNUAL SCHEDULING OF ATLANTIC FLEET NAVAL COMBATANTS

Clarke E. Goodman, Jr.
Lieutenant, United States Navy
B.S., Miami University, 1977

Employment scheduling is the task of assigning ships to fulfill U.S. Navy commitments at home and abroad. Commitments are events, with fixed start and completion dates, that require specified ship resources. The objective of the employment schedule is to satisfy all event requirements while providing an equitable rotation of ships and an even distribution of workload.

This study provides a mathematical programming model to assist employment scheduling. A set covering formulation of the scheduling problem minimizes deviations from an "ideal" schedule, developed in terms of navy scheduling policy, while satisfying event requirements. An efficient column generation program, using problem-specific column reduction techniques, produces a moderate-sized problem which is then solved as an integer program.

The model is tested using data from the 1983 Atlantic Fleet schedule for carriers and surface combatants. The data involving 111 ships, 19 major events, 73 separate ship-type requirements, and 44 force weapon system capability requirements yields a set covering problem with 10,723 variables and 228 constraints. This problem is solved on an IBM 3033 AP in 84 seconds of CPU time.

Master of Science in
Operations Research
March 1985

Advisor: R.K. Wood
Department of
Operations Research

THE EFFECTS OF SUBREFRACTIVE LAYERS AND ELEVATED DUCTS ON AIRBORNE RADAR AND ESM

Douglas D. Grau
Lieutenant, United States Navy
B.S., United States Naval Academy, 1978

This report is an investigation of the effects of anomalous propagation of radar waves, caused by subrefractive layers and elevated ducts, on aircraft radar performance and possible tactics. A test and evaluation of radar coverage for various environmental scenarios is conducted using the Integrated Refractive Effects Prediction System (IREPS) model. From the results of each scenario, a decision matrix is created and applied as an analysis tool for determining satisfactory flight profiles for a given mission. The findings are discussed from both a radiating and a non-radiating aircraft perspective. Environmental data collected from the Mediterranean Sea and Northern Arabian Sea were analyzed and used to determine the test scenarios.

Master of Science in
Operations Research
March 1985

Advisor: W.J. Shaw
Department of
Meteorology

THE SIMULATION OF REMOTELY MEASURED PATHS OF UNDERWATER VEHICLES FOR THE PURPOSE OF MONITORING THE CALIBRATION OF TEST RANGES

Gene Gygax
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1976

This thesis analyses data of and builds a simulation model for the track of an underwater vehicle as perceived by a test range of three dimensional short baseline sonar arrays. In this way many random replications of track become available quickly and inexpensively. These simulations support a larger project whose object is to monitor the performance of the test range and provide clues for troubleshooting problems. In particular, joint values of sensor array estimated displacement and reorientation corrections are generated and their error distribution is quantified.

Master of Science in
Operations Research
September 1985

Advisor: R.R. Read
Department of
Operations Research

METHODOLOGY FOR MONITORING THE USMC PERFORMANCE EVALUATION

James B. Hill
Captain, United States Marine Corps
B.E., Vanderbilt University, 1976

This study examines the usefulness of the United States Marine Corps fitness report information to promotion boards and proposes methodology for monitoring the Marine Corps performance evaluation system. Factor analysis was used to reduce the dimensions associated with fitness report data and construct a discriminant analytic model describing the promotion decision. This decision model successfully predicted promotions from fitness report data and showed that the USMC Fitness Report Form (1610) contained sufficient information for decision making. A model describing fitness report inflation was formulated during development of monitoring methodology. This inflation model was derived heuristically from observations dealing with school grade inflation.

Master of Science in
Operations Research
March 1985

Advisor: F.R. Richards
Department of
Operations Research

MEASURING CAPABILITY OF SURFACE COMBATANTS

William P. Hoker
Lieutenant, United States Navy
B.S., United States Naval Academy, 1979

Measuring overall warfare capability of surface combatants is the purpose of this thesis. Surface combatants chosen were those displacing more than 1000 tons, in the Japanese Maritime Self Defense Force and the Soviet Pacific Fleet. The method used here involves measuring some ship and system capabilities directly by the constant sum method, and finding a functional relationship between ship capability and ship characteristics, by multiple regression.

Master of Science in
Operations Research
March 1985

Advisor: R.E. Looney
Department of
National Security Affairs

COMBAT ENGINEER ALLOCATION MODEL

Robert V. Kazimer
Captain, United States Army
B.S., United States Military Academy, 1978

This thesis presents a basic outline and structure for the development of an engineer planning model which will be incorporated into the Airland Research Model at the Naval Postgraduate School. A game theoretic decision structure is proposed within which opposing strategies are evaluated. A generalized resource allocation algorithm is presented to support the countermobility mission of combat engineers within a U.S. Army brigade.

Master of Science in
Operations Research
December 1984

Advisor: S.H. Parry
Department of
Operations Research

COGNITIVE PERFORMANCE DEGRADATION ON SONAR OPERATOR AND TORPEDO DATA CONTROL UNIT OPERATOR AFTER ONE NIGHT OF SLEEP DEPRIVATION

Mert Kiziltan
Lieutenant JG, Turkish Navy
B.S., Turkish Naval Academy, 1979

The objective of this study was to examine whether or not a relatively short period of sleep deprivation will degrade cognitive skills. Using the Position Analysis Questionnaire (PAQ) two critical submarine jobs were analyzed to reveal the main attributes of the jobs and then the Automated Portable Test System battery (APTS) was used to simulate these attributes. The PAQ analysis showed clearly that the cognitive skills (estimation, mental process and decision making) were essential for these jobs (i.e., Torpedo Data Control Unit operator and Sonar operator jobs).

The results showed that subjects were highly sensitive to the loss of sleep and their cognitive performance suffered as a function of 36 hours of sleep deprivation and time of sleep deprivation.

Master of Science in
Operations Research
September 1985

Advisor: C.W. Hutchins, Jr.
Department of
Operations Research

NETWORK REPRESENTATION FOR COMBAT MODELS

Thomas P. Krupenevich
Major, United States Army
B.S., University of Connecticut, 1973

A general network methodology for combat processes is presented in this thesis for use in the Airland Research Model. Specifically, two processes are developed in detail: the underlying transportation system and the command and control connectivity structure. Attributes necessary to support representation of each system as a network model have been identified.

Master of Science in
Operations Research
December 1984

Advisor: J.K. Hartman
Department of
Operations Research

OPERATIONS RESEARCH TECHNIQUES FOR HUMAN FACTORS ENGINEERS

Judith H. Lind
Engineering Psychologist, Naval Weapons Center
B.S., University of Oregon, 1955
M.S., University of Oregon, 1957

A variety of operations research techniques and models that are applicable to human factors engineering problems are identified and classified according to the functions or purposes for which they are useful. Several of these techniques are described in sufficient detail for a human factors engineer to determine if they are applicable to a problem of interest. Uses for techniques are illustrated in military-related human factors settings, primarily related to the Navy's antiair warfare mission. References are provided for additional information on each technique.

Master of Science in
Operations Research
June 1985

Advisors: C.W. Hutchins, Jr.
P.A. Sandoz
Department of
Operations Research

THE PROBABILITY OF ACCIDENTAL NUCLEAR WAR: A GRAPHICAL MODEL OF THE BALLISTIC MISSILE EARLY WARNING SYSTEM

Barbara Y. Diegel Marsh
Lieutenant, United States Navy
B.A., Indiana University, 1974

Six false alarms occurred at NORAD in 1978, 1979, and 1980. These false alarms subsequently regenerated interest in launch policies and the increased possibility of accidental nuclear war, which motivated this investigation. We construct a new model to address several questions: What is the sequence of events and reasonable timing between events in the missile warning system? How much time do decision makers have to respond to a threat? What effects do United States launch policies have on decision-making time? How likely is accidental nuclear war?

The results show that accidental nuclear war is not very probable with launch-under-attack, but significantly more likely if the United States adopts a launch-on-warning policy. The final decision and responsibility to use these policies, once they are implemented, rests entirely with the President of the United States.

Master of Science in
Operations Research
March 1985

Advisors: M.D. Weir
Department of
Mathematics

J.B. Gafford
Department of
Operations Research

USING MULTIDIMENSIONAL SCALING TO DESCRIBE TEACHER PERFORMANCE

John F. McCourt
Lieutenant, United States Navy
B.S., United States Naval Academy, 1978

The appropriateness of a multidimensional scaling technique (MDS) in attempting to quantify students' perceptions of teacher performance is investigated in the following study. Data collected on an interactive computer survey and from Student Opinion Forms (SOF's) are used to determine if satisfactory linear relationships for teacher performance exist. Multiple linear regression and factor analysis attempt to identify what appear to be the most important characteristics in instructor performance according to the perceptions of a control group. Spatial plots are created reflecting these perceptions.

Master of Science in
Operations Research
March 1985

Advisor: R.R. Read
Department of
Operations Research

PROBABILISTIC ANALYSIS OF FAULT TREES USING PIVOTAL DECOMPOSITION

William T. McCullers III
Major, United States Marine Corps
A.B., Rutgers University, 1973

An algorithm is presented for computing the exact failure probability for binary systems represented as fault trees. This algorithm does not rely on cut sets. Instead, it applies recursive pivotal decomposition together with probabilistic structural reductions and modularization directly to the fault tree. A further capability of the algorithm is the sequential printing of equations to form a function for a specific fault tree which computes system failure probability given the basic event probabilities.

Master of Science in
Operations Research
June 1985

Advisor: R.K. Wood
Department of
Operations Research

AN ANALYSIS OF TARGET ACQUISITION BEHAVIOR FOR OBSERVERS IN TANKS EQUIPPED WITH THERMAL OR OPTICAL SIGHTING SYSTEMS

Cornell McKenzie
Captain, United States Army
B.S., United States Military Academy, 1976

This thesis presents a statistical analysis of the data generated during the Thermal Pinpoint experiment, conducted 19 July 1983 to 10 December 1983. It analyzes the target acquisition capabilities of tanks equipped with either thermal or optical sighting systems under a variety of conditions. The analyses are conducted using both parametric and nonparametric methods to test hypotheses concerning the target acquisition process for various populations of observers.

The results of the analysis concern the detection times and number of detections (in the form of proportions) for various observer groups. They are analyzed in terms of controlled experimental design factors (such as time of day, observer motion, hatch status, range to the target and weapon system sight type), controlled target factors (such as camouflage status, motion, crew exposure, firing and engine status), and environmental factors (such as target/background visual contrast, target/background temperature contrast and sky/background visual contrast).

Master of Science in
Operations Research
September 1985

Advisor: D.R. Barr
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Operations Research

AN ANALYSIS OF THE AMORE METHODOLOGY

Edward P. Negrelli
Captain, United States Army
B.S., United States Military Academy, 1976

The Analysis of Military Organizational Effectiveness (AMORE) methodology was developed in order to translate input degradation of military organizations into output capability as a function of time. Because this methodology requires an extensive amount of subjective, high resolution input by the user, there is a need to analyze the effects of input accuracy and of changes in the input information on the output generated by the model. The purpose of this research effort is to utilize sensitivity or parametric analysis to demonstrate the needed input accuracy, and to identify the effects of input changes on unit reconstitution capabilities. Through an analysis of the algorithms used in the AMORE simulation code, the assumptions and limitations inherent in the use of this methodology are identified, and recommendations concerning the applications of the methodology are provided. Recommendations for enhancements to the model are also presented.

Master of Science in
Operations Research
December 1984

Advisor: G.W. Thomas
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A SURVEY OF COMBAT MODELS FOR USE IN CARF VALUE GENERATION

Kevin J. Newland
Captain, United States Marine Corps
B.S.E., University of Michigan, 1978

The current Combat Active Replacement Factor (CARF) generation system is examined, and possible changes are discussed. A new system within the Marine Corps would be enhanced by use of a combat model to produce attrition estimates, and several existing models are surveyed. Criteria for comparing combat models are discussed with consideration of CARF application, constraints inherent to the Marine Corps, combat model characteristics, and cost of model operation. The five models surveyed are Vector-2, the Amphibious Warfare Model (AWM), the Combat Sample Generator (COSAGE), the Division Map Exercise (DIME), and the Corps/Division Evaluation Model (CORDIVEM). Of the five, Vector-2 appears to have the greatest potential for CARF value generation, because it requires less time and manpower to simulate a given scenario, and its algorithms tend to be more transparent and economical.

Master of Science in
Operations Research
March 1985

Advisor: G.F. Lindsay
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SOFTWARE COST ESTIMATION THROUGH BAYESIAN INFERENCE OF SOFTWARE SIZE

Park, In Kyoung
Lieutenant, Republic of Korea Navy
B.S., Korea Naval Academy, 1979

It is important for the program manager to understand the software life-cycle and development process. Multiple models of the life-cycle are examined and compared with the DOD software life-cycle. The Rayleigh equation and the resulting difficulty gradient equation of the SLIM software model are very powerful techniques for estimating development time, effort, and cost. To estimate the size of the new project a Bayesian inference technique is proposed. This technique is then applied using the SLIM model and the QSM data base.

Master of Science in
Operations Research
September 1985

Advisor: D.C. Boger
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M.G. Sovereign
Department of
Operations Research

A MAINTENANCE SUPPORT MODEL

Stephen P. Peterson
Captain, United States Army
B.S., McNeese State University, 1975

This thesis develops a general structure of an explicit, sequential event model of maintenance support at division level. The model is intended as an initial stage model for subsequent use in tandem with a combat feeder model to provide necessary insight into development of a largely implicit, variable resolution, hierarchical maintenance support model as part of the Corps level systemic Airland Research model. Model development focused upon the delineation of the separate planning and execution processes of combat maintenance support and identification of the key decision points of these processes.

Three key maintenance support planning processes which are crucial to timely and effective combat maintenance support are formulated into pseudo code algorithms: workload scheduling and allocation (triage), workload priorization, and maintenance time criteria (MTC) updating.

Master of Science in
Operations Research
December 1984

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Operations Research

TWO NEW APPROXIMATE SOLUTION TECHNIQUES FOR A MOVING TARGET PROBLEM WHEN SEARCHER MOTION IS CONSTRAINED

Metin Sagal
Lieutenant JG, Turkish Navy
B.S., Turkish Naval Academy, 1979

The objective of this study is to develop and test two new approximate solution techniques for a moving target problem in discrete time and space where both the searcher and the target have constraints on their paths. The first technique is an application of the Local Search Method and the second is an application of the Frank-Wolfe Method. The motivation for looking at approximate methods is that the problem is NP-complete and optimal solution techniques become impractical for large size problems. Experiments showed that the Local Search Method approach is an efficient technique for obtaining approximate solutions. However, the Frank-Wolfe Method approach does not perform well for the problem.

Master of Science in
Operations Research
September 1985

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Operations Research

MINIMIZING FILL-IN FOR GAUSSIAN ELIMINATION OF SYMMETRIC SYSTEMS

Young Ho Seo
Major, Republic of Korea Army
B.S., Korea Military Academy, 1977

The new projective linear programming algorithm by Karmarkar requires solution of symmetric, positive definite systems of equations. One key to solving these systems efficiently is minimizing the fill-in, i.e., the number of new nonzero elements in the reduced matrix, in the various forms of Gaussian elimination used to solve these systems. Fill-in is affected only by symmetric reordering of rows and columns of the system of equations. Various heuristic ordering algorithms are tested and compared with the heuristic minimum degree algorithm of George and Liu. Computational results are reported for sixteen large-scale real-world and artificial problems. The minimum degree algorithm of George and Liu is the most effective of six tested methods.

Master of Science in
Operations Research
September 1985

Advisor: R.K. Wood
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A FLOW MODEL OF THE U.S. ARMY FIELD GRADE OFFICER CORPS TO PRODUCE THE FIVE YEAR PROMOTION PLAN

William R. Thompson
Captain, United States Army
B.S., United States Military Academy, 1978

This thesis analyzes the methods used to produce the U.S. Army Five Year Field Grade Officer Promotion Plan. The officer promotion system is formulated in terms of personnel flows. Calculations used within the system are then consolidated to present a promotion model.

The current microcomputer implementation of the promotion model is presented, showing severe limitations as an analytical tool. A mainframe implementation is then demonstrated, showing significant advantages over the previous technique. The proposed flow model Proplan offers to the force planner a tool which accurately produces the promotion plan. Other characteristics of Proplan show that this implementation is flexible, responsive, and should be used to produce the promotion plan.

Master of Science in
Operations Research
September 1985

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LOSS RATE ESTIMATION IN MARINE CORPS OFFICER MANPOWER MODELS

Dewey D. Tucker
Major, United States Marine Corps
A.S., Ricks College, 1967
B.S., Oregon State University, 1971

Predicting officer attrition is a major difficulty in the Planning, Programming, and Budgeting Process. The Marine Corps has historically used aggregated estimates for attrition rates. The purpose of this paper is to demonstrate the application of the James-Stein and other shrinkage type parameter estimation schemes for the purpose of generating more stable manpower loss rates. It has been illustrated within this project that improvement can be attained by application of the James-Stein and Minimax shrinkage methods rather than the more natural Maximum Likelihood estimation process. The shrinkage schemes employed herein offer powerful and useful methods for generating attrition rates.

Master of Science in
Operations Research
September 1985

Advisor: R.R. Read
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Operations Research

ANALYSIS OF TWO ADVANCED SMOOTHING ALGORITHMS

Jose A. Vasquez, Jr.
Captain, United States Army
B.S., Texas A & I University, 1975

This thesis examines two smoothing algorithms which deviate from the classical method of using only one neighborhood size in the smoothing procedure. The Supersmooth algorithm uses three neighborhood sizes with local cross-validation in order to estimate an optimal neighborhood size. The Split Linear Fit algorithm uses any number of neighborhood sizes and computes a family of linear fits corresponding to each neighborhood size; the final smooth points are a weighted average of the linear fits. These two advanced smoothers are evaluated against the results produced by previously validated, commonly used smoothers and regression techniques. The measure of performance is the quality of the smooth curves and the value of the sum of squared residuals.

Master of Science in
Operations Research
September 1985

Advisor: P.A. Lewis
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Operations Research

APPLICATION OF METEOR TO THE EVALUATION OF MULTI-ECHELON INVENTORY MODELS

David B. Wadsworth
Lieutenant Commander, SC, United States Navy
B.S., University of California, 1971

The Navy supply system forms a complex multi-indenture, multi-echelon system designed to provide support to operating units both afloat and ashore. The current inventory models used by the Navy do not consider explicitly the multi-echelon nature of the system, possibly resulting in misallocations of material and sub-optimal uses of funds. A simulation program, called Multi-Echelon Technique for Evaluating Readiness (METEOR), was developed in an earlier thesis to provide a means of evaluating the effects of the inventory models in existence at that time. This thesis enhances METEOR to model the Navy supply system in its current multi-echelon structure. Additionally, a heuristic, "see-through" model was developed that attempts to improve supply system performance by making shipboard demands visible to both intermediate and wholesale echelons. A preliminary comparison between this model and existing procedures was conducted and showed that the "see-through" model significantly improved effectiveness.

Master of Science in
Operations Research
March 1985

Advisor: F.R. Richards
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Operations Research

A COMPARATIVE ANALYSIS OF A CV HELICOPTER AND A JVX TILT-ROTOR AIRCRAFT IN AN AIRCRAFT CARRIER BASED ASW ROLE

Robert L. Wilde
Lieutenant, United States Navy
B.S.M.E., United States Naval Academy, 1977

This thesis analyzes the environmental compatibility and the potential performance capabilities of two proposed types of vertical flight capable aircraft in an aircraft carrier Anti-Submarine role. The aircraft compared are the CV helicopter (SH-60F) and an ASW variant of the Joint Services Advanced Vertical Lift (JVX) tilt-rotor aircraft. This thesis compares their adaptability and relative expected mission effectiveness by analyzing their physical dimensions and characteristics and their projected flight performance parameters. Their expected performance in a specific scenario, an ASW pouncer mission employing active dipping sonar, is analyzed using a simulation model.

Master of Science in
Operations Research
March 1985

Advisor: D.C. Boger
Department of
Administrative Sciences

MODELS TO PREDICT THE PERFORMANCE OF AXIAL FLOW CARBON DIOXIDE ABSORPTIVE CANISTERS

Joseph E. Yarborough, Jr.
Lieutenant Commander, United States Navy
B.S., University of South Carolina, 1973

Models were developed using the techniques of multiple regression to predict the time at which the carbon dioxide concentration in a gas stream that exists a canister, exceeds the physiological limit for human respiration. Additional models were developed to predict canister efficiency as a function of various geometric and environmental parameters. Simple cross validation was performed in both cases to provide a measure of model applicability.

Master of Science in
Operations Research
March 1985

Advisor: C.W. Hutchins, Jr.
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AN ANALYSIS OF THE NAVAL WARFARE GAMING SYSTEM (NWGS) SOSUS MODEL

Mary Jo Zurey
Lieutenant, United States Navy
B.S., Wright State University, 1976

This thesis is an analysis of the Naval Warfare Gaming System's SOSUS model based on United States SOSUS system performance data. It suggests that through minor alterations of the present model and the use of some specific input parameter values, the NWGS SOSUS model can represent, in a broad manner, the capabilities of the current United States SOSUS system. In addition, a detailed description and examination of the NWGS SOSUS model program is provided.

Master of Science in
Operations Research
March 1985

Advisor: R.N. Forrest
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MASTER OF SCIENCE

IN

PHYSICS

THE WEIGHTING FUNCTION FOR SCINTILLATION ON A FOLDED PATH

Byung G. An
Lieutenant Colonel, Korean Air Force
B.S., Korea Air Force Academy, 1972

In the case of a spherical beam wave propagating in a weakly inhomogeneous medium which has a Kolmogorov spectrum, Dr. Ze'evi derived a weighting function for scintillation for a direct and for a folded path with respect to the position of the turbulence medium. Experiments were performed to verify Ze'evi's weighting function for a folded path for three different types of reflectors. The experimental results did not support Dr. Ze'evi's theory. We found that the scintillation weighting functions are less weighted near the detector and have an unexpected increase near the reflector. These results are discussed by using a geometric optical model of the turbulence.

Master of Science in
Physics
December 1984

Advisor: E.A. Milne
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Physics

LOCALIZATION OF BURIED OBJECTS IN WATER-SATURATED SAND BY VARIABLE INCIDENCE ACOUSTIC PULSE REFLECTIONS

Gwan-Sik Bang
Major, Republic of Korea Army
B.S., Han Yang University, 1975

The purpose of this project is to localize buried objects in water-saturated sand by variable incidence acoustic pulse reflections. In particular, thin aluminum plates are used to model the buried objects. The sound speed and the depth of the overlying sand layer are predicted by using the $T^2 - X^2$ and the ray parameter methods.

The experimentally computed results have an average 3.5% depth error. The calculated speed of sound in the water-saturated sand layer differed by 8.1% between the $T^2 - X^2$ and the ray parameter methods.

Master of Science in
Physics
June 1985

Advisor: S.W. Yoon
T.B. Gabrielson
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ELECTRON IRRADIATION OF N TYPE CADMIUM TELLURIDE

Cletus P. Bauer, Jr.
Lieutenant, United States Navy
B.S., Clarion State College, 1978

An experiment is described in which 30 MeV electrons were used to irradiate a sample of cadmium telluride. A brief history of irradiation studies of cadmium telluride is given, followed by a description of the construction of a laboratory used in the taking of Hall measurements and resistivity versus temperature data. The irradiation was performed at the Naval Postgraduate School linear accelerator facility and damage was observed in the CdTe sample at doses above 10^{13} electrons/cm^2. The sample was held at 100 K for the irradiation. Three results were noted from the Hall and resistivity data. First, the resistivity increased by a factor of two at radiation doses of 10^{15} electrons/cm^2. Secondly, there was a ten percent lowering of the electron mobility at 77 K. Finally, possible annealing was seen at 160 K for the 10^{13} electrons/cm^2 dose resistivity versus temperature graph. Photoluminescence measurements confirmed the existence of damage by an increase of a broad maximum associated with defects.

Master of Science in
Physics
March 1985

Advisor: K.C. Dimiduk
Department of
Physics

DESIGN AND CONSTRUCTION OF A CW ND:YAG LASER USING A SINGLE ELLIPTICAL CAVITY AND WATER COOLED KRYPTON ARC LAMP PUMPING

Bruce T. Burkett
Lieutenant, United States Navy
B.S., United States Naval Academy, 1977

A CW Nd:YAG laser was designed and constructed using a water cooled krypton arc lamp as the pump source in a single elliptical cavity. Operational testing of the system could not be done due to technical problems with running the arc, but fluorescence measurements on the cavity were made using a tungsten filament lamp. The results were compared with those of previous projects which employed circular cylindrical cavities. The elliptical cavity did not have the highly reflective gold coating present on the other cavities, and was not designed for the tungsten lamp. Despite this, the elliptic cavity's fluorescence output was greater than that recorded for the multi-lamp configurations at the same input power levels.

A detailed description of the design process used and sufficient information to implement recommendations and improve the overall system are given.

Master of Science in Physics
December 1984

Advisor: A.W. Cooper
Department of Physics

CERENKOV RADIATION FROM PERIODIC BUNCHES FOR A FINITE PATH IN AIR

Robert G. Bruce
Commander, United States Navy
B.A., University of California, Santa Cruz, 1967

The equation as derived by F.R. Buskirk and J.R. Neighbors for the power in the diffraction pattern of Cerenkov radiation from periodic bunches in air is experimentally tested at the Naval Postgraduate School Accelerator Laboratory (NPSAL). Previous experiments done at NPSAL are briefly reviewed. The experiment focuses on reducing RF noise and introduces a method for recording experimental data. RF noise is divided into two categories: 1) Noise received directly at the antenna, and 2) noise picked up by the cabling. Category 1 is divided into two subcategories: a) Cerenkov radiation received by the antenna after being reflected off secondary objects, and b) residual klystron radiation. Experimental data curves from the third harmonic are compared to theoretical patterns for various finite emission lengths and angle shifts. The data demonstrates that noise-generated fine structure which appeared in previous experiments at NPSAL can be eliminated with increased shielding.

Master of Science in
Physics
June 1985

Advisors: X.K. Maruyama
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Department of
Physics

DESIGN CONSIDERATION FOR THE X-RAY CERENKOV EXPERIMENT

Youn Dae Choi
Major, Republic of Korea Army
B.S., Korea Military Academy, 1976
B.S., Kyung Puk National University, 1980

The feasibility of measuring Cerenkov radiation in the X-ray region has been investigated. It is found that the experimental measurement of X-ray Cerenkov radiation is possible for the carbon K (283.84 eV), aluminum L1 (87.01 eV) and L2,3 (72.78 eV) absorption edges. Measurement in the aluminum K (1559.9 eV) absorption edge region is found to be not possible since the real part of the index of refraction does not exceed unity. The relative power from Cerenkov radiation has been calculated for the three possible cases and count rate estimates are given. The experimental apparatus for the measurement of X-ray Cerenkov radiation has been redesigned to allow measurement of the carbon K edge and aluminum L1 edge.

An experiment was attempted, but not completed, due to the failure of a necessary preamplifier for a proportional counter. New design considerations are presented here and incorporate changes to avoid the experimental shortcomings of previous measurements.

Master of Science in
Physics
December 1984

Advisor: J.R. Neighbours
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Physics

COMPARISON OF CALCULATIONS AND MEASUREMENTS OF THE OFF-AXIS RADIATION DOSE (SI) IN LIQUID NITROGEN AS A FUNCTION OF RADIATION LENGTH

Patrick F. Cromar
Lieutenant, United States Navy
B.S., University of Oregon, 1976

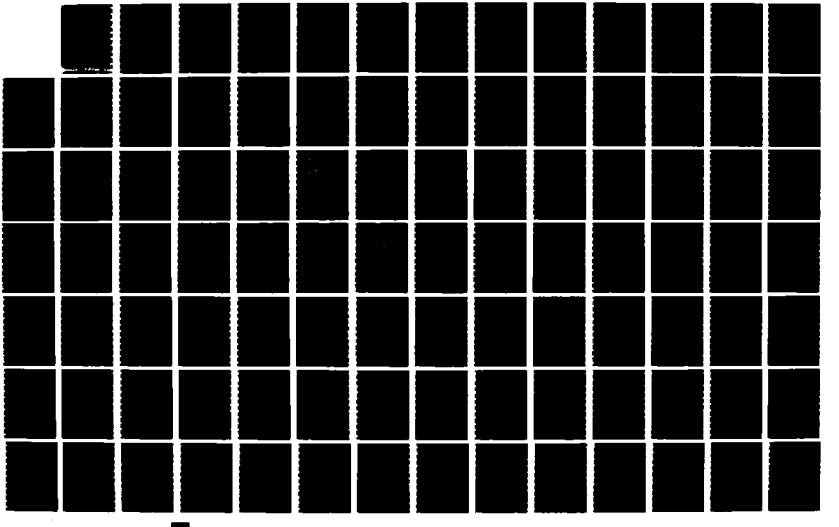
Results are presented from the study of the off-axis X and Gamma radiation field caused by a highly relativistic electron beam in liquid Nitrogen at various path lengths out to 2 radiation lengths. The off-axis dose in Silicon was calculated using the electron/photon transport code CYLTRAN and measured using thermal luminescent dosimeters (TLD's). Calculations were performed on a CDC-7600 computer at Los Alamos National Laboratory and measurements were made using the Naval Postgraduate School 100 Mev Linac. Comparison of the results is made and CYLTRAN is found to be in agreement with experimentally measured values. The CYLTRAN results are extended to the off-axis dose caused by a 100 Mev electron beam in air at Standard Temperature and Pressure (STP).

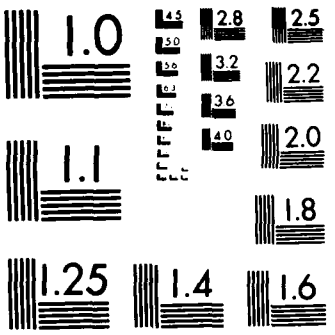
Master of Science in
Physics
December 1984

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AD-A174 869 COMPILATION OF ABSTRACTS OF THESES SUBMITTED BY CANDIDATES FOR DEGREES(U) NAVAL POSTGRADUATE SCHOOL MONTEREY CA 30 SEP 86 NPS-012-86-004 6/7

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30 MEV ELECTRON BEAM IRRADIATION EFFECTS ON GAAS $.7P.3$ LEDS

James K. Foley
Lieutenant, United States Navy
B.S., United States Naval Academy, 1978

LEDs of the ternary alloy GaAs $.7P.3$ were irradiated with a 30MeV electron beam. The effects this exposure had on peak wavelength, absolute and relative light output intensities, and current-forward bias characteristics were studied. A simple model of LED current controlling mechanisms is described and a mathematical approach for deriving a descriptive damage-constant is provided. Observed irradiation effects consisted of increased current and decreased light output intensity for a given forward bias voltage and indicate that the devices tested are an order of magnitude softer to electron radiation than results previously reported. Damage constants were calculated: group 9 (2.9×10^{-14} cm^2/e), group A5 (2.6×10^{-14} cm^2/e), and group 3 (1.4×10^{-14} cm^2/e). Shielded and unshielded devices were compared to determine if the secondary electron production from Bremsstrahlung losses would reduce the total fluence required for degradation. The results of this experiment were inconclusive. A procedure was developed to determine the electron beam current density for use in dose estimations. Electron doses were a factor of three higher when compared to the previous method of calculation.

Master of Science in Physics
June 1985

Advisor: K.C. Dimiduk
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A SEARCH FOR X-RAY CERENKOV RADIATION

William R. Fritchie
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B.S., Marquette University, 1978

Cerenkov x-ray emissions should not exist in media where the index of refraction is less than unity. In previous work, x-ray Cerenkov radiation at the K absorption edge of aluminum was reported to have been observed. The present experiment observed no x-ray Cerenkov radiation. However, radiation not characteristic of the Cerenkov mechanism was seen. The results of the experiment are provided. Various aspects of an experiment designed to investigate Cerenkov radiation in the x-ray region are also considered by exploring procedures, methods, equipment design and limitations. Suggestions for improvements to facilitate further experiments with media that allow the formation of Cerenkov radiation are provided.

Master of Science in
Physics
June 1985

Advisors: J.R. Neighbours
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PARAMETRIC ANALYSIS OF ECHOSOUNDER PERFORMANCE

Robert J. Fuller
Lieutenant, United States Coast Guard
B.S., Fresno State University, 1975

An echosounder is used to probe various atmospheric parameters. An acoustic wave is transmitted into the atmosphere and information deduced from the backscattered energy.

This thesis seeks to understand the range limitations of the echosounder and to explore methods to quantify atmospheric turbulence parameters at a given range. The propagation of the acoustic energy, including the effects of excess attenuation, are modeled to predict the performance of an echosounder when various parameters are changed. The electronics of an existing echosounder are investigated to understand inherent or design limitations.

Master of Science in Physics
September 1985

Advisor: D.L. Walters
Department of Physics

OPERATING CHARACTERISTICS, ABSORPTIVITY/REFLECTIVITY MEASUREMENTS AND PULSE SYSTEM DESIGN OF THE NPS HYDROGEN FLUORIDE/DEUTERIUM FLUORIDE LASER

Edward L. Garcia
Lieutenant, United States Navy
B.S., United States Naval Academy, 1977

The Hydrogen Fluoride/Deuterium Fluoride Laser is a fast flow electrical discharge operated chemical laser. Refitting of the subsystems of the laser was completed and lasing was observed utilizing a 100 percent reflective mirror and a 95 percent reflectance output coupling mirror. The maximum multiline output power obtained was 2.6 Watts at 19.0 kV and 475 mA. The data obtained was in general agreement with previously reported data. However, an increase in power output from 1.6 to 2.6 Watts was obtained by utilization of a Hipotronics power supply that enabled usage of higher input voltages for SF dissociation. Measurements were also taken over a variation of the He, SF_6, H_2, and O_2 flow rates resulting in the change of the optimum flow rates for the above listed gases. The new flows were found to be (1) SF_6 =.7167 grams/second (2) H_2 = .0220 grams/second (3) O_2 =.22 grams/second and (4) He = .05 grams/second.

Target reflectivity/absorptivity measurements were taken and a dependence on incidence angle with the laser beam was found. For the P-doped Silicon wafer used, the power absorbed decreased over the range of 25 to 60 degrees. At the 25 degree angle approximately 95 percent of the incident power was absorbed. The reflected power was found to increase with the increase in target angle with approximately 95 percent of the incident power being reflected at 60 degrees. The results of these measurements are in general agreement with previously reported measurements.

A design for reconfiguring the HF/DF laser system into a pulsed system was also formulated but was not tested. The design criterion was to utilize a capacitor bank to drop a high voltage pulse across the anodes of the laser.

Master of Science in Physics
December 1984

Advisor: A.W. Cooper
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INITIAL DEVELOPMENT OF A LASER ALTIMETER

Joseph P. Gilio
Lieutenant, United States Navy
B.S., University of California, 1978

A design study was carried out of a small, expendable, self-contained laser altimeter for overwater operation at low altitude. A .904 μm GaAs laser was used to build a prototype transmitter/receiver at a cost of less the $600 and small enough to fit inside a 5-inch diameter cylinder, 5 inches long. Tests at a height of 120 feet above the surface of a lake resulted in a signal-to-noise ratio of 6, and validated the trade-off equation used in the study. A second test model, with design improvements incorporated, is predicted to yield a SNR of over 20 for an altitude of 150 meters.

Master of Science in
Physics
September 1985

Advisor: A.W. Cooper
Department of
Physics

RECIPROCITY CALIBRATION IN A COMPLIANT CYLINDRICAL TUBE

Michael B. Johnson
Lieutenant Commander, United States Navy
B.S., Cornell University, 1975

A new method for absolute calibration of electroacoustic transducers is described which permits low frequency reciprocity calibration in a test apparatus of small dimensions. The method takes advantage of the reduced wave speed in a cylindrical water column bounded by a compliant PVC tube to reduce the length of the standing wave to dimensions which can be easily handled in the laboratory.

Results of a limited series of experiments show a mean reproducibility of ± 0.8 decibels in a one-meter long tube at frequencies between 750 and 1100 Hz and sound speeds from 330 to 365 meters/second. The hydrophone voltage sensitivities obtained by the method, however, systematically differ by 1.5 decibels from those measured by comparison with a standard hydrophone; additional research will be required to resolve this discrepancy.

Master of Science in Physics
June 1985

Advisor: S.L. Garrett
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NOISE CHARACTERISTICS OF AN AVALANCHE PHOTODIODE

Eun Gi Kim
Major, Republic of Korea Air Force
B.S., Republic of Korea Air Force Academy

The responsivity, noise equivalent power, specific detectivity, shot noise and multiplication noise of a RCA C30872 silicon reach-through avalanche photodiode were studied at 4 wavelengths 563.8 nm, 569.9 nm, 699.6 nm, and 826.2 nm. The detector noise was resolved into amplifier, shot and a multiplied leakage component as a function of the reverse bias voltage. Experimental results are discussed and it is concluded that this photodiode has an optimum reverse bias voltage of about 250 volts that maximizes the specific detectivity and minimizes the noise equivalent power. The avalanche photodiode excess noise factor was found to be 1.4-2.0 at low gain and increases to 9.17 at a gain of 440.

Master of Science in
Physics
December 1984

Advisor: D.L. Walters
Department of
Physics

MEASUREMENTS OF FOLDED PATH OPTICAL SCINTILLATION USING A CORNER CUBE, A CAT'S EYE AND A FLAT MIRROR REFLECTOR

Jong Hwan Kim
Lieutenant Commander, Republic of Korea Navy
B.S., Korea Naval Academy, 1973
B.S., Seoul National University, 1977

A theoretical prediction of the folded path weighting function for optical scintillation strength was made by Dr. Avihu Ze'evi. In an effort to verify this prediction, a sixty-one meter, enclosed turbulence chamber was built, allowing the position of a turbulence source to be moved and the scintillation strength measured at different path positions. This experiment tested the Ze'evi hypothesis using a corner cube, a cat's eye and a flat mirror and compared the results of each. The experimental results do not follow Dr. Ze'evi's theory. The general pattern of both the corner cube and the flat mirror have less weight at the detector end than predicted and more weight at the target end than predicted. The cat's eye scintillation followed the predicted weighting.

Master of Science in
Physics
December 1984

Advisor: E.A. Milne
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Physics

DEVELOPMENT OF COMPUTER PROGRAMS USING THE METHOD OF IMAGES TO PREDICT THE SOUND FIELD IN A WEDGE OVERLAYING A FAST FLUID AND COMPARISON WITH LABORATORY EXPERIMENTS

Patrick K. LeSesne
Lieutenant, United States Coast Guard
B.S., U.S. Coast Guard Academy, 1975

Two computer models using the method of images to determine the pressure amplitude and phase distribution in a wedge-shaped medium overlaying a fast fluid bottom were studied. WEDGE used a source at infinity and was constrained to upslope, on axis predictions, while CROSS SLOPE using a source at finite distance made predictions anywhere within the medium. Comparison of the two programs suggest that an infinite source is not approached until the source exceeds six hundred dump distances from the apex. CROSS SLOPE prediction of pressure amplitude were in agreement with experimental data obtained in the upslope direction, and with sound field similar to that described by the theory of Buckingham but of much richer variety.

Master of Science in Physics
December 1984

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

ELECTRON IRRADIATION OF P-TYPE MERCURY CADMIUM TELLURIDE

Dennis G. Morral
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1972

Thirty Mev electrons were used to irradiate samples of p-type $Hg_{1-x}\ Cd_x\ Te$ to study radiation induced changes in conductivity versus temperature. Samples were held below 95°K while irradiated with doses between 4×10^{13} electrons/cm^2 and 6×10^{15} electrons/cm^2. Little or no change in conductivity was detected for the lower dose levels. Conductivity steadily decreased with increasing dose level, showing a 50% decline at 100°K for the maximum dose. The decrease in conductivity was smaller at higher temperatures. Approximately two hour post-irradiation temperature excursions up to 300°K, resulted in a 25% restoration of the conductivity at 100°K. The mobility of the samples, irradiated at the maximum dose level showed a 3 to 6 fold increase, while the majority carrier concentration decreased by a factor of 7 to 10 times the pre-irradiation values. All samples irradiated with dose levels above 1×10^{15} electrons/cm^2, converted from p to n-type at 295°K, but remained p-type at 77°K. It was hypothesized that radiation induced donor defect levels in the conduction band were responsible for the reported changes.

Master of Science in
Physics
June 1985

Advisor: K.C. Dimiduk
Department of
Physics

OPTICAL PHASE CONJUGATION VIA STIMULATED BRILLOUIN SCATTERING IN CARBON DISULFIDE

Kenneth P. Morton
Lieutenant, United States Navy
B.S., United States Naval Academy, 1979

The interaction of a strong, monochromatic beam of light with liquid CS_2 can produce a backscattered wave that is a phase conjugate replica of the input beam. A Nd-glass laser focused into an unguided cell returned 33% of the incident energy in the backscattered wave. Normal reflection from the glass surfaces of the lens and cell can account for only 2.5% of this energy. Observations were also made concerning the distortion repairing qualities of the phase conjugate wave and the sensitivity of the process to multimode excitation. Finally, appreciable visible fluorescence was observed when phase conjugation occurred.

Master of Science in
Physics
June 1985

Advisor: D.L. Walters
Department of
Physics

ELECTRON IRRADIATION OF LIGHT EMITTING DIODES

Christian Q. Ness
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1972

An experiment is described in which 30-MeV electrons were used to irradiate LEDs. A brief description of typical electron radiation sources is given along with a description of the effects of electron radiation on semiconductors. Using a simple model for LED current generation, a set of equations for determining phenomenological damage constants is given. The damage sustained by the LEDs increased total current but reduced radiative current for a given voltage and was similar to that seen by earlier workers performing comparable experiments with electrons, protons, and neutrons. Four groups of LEDs were studied. The group of LEDs, fabricated by liquid phase epitaxy (LPE) had an average lifetime-damage constant product $\tau_0 K = 6.4 \times 10^{-13}$ cm^2/e$^-$ which was much greater than the averages for three different color groups of LEDs fabricated by vapor phase epitaxy (VPE) where the average lifetime-damage constant products were $\tau_0 K = 1.3 \times 10^{-13}$ cm^2/e, $\tau_0 K = 0.7 \times 10^{-13}$ cm^2/e$^-$ and $\tau_0 K = 1.9 \times 10^{-13}$ cm^2/e . This indicated that the LPE devices are from 3 to 9 times as susceptible to damage as the VPE devices.

Master of Science in
Physics
December 1984

Advisor: K.C. Dimiduk
Department of
Physics

DESIGN AND TESTING OF HARDWARE IMPROVEMENTS OF AN ACOUSTIC SOUNDER

William L. Richards
Lieutenant, United States Navy
B.S., United States Naval Academy, 1977

Acoustic sounders have proven to be excellent tools in probing the fine dynamic structure of the atmosphere. Commercial instruments, such as the Aerovironment model #300 acoustic sounder, are qualitative devices and do not operate well at ranges beyond five hundred meters. This project centered on two hardware improvements designed to help increase the range of the acoustic sounder to over one thousand meters. The developments include the design and testing of an improved transmission horn for the transducer.

Master of Science in
Physics
June 1985

Advisor: D.L. Walters
Department of
Physics

LASER DAMAGE TO SPHERICAL TARGETS

Charles O. Stephenson
Lieutenant, United States Navy
B.S., United States Naval Academy, 1978

Previous research has investigated laser beam interaction with flat surfaces. Those studies have generated theoretical foundations for cratering, plasma formation and expansion, and electric and magnetic field dynamics.

This study applies previously developed theory to understanding damage to spherical targets of 1 millimeter diameter and smaller. The targets analyzed were irradiated on one side with 300 picosecond iodine laser pulses (6×10^{15} W cm^{-2}). Direct laser beam damage and surface damage to areas remote from the focal spot were analyzed. Time-resolved pinhole photography, x-ray spectroscopy, and electron microscope photography were used to determine sequence, mode and severity of damage. Finally, a model for the creation and spread of the laser-produced plasma around the sphere is formulated, taking into account plasma pressure gradients, magnetic fields and hot-electron transport.

Master of Science in
Physics
June 1985

Advisor: F.R. Schwirzke
Department of
Physics

FORM FACTOR EFFECTS ON MICROWAVE CERENKOV RADIATION

Edward R. Turner
Lieutenant Commander, United States Navy
B.S., University of New Mexico, 1976

The effects of the electron bunch charge distribution on the production of microwave Cerenkov radiation in air are investigated. The representation of this distribution is presented in terms of a function called the form factor. Theory is developed which uses two dimensionless quantities to study the form factor effects. These are the emission length to wavelength ratio and the bunch length to wavelength ratio. A prediction is made for conditions which allows a concentration of radiation ninety degrees to the beam. Results are reported of experiments which were performed to measure the effects of the form factor using parameters available at the Naval Postgraduate School's linear accelerator. Findings from these experiments along with suggestions for further research are included.

Master of Science in
Physics
December 1984

Advisor: J.R. Neighbours
Department of
Physics

AN INVESTIGATION OF LASER INDUCED SURFACE DAMAGE IN GLASS

Richard D. Uyak
Lieutenant Commander, United States Navy
B.S., University of Akron, 1976

Laser-induced plasma surface damage in a transparent dielectric is investigated. The possible occurrence of unipolar arcing as a damage mechanism in non-conductors is examined.

Experiments were conducted using a neodymium glass laser in a Q-switched mode to create a hot plasma. The plasma damage on both entrance and exit surfaces was examined. The morphology of damage is qualitatively analyzed. Several theories are applied in explanation of the damage obtained.

The appearance of micropitting at the periphery of the laser impact area of the targets indicates the possible occurrence of unipolar arcing as a damage mechanism. Other damage mechanisms include thermal stress, electron avalanche, particle deposition, and micropitting from particle inclusions or surface imperfections.

Master of Science in
Physics
June 1985

Advisor: F.R. Schwirzke
Department of
Physics

CERENKOV RADIATION FROM PERIODIC ELECTRON BUNCHES FOR FINITE EMISSION LENGTH IN AIR

Milorad Vujaklija
Lieutenant, Yugoslav Navy
B.S., Naval Academy, Split, 1979

The physical mechanism of Cerenkov radiation in air caused by the periodic electron bunches is presented here in a simplified and exact mathematical form, as well as some applications and evidence. The experiment is an effort to verify the theoretical prediction of the power increase and fall off with discrete harmonic frequency in the microwave region.

The radiation diagrams and absolute power measurements in the far field for the first four harmonics are provided by the improvements, such as: frequency selection by the YIG filter, power amplification by the TWT amplifiers, high sensitivity of the signal detection by the oscilloscope vertical differential amplifier along with the noise reduction and radiation shielding. Suggested experimental methods may be expanded to the higher harmonics with appropriate equipment.

The experimental data reveal the unexpected spikes in the radiation diagrams. The absolute power results are reasonably close to the theoretical ones. The experimental method satisfies this Cerenkov experiment and may be improved. Further research may provide usable information for the electron beam monitoring or Cerenkov source at higher microwave frequencies, for which a certain interest exists.

Master of Science in
Physics
December 1984

Advisor: J.R. Neighbours
Department of
Physics

FACILITIES REQUIREMENTS FOR A FLASH X-RAY MACHINE

Edward C. Zurey, Jr.
Lieutenant, United States Navy
B.S., The Pennsylvania State University, 1978

This study discusses the impact and benefits of installing a 1.5 MeV flash X-ray machine at the Naval Postgraduate School. It reviews the specifications and applications of the 100 MeV linear accelerator currently in operation at NPS and compares it with the performance of the proposed equipment. Estimates of radiation production and area dosages from the flash X-ray machine, as well as proposals for equipment location and shielding design, are presented. Laboratory requirements for electrical power, space, radiation monitoring, equipment interlocks and safety awareness, as well as federal regulations applicable to an installation of this type, are considered.

Finally, research and thesis opportunities through the improved and unique capabilities of the flash X-ray machine are presented, along with some suggestions for proposed experiments and applications.

Master of Science in
Physics
June 1985

Advisor: X.K. Maruyama
Department of
Physics

MASTER OF SCIENCE

IN

SYSTEMS TECHNOLOGY
ELECTRONIC WARFARE (EW)

HUMAN FACTORS ENGINEERING AND OPERABILITY IN THE DESIGN OF ELECTRONIC WARFARE SPACES ABOARD UNITED STATES NAVAL COMBATANTS

David J. Blauser, Jr.
Lieutenant Commander, United States Navy
B.A., Illinois College, 1972

The purpose of this thesis is to present and discuss a method of assessing the effectiveness of a work space layout. In addition, this method will provide the framework for pinpointing those areas of layout design where redesign will be most cost effective. The objective is to address inefficiencies in the layout of warfare modules on U.S. Navy combatants. In particular, the Electronic Warfare Module on aircraft carriers is assessed due to the highly time-critical nature of electronic warfare. The method chosen in this thesis is a modification of two techniques of assessment: Integration Analysis and Mission Operability Assessment Technique (MOAT). The portions of these techniques used are Link Analysis, Task Analysis, and Operability Analysis. The application herein concludes that the EW Module layout design on the latest NIMITZ-class aircraft carriers was less than 40% effective in promoting mission accomplishment.

Master of Science in
Systems Engineering
(Electronic Warfare)
September 1985

Advisor: C.W. Hutchins, Jr.
Department of
Operations Research

DEVELOPMENTS IN MODELLING THE USE OF INFRARED OFFBOARD COUNTERMEASURES IN AN INFRARED ANTI-SHIP MISSILE SCENARIO

Vernon D. Reed
Lieutenant, United States Navy
B.S.E.E., University of Missouri, 1978

This work deals with the evolution of a FORTRAN simulation written by Naval Research Laboratory which is used to evaluate the effectiveness of deploying ship-launched infrared decoys to counter the anti-ship infrared seeking missile threat. Although the model (referred to as the Stochastic Infrared Engagement Model - SIREM) possesses extensive analytical capability and flexibility, refinements are desired to more accurately emulate atmospheric effects on the acquisition process. Methods are derived herein to calculate atmospheric transmittance as a function of range using an accurate, LOWTRAN-based empirical formula.

Basic seeker discrimination techniques are addressed which may be incorporated into SIREM or other simulations for future missile-versus-decoy evaluations; and some ideas are presented which may prove valuable in decoy enhancement to subjugate the discriminating seeker.

Master of Science in
Systems Engineering
(Electronic Warfare)
September 1985

Advisor: A.W. Cooper
Department of
Physics

TACTICAL MILITARY DECEPTION

John Anton Van Vleet
Major, United States Army
B.S., United States Military Academy, 1974

This is a study of deception in military operations with emphasis on the Army division level. The thesis is developed from empiracal data, fundamental processes, and decision-making processes. It is a comprehensive analysis of the battlefield deception process and a basic guide to deception planning.

The thesis formulates a theory for operational military deception as an extension of the pioneering work of Barton Whaley. Whaley's deception data base is analyzed to show trends in operational deception. These trends are combined with pertinent elements of game, communications, organization, and systems theory as well as perceptual and cognitive processes.

As a result of this study, the author presents conclusions and recommendations on how deception might be better applied to support U.S. Army division operations.

Master of Science in
Systems Engineering
(Electronic Warfare)
September 1985

Advisor: K.L. Herbig
Department of
National Security Affairs

MASTER OF SCIENCE

IN

SYSTEMS TECHNOLOGY ANTISUBMARINE WARFARE (ASW)

OPTIMUM FREQUENCY FOR PROPAGATION OF SOUND IN SHALLOW SOUND CHANNELS

W.L. Bradfield-Smith
Lieutenant Commander, United States Navy
B.S., Duke University, 1975

Optimum frequency for propagation of sound in shallow sound channels was studied using two acoustic transmission loss models. The split-step Parabolic Equation model (a full-wave model) and the Fast Asymptotic Coherent Transmission loss model, version 9H (a ray-tracing model) were tested against experimental data collected by Dosso and Chapman in the northeast Pacific Ocean. The models were found to be valid predictors of optimum frequency for the shallow sound channel observed by Dosso and Chapman. Both models were then used to predict optimum frequency for two sound velocity profiles obtained in a high-latitude deep ocean basin under summer conditions, exhibiting shallow sound channels. As expected, the split-step Parabolic Equation (PE) model adequately predicted optimum frequencies for these cases. The Fast Asymptitic Coherent Transmission loss model, version 9H (FACT 9H) model did not produce reasonable results for optimum frequencies.

Master of Science in
Systems Technology
(Antisubmarine Warfare)
June 1985

Advisors: S.W. Yoon
Department of
Physics

C.R. Dunlap
Department of
Oceanography

USE OF THE WAVENUMBER TECHNIQUE WITH THE LLOYDS MIRROR FOR AN ACOUSTIC DOUBLET

Portia B. King
Lieutenant Commander, United States Navy
B.S., Louisiana State University in New Orleans, 1971

This thesis examines a method to determine the depth of a point source in an isospeed ocean environment. Using the Fourier Transform on the acoustic pressure field in the range domain results in the attainment of the acoustic pressure spectrum in the wavenumber domain and a characteristic nodal spacing unique to the source receiver depths. Quantitative examination of a magnitude plot of the spectrum and use of simple mathematical formulae yield the source depth. The debilitative effects of narrowband noise and surface roughness on the pressure spectrum are also examined. The pressure spectrum is recognizable in noise after the pressure field in the range domain has been lost in the noise field. The effect of surface gravity waves on the pressure spectrum is similar to that on the pressure field in the range domain: the characteristic nodal spacing is suppressed as the height of the surface waves increases.

Master of Science in
Systems Technology
(Antisubmarine Warfare)
March 1985

Advisors: A.B. Coppens
Department of
Physics

C.R. Dunlap
Department of
Oceanography

FIBER OPTIC GRADIENT HYDROPHONE CONSTRUCTION AND CALIBRATION FOR SEA TRIAL

Glenn E. MacDonald
Lieutenant, United States Navy
B.S.M.E., University of Mississippi, 1978

A Mach-Zehnder interferometric fiber optic gradient hydrophone, for operation at 632.8 nm wavelength, was designed and constructed for testing in the laboratory. Two individual fiber optic hydrophone sensing coils with 10 m of fiber each were wound and potted on an epoxy mandrel and their respective sensitivities were obtained. They were then mounted on a rigid bar, separated by 10 cm, to form a gradient hydrophone. The sensitivity of this arrangement was then obtained in a calibrator which allowed the coil pair to be rotated 360°.

Since the laboratory interferometric system was too large to be used in the sea trial tests, a second interferometric system, operating at 830 nm wavelength, using diode lasers was designed and constructed. This was mounted in an experimental apparatus designed and constructed for sea trial. A sea trial of a standard Navy type DIFAR hydrophone was conducted to test the effectiveness of the experimental apparatus. The results of the laboratory tests are summarized and discussed and recommendations for further studies are presented.

Master of Science in
Systems Technology
(Antisubmarine Warfare)
March 1985

Advisors: S.L. Garrett
E.F. Carome
Department of
Physics

MULTIPLE SENSOR TRACKING IN THE INTERIM BATTLE GROUP TACTICAL TRAINER

Keith N. Spangenberg
Lieutenant, United States Navy
B.S., United States Naval Academy, 1977

This thesis provides two subroutines for the Interim Battle Group Tactical Trainer (IBGTT). The first is a single sensor tracking model using the Kalman filter. This subroutine is part of the Passive Sonar Model. The second is a multiple sensor tracking model using the Kalman filter to correlate all sonar contacts on a specific target. This subroutine is a separate entity and can be turned on or off at simulation initiation as required by training objectives.

Master of Science in
Systems Technology
(Antisubmarine Warfare)
March 1985

Advisor: R.H. Shudde
Department of
Operations Research

MASTER OF SCIENCE

IN

SYSTEMS TECHNOLOGY (SPACE SYSTEMS OPERATIONS)

COMPUTER SIMULATION OF DIGITAL SIGNAL MODULATION TECHNIQUES IN SATELLITE COMMUNICATIONS

Craig D. Carlson
Lieutenant Commander, United States Navy
B.A., Concordia College, 1973

This thesis is a tutorial on digital signal modulation techniques used in satellite communications and includes computer simulations of those digital signal modulation techniques introduced. The purpose of the thesis is to introduce digital signal modulation techniques and through the use of computer simulation, generate statistics which represent the characteristics of the FFT for the respective signal type. Further, an analysis of the statistics of the FFT's was conducted to determine if there is any relationship between the components of the FFT of the different signals. The statistic used to investigate this possible relationship was the F-distribution. The computer simulation was written and conducted in the FORTRAN programming language. A copy of the program, results of the simulations and the statistical analysis conducted are included in the appendices.

Master of Science in
Systems Technology
(Space Systems Operations)
September 1985

Advisor: J.L. Wayman
Department of
Mathematics

SOLAR SIMULATION LABORATORY DESCRIPTION AND MANUAL

Kevin T. Mabie
Lieutenant, United States Navy Reserve
B.S., Peru State College, 1978

This research project consisted of writing a manual for testing solar cells. It was written for students in the Space Operations and Space Engineering curricula. A location was selected at the Naval Postgraduate School and equipment was purchased for the construction. The manual begins with an introduction to solar cell theory. The individual components of the solar power laboratory are discussed in detail and their integration into a system is described. The system was designed for automated data acquisition. An IBM PC/XT is the central point of the system. Two computer programs written in IBM BASIC are included for the user with a complete discussion of each.

Master of Science in
Systems Technology
(Space Systems Operations)
June 1985

Advisor: A.E. Fuhs
Department of
Aeronautics

MASTER OF SCIENCE

IN

SYSTEMS TECHNOLOGY COMMAND, CONTROL AND COMMUNICATIONS (C3)

METHODOLOGIES OF DIRECT-FIRE ALLOCATION AND MANEUVER UNIT ALLOCATION AND PLACEMENT

Kenneth D. Boyd
Captain, United States Army
B.S., University of Delaware, 1975

This thesis is directed at the derivation of several methodologies associated with the Airland Battle Research Model currently under development at the Naval Postgraduate School. Two systems are presented that derive aggregated distribution allocation plans involving enemy and friendly direct-fire weapon systems. A military tactical scenario is used to present and contrast both systems. Additionally, allocation and placement models for ground force maneuver units are presented. Specifically, these models demonstrate how military units are allocated and placed on a battlefield by various levels of organization. The use of a transportation network illustrates implementation of the models.

Master of Science in
Systems Technology
(Command, Control and Communications)
March 1985

Advisor: S.H. Parry
Department of
Operations Research

A DEMONSTRATION OF INTERFACES BETWEEN AUTOMATED DEPLOYMENT SYSTEMS

Janice E. Breidert
Captain, United States Air Force
B.S., University of Missouri at Rolla, 1975

Martha J. Smart
Lieutenant, United States Navy
B.S., Oregon State University, 1978

This thesis is intended to demonstrate the technological feasibility of interfacing numerous automated information systems throughout the joint deployment community. Through the use of the EDI concept, deployment information can be transferred between commands which must interact in order to efficiently and effectively plan, execute, and coordinate deployment efforts. The Electronic Data Interchange is a transaction set oriented interchange which provides the means for efficient data communication. Implementation of the EDI concept will tie together systems throughout the community in support of the Joint Operation Planning and Execution System (JOPES).

Master of Science in
Systems Technology
(Command, Control and Communications)
March 1985

Advisor: S.H. Parry
Department of
Operations Research

ENHANCED TACTICAL SYMBOLOGY FOR COMMAND AND CONTROL OF GROUND FORCES

Michael N. Hawrylak
Captain, United States Army
B.A., University of Toledo, 1974

Jeffrey W. Miller
Captain, United States Marine Corps
B.E.E., University of Minnesota, 1975
M.B.A., Capital University, 1983

This thesis is directed at the design and evaluation of "enchanced" ground-force map symbology. Enhanced symbology differs from conventional in that enhanced symbols quantify and clarify information on particular units such as combat effectiveness, personnel strength, equipment density and logistics readiness.

A variety of design properties compiled from several sources that should be considered when fashioning a new military symbol group is discussed with special emphasis on reducing the negative effects of clutter. A suggested symbol set is developed for support of tactical decision-making and for display on computer graphics systems.

The performance of this symbology is then evaluated through an experiment designed to compare the process of quickly and easily solving tactical problems with the enhanced decision aids versus the conventional. An analysis of the experiment results indicated that a commander can reach a tactical decision faster using enhanced symbology.

Master of Science in
Systems Technology
(Command, Control and Communications)
March 1985

Advisor: F.R. Richards
Department of
Operations Research

MICROLAN FILE TRANSFER PROGRAM FOR MICROPROCESSORS

Harold W. Henry
Captain, United States Air Force
B.S., Texas Tech University, 1975

Roger D. Jaskot
Lieutenant, United States Navy
B.S., Illinois Institute of Technology, 1979

The age of automation has established its foothold in today's society. Computerization now affects almost everyone's job, and sharing of information is vital to successful job performance. Manual transfer of information is inefficient and prone to error, so another means is needed. One option is computer networking. Both Local Area Networks and long-haul networks presently exist, but they are either very expensive or hardware dependent.

It would normally require a long lead time and high costs for the military to acquire an information transfer system. To provide a readily available, low cost file transfer system, the authors developed an assembly language program named MICROLAN, which is written to work with three of the main microcomputer operating systems (CP/M-80, CP/M-86, and MS.DOS) and to take advantage of RS232 technology. MICROLAN was tested successfully for file transfer at up to 4800 baud, and suggestions have been included as to possible uses for MICROLAN in the military environment. Additionally, possible methods for upgrading MICROLAN are also included.

Master of Science in
Systems Technology
(Command, Control and Communications)
March 1985

Advisor: G.B. Latta
Department of
Mathematics

COMPARISON OF CONTINUOUS SPEECH, DISCRETE SPEECH, AND KEYBOARD INPUT TO AN INTERACTIVE WARFARE SIMULATION IN VARIOUS C3 ENVIRONMENTS

Rick B. Manson
Captain, United States Army
B.S., United States Military Academy, 1976

Michael E. Wright
Captain, United States Air Force
B.A., Alfred University, 1971

This thesis describes an experiment conducted at the Naval Postgraduate School (NPS) during the period 30 October 1984 through 30 November 1984. Specifically, the experiment compares the use of continuous speech recognition equipment, discrete speech recognition equipment, and keyboard to input commands in a command and control environment. This was accomplished by using the Naval Warfare Interactive Simulation System (NWISS) as a vehicle to pose military problems to subjects in a variety of light and noise environments.

Although the results are not conclusive, they do show a definite advantage in using continuous speech or keyboard entry modes over discrete speech modes. Continuous speech and keyboard methods were superior in all environmental conditions.

Master of Science in
Systems Technology
(Command, Control and Communications)
March 1985

Advisor: J.S. Stewart, II
Department of
Operations Research

AN EXPERIMENT IN THE VALUE OF INFORMATION CORRELATED TO THE WAY THE INFORMATION IS PRESENTED

Joel E. Peterson
Captain, United States Air Force
M.S., George Peabody College for Teachers, 1976

This thesis investigates the quality of decisions made as a function of the method of representing information and the amount of information presented. A software-controlled sequential decision experiment was conducted. A variation of the game of chess was used as a low-level surrogate for battlefield scenarios. The object was to determine if the amount and method of representing information significantly affected the quality of the decisions made.

The analysis of the collected data indicates that several factors affected the measure of effectiveness. The situation or scenario, the experience of the subject, the way information is represented, and the amount of information all affect the quality of decisions made. Multicolored displays of information helped novice decisionmakers perform better than experienced decisionmakers.

Master of Science in
Systems Technology
(Command, Control, and Communications)
March 1985

Advisor: F.R. Richards
Department of
Operations Research

MASTER OF SCIENCE

IN

TELECOMMUNICATIONS SYSTEMS MANAGEMENT

A VFH-FM DIGITAL SELECTIVE CALLING SYSTEM MATHEMATICAL MODEL USING GRADE OF SERVICE CRITERIA

James W. Decker
Lieutenant, United States Coast Guard
B.S., United States Coast Guard Academy, 1976

This thesis presents a mathematical model of a maritime VHF-FM Digital Selective Calling (DSC) System using grade of service as a criterion to determine if a single DSC channel can accomodate both distress and commercial calling. The model calculates the probability of a call being delayed, the average delay of a call, the probability of a call being answered within a certain time frame, and the throughput for the random access calling systems of ALOHA, Slotted ALOHA, Slotted ALOHA with Capture, Nonpersistent Carrier Sense Multiple Access (CSMA), and 1-Persistent CSMA. Analysis of the results indicates that all VHF DSC calling can be made on a single channel. Without regard to a cost-benefit evaluation, it was also determined that 1-Persistent Carrier Sense Multiple Access was the superior random access calling system to utilize for the VHF-FM Digital Selective Calling system.

Master of Science in
Telecommunications Systems
Management
September 1985

Advisor: F.M. Perry
Department of
Operations Research

C.R. Jones
Department of
Administrative Sciences

A MANAGEMENT STRATEGY FOR THE NAVAL ADMINISTRATIVE TELEPHONE SYSTEM

Timothy L. Edgell
Lieutenant, United States Navy
B.S., Miami University, 1978

Management responsibility for the Navy's administrative telephones is in transition from the Commander, Naval Facilities Engineering Command to the Commander, Naval Telecommunications Command. This shift of responsibility was precipitated by fundamental structural changes within the telecommunications industry, changes which produced a volatile market structure rife with competition. A new management strategy is required to deal with these changes. The development of alternative strategies for administrative telephones is prerequisite to any cost-benefit analysis which may be necessary to choose the most cost-effective strategic option for overall system planning and management.

This thesis examines the various system and environmental factors which impact upon a selection of a management strategy, and within the constraints imposed by these factors, develops a hybrid management strategy alternative for the Navy's administrative telephones.

Master of Science in
Telecommunications Systems
Management
March 1985

Advisor: J.W. LaPatra
Department of
Administrative Sciences

A STUDY OF THE COMMUNICATIONS SERVICES INDUSTRIAL FUND

Jan M. Hinton
Lieutenant, United States Navy
B.S., University of Illinois, 1976

The Communications Services Industrial (CSIF) is an integral tool available to the Defense Communications Agency in directing and controlling the operations of the Defense Communications System. This thesis is an analysis of how effective the current structure of the fund has been in allowing the Defense Communications Agency to meet its objectives. A detailed description of the history, purpose and procedures of the fund is provided in the first three chapters. Subsequent chapters examine the fund in the context of management and efficiency difficulties arising from present practices. Alternatives to the current structure are outlined and analyzed.

The basic conclusion reached as a result of the study is that there are areas of the fund requiring change if the CSIF is to accomplish its purpose. The incentives derived from existing methodology undermine the benefits which were envisioned when industrial funding was extended to communications.

Master of Science in
Telecommunications Systems
Management
March 1985

Advisor: J.W. LaPatra
Department of
Administrative Sciences

CONCEPTS OF A MANPOWER REPLACEMENT SYSTEM FOR A MARINE AIR GROUND TASK FORCE IN A DEPLOYED/TACTICAL ENVIRONMENT

*William C. Johnson
Captain, United States Marine Corps
B.S., North Carolina A&T State University, 1975
M.S., University of Southern California, 1983

Jan Williams
Captain, United States Marine Corps
B.S., North Carolina A&T State University, 1976
M.B.A., Pepperdine University, 1980

This thesis is designed to illustrate concepts of a manpower replacement system for a Marine Air Ground Task Force in a deployed/tactical environment. In this environment, the Administrative Officer (G-1) is tasked with the responsibilities of coordinating all efforts associated with personnel replacements. Presently, there are no systems responsive enough to handle personnel replacements in an efficient manner. The first part illustrates the need for such a system. The second part discusses the requirements for such a system including data elements and data flow requirements of the system. The third part explores several alternative ways of satisfying this requirement. The recommended alternative utilizes distributed processing over packet radio networks linked to the defense data network via gateways or tactical radio links. Applicable attributes of both th DDN and Packet Radio technologies are discussed extensively.

*Master of Science in Telecommunications Systems Management
March 1985

Advisor: N.F. Schneidewind
Department of Administrative Sciences

MODIFICATION OF HUFFMAN CODING

Suha Kilic
Lieutenant JG, Turkish Navy
B.S., Turkish Naval Academy, 1978

Huffman Coding minimizes the average number of coding digits per message. Minimizing the mean time by this method raises the problem of large variance. When the variance is large there is a greater probability that an arbitrary encoded message significantly exceeds the average. The delicate point here is the danger of an urgent message taking more time than expected, in addition to larger bandwith or buffer requirements.

With this research a large reduction of variance versus a small increase in mean time is examined for the purpose of modifying Huffman Coding for a particular alphabet.

Master of Science in
Telecommunications Systems
Management
March 1985

Advisor: R.W. Hamming
Department of
Computer Science

THE NAVY'S MODEL FOR ASSESSING LEASE VERSUS BUY DECISIONS IN SATELLITE COMMUNICATIONS SYSTEMS: AN EVALUATION

Joy L. Phillips
Lieutenant Commander, United States Navy
B.A., University of Houston, 1974

This thesis contains a policy analysis of the Navy's lease versus buy decision model used in the Military Satellite Communications (MILSATCOM) systems acquisition process. The general issues of the lease/buy question are considered as well as the specific quantitative methodology used in the Navy's current model. The model is found to be deficient in several ways. First, its basic assumption that public sector leasing can be less costly than buying is unfounded when total costs of the lease option to the whole economy are the criteria for comparison. Second, the model fails to compare the same system output when comparing the two financing mechanisms. The analysis of the leasing alternative is based on the presumption that a leasing instrument will fix all inputs at the time of contract negotiation while the buy analysis presumes all inputs will remain variable. Last, the model inadequately addresses issues such as survivability and interoperability and how, or if, these elements of the MILSATCOM systems decision problem affect the lease/buy decision.

Master of Science in
Telecommunications Systems
Management
June 1985

Advisor: C.R. Jones
Department of
Administrative Sciences

INTEGRATED SERVICES DIGITAL NETWORK (ISDN)

Margaretmary T. Weidert
Lieutenant Commander, United States Navy
B.E.A., University of Delaware, 1972

This thesis contains development of a conceptual framework for an Integrated Services Digital Network (ISDN) and relates ISDN concepts to non-tactical Department of Defense (DoD) communications applications. The conceptual framework developed is non-technical and is intended to provide general management with an introduction to the ISDN. An existing Model communications system, Japan's Information Network System (INS), which exhibits characteristics of ISDN, is also discussed in terms of the conceptual framework developed. General ISDN concepts are also related to DoD applications. The Defense Data Network (DDN) is presented as a candidate network on which a potential military ISDN could be based.

Master of Science in
Telecommunications Systems
Management
June 1985

Advisor: C.R. Jones
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MASTER OF ARTS

IN

NATIONAL SECURITY AFFAIRS

EGYPT BETWEEN THE SUPERPOWERS: CONTINUITY OR CHANGE IN EGYPTIAN FOREIGN POLICY UNDER MUBARAK

Mohamed Youssef Amer
Lieutenant, United States Navy
B.A., University of Minnesota, 1974

This thesis deals with Egyptian foreign policy under President Mohamed Hosni Mubarak. The emphasis is on Egypt's orientation between the superpowers, and the dilemma of continuity or change. The Egyptian leadership's perception of their country's international and regional role is discussed as it affects the foreign policy decision-making process. We propose that a reassessment by the Mubarak regime was made regarding Egypt's foreign policy in the wake of Sadat's assassination with the desire to break out of its isolation. Mubarak is presenting a variation of Sadat's solution on how to balance an active foreign policy with limited resources and serious economic problems without becoming overly dependent on either superpower. Our hypothesis is that Egyptian foreign policy has not deviated markedly in content since Sadat, however it has in style. Egypt continues to maintain a special relationship with the United States, despite the recent exchange of ambassadors with the Soviet Union and its reassertion of the nonaligned principles as a guide to its foreign policy.

Master of Arts in
National Security Affairs
December 1984

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UNITED STATES STRATEGIC MILITARY ACCESS IN NORTHEAST AFRICA

Harold L. Bakken
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B.A., North Dakota State University, 1976

This study examines and assesses the implications of U.S. efforts to obtain strategic military access in four Northeast African states: Egypt, Sudan, Somalia and Kenya. Accomplishment of USCENTCOM's different missions requires access at various levels to varying degrees. This study establishes a general hierarchy of access priorities in the six most critical complexes in the region. Despite U.S. military and economic assistance programs which are designed to deter Soviet expansion, increase American influence, and create regional stability, U.S. access has not been attained. A concern of American decisionmakers is that increased political pressure on the current regimes in Northeast Africa would be counterproductive to regional stability. For these reasons, strategic planners must consider alternatives to access, including elimination of USCENTCOM; reducing its size and mission; or maintaining the current force structure while expanding its strategic mobility.

Master of Arts in
National Security Affairs
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AMERICAN ACTIONS IN THE DOMINICAN REPUBLIC AND GRENADA

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This thesis focuses on U.S. actions in the Dominican Republic in 1965 and in Grenada in 1983. Both of these incidents involved U.S. military action in minor Caribbean island nations undergoing violent political revolutions. Both incidents had significant East/West ramifications.

These two incidents are compared and contrasted for policy similarities applicable to revolutionary regimes in Latin America and the Caribbean basin.

The specific areas addressed are similarities and differences in each situation regarding the motivations and objectives of the U.S. national leadership, international and domestic repercussions of each action, and military objectives and method of application in each case.

Master of Arts in
National Security Affairs
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THE ROAD FROM LAPALMA: ANALYSIS OF THE POTENTIAL FOR A NEGOTIATED SOLUTION IN EL SALVADOR

James L. Brubaker
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The crisis in El Salvador has evolved through several distinct bargaining phases. Each phase has involved the interaction/conflict between various political power contenders, resulting in a reassessment of relative positions and a new phase. This has led to the present condition in which the major actors are realizing that the need for limited concessions and a peaceful settlement outweigh the potential gains and costs of continued conflict. This thesis is a study of the historical and cultural bases of bargaining powers in El Salvador, and how they have been utilized and transformed within each socio-political power faction in reaching the present situation, and what is portends for the future.

Master of Arts in
National Security Affairs
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CUBAN SUPPORT TO LATIN AMERICAN AND CARIBBEAN INSURGENCIES: 1978-1983

Susan H. Butler
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B.A., West Virginia University, 1975

This thesis explores the historical and ideological foundations of Cuban involvement with other Communist and insurgent movements throughout Central America and the Caribbean. The thesis focuses on the period 1978 to 1983, and includes analyses of Cuban relations with groups in and out of power in Nicaragua, El Salvador, Guatemala, Honduras, Costa Rica, Colombia, Grenada, and other Caribbean microstates. Cuban techniques for promoting wars of national liberation, with minimal risk and cost to the Castro regime, are discussed. Areas in which Cuban and Soviet objectives have diverged are noted to show that Cuban aggression in the region is directed primarily against the United States, and not necessarily tailored to meet Soviet goals.

Master of Arts in
National Security Affairs
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THE POTENTIAL OF THE REPUBLIC OF KOREA NAVY FOR COOPERATION WITH THE JAPANESE MARITIME SELF-DEFENSE FORCE IN THE SECURITY OF GREATER EAST ASIA

Jack R. Carpenter, Jr.
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B.S., United States Naval Academy, 1974

This thesis is concerned with the possibilities for cooperation in the security of greater East Asia by the ROK Navy and Japan's Maritime Self-Defense Force. It examines the early histories of those navies, their traditions and images, and the cultural antipathies and nuances which affect aspects of cooperation.

External threats to the security of the region are weighed, balanced against the political and economic foreign policies of Japan and the ROK, and a strategic calculus involving U.S. participation is carefully developed. The ensuing impacts of cooperation on Japan, the ROK, and the U.S. are set forth, with the likely limitations stemming from internal political processes.

Finally, the realities of possible cooperation are assessed, and some recommendations advanced for encouraging and enhancing that cooperation.

Master of Arts in
National Security Affairs
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ASEAN AND INDOCHINA: A STRATEGY FOR REGIONAL STABILITY IN THE 1980'S

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B.A., University of Washington, 1974

This thesis suggests a reassessment of United States and Southeast Asian policy towards Vietnam and the other Indochinese states. The hypothesis behind this suggestion is simply that the current policies of isolation imposed on Indochina do little to promote stability in the region; drive Indochina further into the Soviet sphere; and do not serve the long range interests of the United States and other nations of the region. It explores the possibility of ASEAN-Indochinese rapprochement, based on encouraging proper interactive behavior by Indochina through linking such behavior to economic incentives. It is postulated that such actions can lead to regional interdependency and long term political stability.

To this end, comparative national interests/policies are examined within the context of military, political and economic interaction in Southeast Asia. Weaknesses and strengths are highlighted and areas for mutual cooperation explored. Options for the future are discussed and an emphasis on internal economic growth is suggested as the soundest path towards stability in Southeast Asia.

Master of Arts in
National Security Affairs
December 1984

Advisor: C.A. Buss
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NEW BASES FOR OLD: AN UNUSUAL VIEW OF THE PHILIPPINE BASES PROBLEM

Cheri L. Conilogue
Lieutenant Commander, United States Navy
B.A., Colorado Women's College, 1975

This study takes an unusual view of what would happen should we have to leave our facilities and bases in the Philippines. Most studies review the most available alternatives, catalog their many faults, and conclude that we must retain our facilities in the Philippines because we have no better sites from which to accomplish our missions.

This study assumes that since we need a permanent, strong U.S. presence in Southeast Asia, instead of having to cope with the changing attitudes of any local government, the U.S. would be better served by locating and purchasing a permanent U.S. site, and building new facilities there. The site proposed is Malampaya Sound, on the Philippine island of Palawan.

This innovative approach would reduce friction with the Filipinos over U.S facilities' proximity to population centers, jurisdictional disputes stemming from status of forces agreements, and affronts to Philippine "honor and dignity," while enhancing U.S. naval and air capabilities.

Master of Arts in
National Security Affairs
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RETROCESSION OF HONG KONG

Charles W. Cunningham
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The People's Republic of China and Great Britain have set a precedent in negotiating the peaceful return of Hong Kong's sovereignty and administration to China. This thesis examines the political, economic and social forces operating within China, Hong Kong and Great Britain to determine the future success of the Joint Declaration in maintaining Hong Kong's stability and economic prosperity. It also investigates the commitment of all three parties to the future success of the Hong Kong Special Administrative Region (SAR). Although optimistic about the success of the Hong Kong SAR, it recognizes the need for continued pragmatism and restraint by Beijing and Hong Kong. The Hong Kong people must be committed to maintaining the SAR's independence by avoiding any radical changes in their political or social systems that would threaten their prosperity and stability.

Master of Arts in
National Security Affairs
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Advisor: C.A. Buss
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MONITORING SOVIET NAVAL DEVELOPMENTS THROUGH BINARY THEMATIC CONTENT ANALYSIS

Thomas P. Dolan
Lieutenant Commander, United States Navy
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This thesis describes the analysis of publications for intelligence purposes using the method of content analysis and processing of the data collected. For this experiment, the Soviet naval journal Morskoy Sbornik was examined over a three-year period, 1970 to 1972. The data generated by this approach was then compared with key events to validate the methodology. For example, the influence of the 24th Congress of the Communist Party of the Soviet Union on the Soviet military was revealed through this technique.

This particular type of content analysis used a thematic approach, using binary coding of topics, enabling large amounts of material to be surveyed in a relatively short period of time. Creation of a computer data base for analysis is described, and original source code of programs has been included. Recommendations for dissemination and use of such a data base to appropriate users are included.

Master of Arts in
National Security Affairs
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BETWEEN SCYLLA AND CHARYBDIS: THEATER NUCLEAR FORCES IN EUROPE

Carl W. Dossel
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B.A., The Citadel, 1978

This thesis examines the topical issue of nuclear weapons in Europe and is divided into two major parts. The first traces the history of nuclear weapons and doctrine associated with NATO and the Warsaw Pact from 1945 through 1985. Drawing on this historical perspective, the second part critically examines current conventional and nuclear force structure and doctrine.

Briefly, it concludes that NATO's approach to nuclear force structure and doctrine might be charitably labled *ad hoc*. In view of present and projected Warsaw Pact conventional and nuclear capabilities, the credibility of flexible response suffers accordingly. To remedy this situation, a series of recommendations are made, the gist of which are: adoption of a mobile conventional defense, removal of battlefield nuclear weapons from Europe, enhance the survivability of theater-strategic systems, and seek the ultimate elimination of theater nuclear weapons on both sides via arms control talks.

Master of Arts in
National Security Affairs
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THE MORO PROBLEM: AN HISTORICAL PERSPECTIVE

Dennis B. Fowler
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For over 400 years the Muslim people of the southern Philippines have been at war. They have resisted the Spanish occupation of their ancestral homelands, the American colonial presence, and the current Christian government.

To understand what motivates the Moro people to such conflict, it is necessary to study their history, religion, and the ethnic fabric which makes up their various regional groups.

The fundamentals of their religion require a homogenous Islamic government. In the Philippines this would require separation, or at least total autonomy for the Muslim areas. This has never been allowed by the Christian government which has perpetuated the cause of the Moro insurgency. Conflict will surely continue as long as Christian authority is imposed upon the Moro people.

Master of Arts in
National Security Affairs
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THE FEDERAL REPUBLIC OF GERMANY'S SECURITY DILEMMA: OSTPOLITIK WITHIN U.S.--SOVIET DETENTE

Judith L. Gurney
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Detente has created dissension within NATO, dissension centered on the Federal Republic of Germany (FRG). The FRG's contribution to detente -- Ostpolitik -- has made it both a focus of controversy within the Alliance and a prime target of Soviet pressure. Since Germany is vital to a stable European order, the German question has had high priority on the detente agenda. This thesis analyzes the unresolved German question, and the resulting West German security dilemma, in terms of the conflict and incompatibility between American, Soviet and West German designs for a future European security order. It suggests that inconsistent and vacillating American detente policies have helped to encourage the FRG to seek its own divergent accommodation with the USSR. The FRG's Ostpolitik will probably continue to be vulnerable to Soviet manipulation. Further discord in the US-West German alliance is therefore likely.

Master of Arts in
National Security Affairs
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PARTY POLITICS AND GREEK SECURITY POLICY FROM 1974 TO 1984: CHANGE AND CONTINUITY

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M.Ed., Campbell University, 1984

This thesis explores the effects of political change on Greek security policy during the period 1974 to 1984. This period encompasses significant change in Greece's foreign relations including those with the United States. The central question is: Are the elements of Greek security policy based on long-term basic interests which find consistent expression, or are they a function of domestic political factors, more ideologically motivated, and therefore variable according to the governing political party? The fundamental issues include: relations with the Eastern Bloc, Cyprus, the Aegean Sea, relations with NATO, and U.S. military installations in Greece. These issues are analyzed for three periods: the 1974-1981 New Democracy Governments, the 1974-1981 opposition policies of PASOK, and the 1974--present PASOK government. Although some expected a radical departure in policies with the 1981 change to a socialist government, practical policies have shown very little change. The basic requirements of a developing and maturing country influenced by the conditions of its regional environment and general world conditions seem to lend consistency and rationality to Greek security policy and should be considered in forming Western policy for the region.

Master of Arts in
National Security Affairs
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THE TRUST: THE CLASSIC EXAMPLE OF SOVIET MANIPULATION

Stephen A. Harris
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This thesis covers the career of the organization which came to be known as "The Trust." It is the classic example of Soviet deception and manipulation which proved to be very successful in neutralizing, for a period of about six years, the many and varied "White" Russian emigre groups which abounded in Europe after the Russian Revolution. It also lured back into Russia many of the leaders of these various Russian groups who were committed anti-Bolsheviks; the two most important victims were Sydney Reilly (Britain's "Master" spy) and Boris Savinkov (Kerensky's War Minister and a former terrorist under the Czars).

Master of Arts in
National Security Affairs
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THE SUCCESSION PROBLEM IN THE PEOPLE'S REPUBLIC OF CHINA

Cheng Yu Huang
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In light of Deng Xiaoping's advanced age (80 years old), the Chinese leaders, without a historical precedent of smooth institutional succession or the ability to rely on legal documents, are once again facing the same pattern of uncertainty, instability, conflict and major policy change related to succession. This thesis explores the problems and possible solutions of the succession issue. In the introductory chapter, five factors are identified as the major problems associated with the Chinese succession. However, only military, power base, and Deng's policy alternatives will be discussed in this thesis. Chapter II looks at the People's Liberation Army as a political and military institution on the one hand, and as a participant in the political succession struggle on the other. The concept of political power base will be analyzed in Chapter III by examining Deng Xiaoping vs. Hua Guofeng. Chapter IV deals exclusively with Deng's attempt to build a consensus that will avoid repeating turbulence associated with succession. In the Conclusion Chapter, an attempt will be made to speculate the near term (5-10 years) outcome of PRC succession politics. At the conclusion of this thesis, an epilogue discusses the United States' near term interest(s) in PRC and recommends a policy alternative for the U.S. policy makers.

Master of Arts in
National Security Affairs
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THROWING OFF THE SHACKLES: THE EMERGENCE OF THE SOVIET UNION INTO THE ARENA OF WORLD TRADE

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The Soviet Union has broken away from their traditional autarkic views and entered the arena of world trade. Initially focusing on and enjoying the political and economic benefits of trade with the West, the Soviets are now gradually enlarging their trade activity and shifting their attention to Third World markets for political and economic gain. It is the intent of the Soviet leadership to form a more operable and lasting extension of power through a stable triangle of influence, with Marxist/Leninist ideology and political structures on one side, military support and arms supply on the other side, on an ever-expanding stabilizing economic base. This study examines the economic motivations and viability of these Soviet intentions.

Master of Arts in
National Security Affairs
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SWEDEN: NATO'S SILENT PARTNER?

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In 1949 Sweden elected not to join NATO and declared a security policy which remains in effect today: nonalignment in peace, neutrality in war. To conduct this policy, Sweden must have a credible deterrent. In this context, the defense doctrine is one of "total defense," in which all aspects of Swedish society (military, civilian, economic) are coordinated in a total effort to ensure the survival of the nation. But the doctrine may not be effective without the support of outside forces, and some Swedish military planners admit that they rely on NATO support within seven days of any outbreak of hostilities with the Warsaw Pact, making Sweden a "trip-wire" for NATO.

This paper examines the Swedish defense doctrine in terms of military force structure, framed in the political debate of the past decade. It discusses the difficulties facing Sweden in regard to modernizing her armed forces, and suggests that Sweden is now, and will continue to be, a silent partner in NATO.

Master of Arts in
National Security Affairs
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FUTURE U.S. SECURITY IN THE CARIBBEAN: THE CARIBBEAN BASIN INITIATIVE AND THE ECONOMICS OF JAMAICA

Gerhart K. Maas
Lieutenant Commander, United States Navy
B.A., Transylvania, Lexington, Kentucky, 1971

Donald E. Pletcher
Lieutenant, United States Navy
B.S., University of Idaho, 1975

Chapter one provides a study of Jamaica during the 1970's. The outcome of this research and the associated modeling reveals that Prime Minister Manley's approach to government had some dire consequences. Chapter two provides a current view of the Caribbean Basin Initiative (CBI) along with some computer simulations which serve as a basis for future economic forecasts. The results of this research suggest several possible courses of action for the present government under Prime Minister Seaga. Fortunately, under Jamaica's present leadership, any policy which serves to strengthen the country economically, will also enhance local U.S. security interest. Chapter three discusses various aspects of Jamaican history and culture to investigate the likelihood that, if given the optimum economic recovery program, it could be successfully implemented. Finally, chapter four addresses some overall conclusions about Jamaica's economic future, the prospects of which appear hopeful under America's current Caribbean Basin Initiative.

Master of Arts in
National Security Affairs
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THE SOLOMONS NAVAL CAMPAIGN: A PARADIGM FOR SURFACE WARSHIPS IN MARITIME STRATEGY

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Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1973

This thesis examines the naval campaign in the Solomons during World War II with an emphasis on the relationship between the campaign strategy and the tactics employed. The strategic background is reviewed within the context of the War in early 1942. A central theme developed is that in the Solomons campaign both sides employed cruisers and DD's as principal naval forces in place of the fully integrated "battle fleets" envisioned as part of pre-war strategy. The role of war gaming in American preparations for the war is shown to explain in part the failure of American commanders to modify existing doctrine in a timely manner during the campaign. Data from the naval battles fought in the Solomons is compiled in an original way and analyzed to explain the factors which consistently influenced the outcome of the eleven battles. Conclusions reached address the nature of modern campaigns undertaken to widen a conflict ("horizontal escalation") and the forces that may be required to pursue such campaigns. The parallels between the use of surface combatant task forces in World War II and their projected employment today are noted and discussed.

Master of Arts in
National Security Affairs
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CREOLE-LENINISM: GRENADA, A CASE STUDY

Alan B. McKenzie
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B.S., North Carolina State University, 1972

This thesis examines the socialist transformation and subsequent militarization and violent political polarization of Grenada in view of the primary source documents that were recovered by the joint Caribbean task force in October 1983.

Chapter one presents a brief history and the rise to power of Maurice Bishop and the New Jewel Movement. Chapter two demonstrates the strategic significance of the Caribbean basin to both the United States and the Soviet Union.

Chapter three traces the Soviet, Cuban and other communist bloc assistance, to Grenada with an examination of Grenadian foreign policy during the Bishop regime.

Chapter four reviews the assassination of Maurice Bishop with contrasting parallels of Soviet decisionmaking in Angola and Afghanistan.

Chapter five concludes that the attempt to subvert and replace the populist Bishop with Moscow trained Coard, was orchestrated and sponsored by the Soviet Union.

Master of Arts in
National Security Affairs
December 1984

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UNDERSTANDING THE PLO

Mark E. Morrison
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B.A., Brigham Young University, 1978

This thesis is concerned with giving a complete understanding of the Palestine Liberation Organization. The organization of the thesis emphasizes three important factors which help to explain what the PLO is, how it operates, and why it acts as it does: Organizational Structure, Environmental Constraints, and Belief Systems. The Organizational Structure section includes data on PLO organization including the Palestine National Council, Executive Committee, Central Council, Commando Groups, and the medical, educational, trade unions, cultural, and social institutions. The section concerning the Environmental Constraints deals with the various PLO leaders, PLO ideology, strategy, military, and economic history. The Belief System section consists of an Operational Code of the PLO as an institutional entity. After developing all three factors the thesis gives three examples of recent PLO behavior. By understanding the factors of Organizational Structure, Environmental Constraint, and Belief Systems one can more easily and logically comprehend how these factors operate to influence the behavior of the PLO and its leaders.

Master of Arts in
National Security Affairs
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DIPLOMATIC PRIVILEGE AND IMMUNITY--ABUSE AND EXPLOITATION BY INTERNATIONAL TERRORISTS

James S. Osborne, Jr.
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B.P.A., University of Mississippi, 1977

International terrorism is a serious problem in the world today threatening the security and stability of large world powers as well as relatively weaker third world nations. Violence and terror as tools for modern revolution are commonplace and terrorists are constantly seeking new ways to increase their mobility, strength, credibility, and visibility.

Diplomatic agreements have been developed over the years as a means of protecting the official government representatives serving in consulates and embassies in foreign countries from official harassment and interference with their official duties. Privileges and immunities from civil and criminal actions are granted between nations which maintain diplomatic ties because officials are personal representatives of their heads of state.

Abuses associated with the implementation of political terrorism are taking place and are apparently increasing. States sponsoring international terrorists have seized the initiative and are exploiting the privileges granted to diplomats as a means of increasing the capabilities of the terrorists. The battle against terrorism is an important one and countermeasures to combat terrorist abuses of diplomatic privilege must be developed.

Master of Arts in
National Security Affairs
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THE RELIABILITY OF THE WARSAW TREATY ORGANIZATION: CAN THE SOVIET UNION DEPEND ON ITS NORTHERN TIER ALLIES?

Karen A. Prichard
Captain, United States Air Force
B.A., East Texas State University, 1971

This thesis examines the reliability of Czechoslovakia, East Germany (GDR), and Poland (the Northern Tier Eastern bloc states) as Soviet allies in case of a war with NATO. The success of Soviet efforts to bind the political, military, and economic systems of these states into a homogeneous whole under Moscow's control is evaluated. In spite of a good deal of interdependence among the East Bloc contries, hostility towards the Russians and between the various ethnic groups makes control difficult and reliability questionable in a conflict with the West. East Germany is the most reliable of the three and is not likely to shift its position in the near future in spite of differences of opinion on how to deal with East German-West German relations. Czechoslovakia is outwardly reliable, but only because the people see no chance of breaking the Soviet's grip. Poland is now, and will be for the foreseeable future, an unreliable ally, but one whose geographical position is so vital to the Soviet Union that the Russians will expend whatever resources necessary to keep it under control.

Master of Arts in
National Security Affairs
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TRANSPORTATION AS AN ELEMENT OF FOREIGN POLICY IN SOUTHERN AFRICA OR THE TIES THAT BIND

Karl E. Prinslow
Captain, United States Army
B.S., United States Military Academy, 1976

This thesis examines the use of transportation as a foreign policy instrument in Southern Africa. Because of its dominant position in the regional transportation network, the Republic of South Africa is the focus of this study. Transportation has been used by the states of Southern Africa as a means of gaining an advantage or leverage over their neighbors to further their own vital interests, economic and political. During the 1970's the South African Railways attempted to use common interests in the creation and maintenance of effective transport organizations to transcend regional political differences and improve interstate relations. This strategy came to be referred to as transport diplomacy. After tracing the evolution of the Southern African transport network and South African foreign policy, this study examines several attempts to use transport to achieve influence over neighboring states in various ways. A framework that distinguishes between positive, negative and neutral influence strategies is developed; and an effort is made to identify the prerequisites for effective implementation of each type of strategy. Finally, an argument is made that a distinct association of regional transport organizations has come into being in Southern Africa.

Master of Arts in
National Security Affairs
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LIMITED WAR: A MODEL FOR ENTRY, CONDUCT, AND TERMINATION

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This thesis presents and tests a model for Entry, Conduct, and Termination of a limited war. Employing the "Focused Comparison" methodology, an attempt is made to relate this "Limited War Model" to a pair of historical case studies. The cases analyzed in this endeavor are the Korean War spanning the years 1950-1953 and the Falklands War of 1982. In the former the analysis is concentrated on the decisions of the United States, while the latter deals primarily with the delibrations of the United Kingdom. The findings of the study are encapsulated in the final chapter.

Master of Arts in
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THE SOVIET STYLE OF SURPRISE

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This thesis examines the nature and scope of surprise and its use in modern warfare using historical data, computer-aided analysis, and three case studies (Manchuria, Czechoslovakia, Afghanistan).

From the data analysis, this thesis develops a Soviet "style" of surprise.

Additionally, the analysis indicates that with a relatively small number of deceptive ruses the probability of a successful surprise attack is very high even if the ruses are detected and a warning is sounded.

This thesis ends by making several recommendations on how the effects of a surprise attack may be reduced if not eliminated.

Master of Arts in
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A MULTIVARIATE ANALYSIS OF DEFENSE EXPENDITURES IN LATIN AMERICA

Jack S. Sasser
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B.A., North Carolina State University, 1970

This study attempts to determine whether developing countries differ with regard to the impact that military and social expenditures have on their overall rates of economic growth. A discriminant analysis of sixty-seven developing countries indicated that based on a relatively small number of discriminating variables developing countries could be categorized as either relatively dynamic or undynamic. Through a multivariate analysis of socio-economic data this study concludes that: 1) military expenditures are positively related to social expenditures and economic growth for the less economically dynamic developing countries and 2) military expenditures are negatively related to social expenditures and economic growth for the more economically dynamic developing countries. The analysis of economic growth and expenditure models also suggest that Latin America is not unique as a region when compared to the other developing countries of the world. The findings of this study are intended to contribute to the formulation of a general theory of defense expenditures and economic growth.

Master of Arts in
National Security Affairs
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Advisor: R.E. Looney
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THE SOVIET UNION AND ITS CARIBBEAN ALLIES: STRATEGIC, MARITIME, AND REGIONAL THREAT TO THE UNITED STATES

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Lieutenant, United States Navy
B.A., Syracuse University, 1975

The Soviet Union's activity in the Caribbean Basin, executed via its client-states of Cuba and Nicaragua, has created a serious threat to U.S. security in the region. This threat to U.S. security takes two forms. The first is the reality of a heavily militarized Cuba posing a significant anti-SLOC potential against Caribbean sea lanes in the event of general war. Such a scenario would tie down NATO antisubmarine warfare (ASW) assets in the Caribbean, detracting from NATO's ability to wage the ASW campaign in more critical areas such as the Central and North Atlantic. The second threat is Nicaraguan and Cuban active support of leftist insurgencies in the Basin. These efforts, at the direction of the Soviet Union, pose not a potential, but a present-day and ongoing security concern for the United States.

This thesis briefly examines the historical context of Soviet involvement in the region, and then proceeds to catalog the above-mentioned threats to U.S. security, and discusses their implications.

Master of Arts in
National Security Affairs
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Advisor: J. Valenta
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National Security Affairs

PREREQUISITE FOR STRATEGIC PLANNING: A CONCEPT OF THE NATIONAL INTEREST

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B.S., United States Naval Academy, 1973

This thesis examines the concept of the national interest from the perspective of strategic planning. The basic premise is that an articulation of the national interest is essential if the nation's strategic planning is to become more effective.

After outlining some methodological problems and issues which are related to this task, the thesis begins by reviewing the problems that have precluded such an articulation. The two primary obstacles that are discussed are the lack of consensus about the philosophic nature of the concept itself, and the eternal debate between realism and idealism in politics. The nature of the American character is examined as the fundamental determinant of the national interest. The concluding chapter considers the requirements of strategic planning in terms of what functions the concept of the national interest must fulfill. In light of these requirements, it is argued that only a value-centered approach to defining the national interest, which recognizes the importance of ideals and the American Dream, can adequately meet those requirements.

Master of Arts in
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THE CONCEPT OF DISCIPLINE IN THE SOVIET ARMED FORCES: A PARADOX FOR THE NEW SOVIET MAN

Robert N. Smith
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B.A., The Ohio State University, 1979

This thesis is an examination of discipline in the Soviet armed forces. A review of the historical development of the concept of discipline reveals an interesting paradox. Throughout Russian and Soviet history there is a consistent pattern to rely on physical punishment to impose discipline that continues to the present day. This is in contrast to regulations and reforms seemingly designed to limit the use of physical punishments for disciplinary purposes. The reliance on punishment is in further contrast to the successful methods employed by Alexander Suvorov to impose discipline.

The examination of discipline in the Soviet armed forces also reveals a second paradox. This paradox arises due to the Soviet Marxist-Leninist insistence for quantification to provide scientific solutions, while discipline is recognized as an unquantifiable morale factor of war. An examination of current disciplinary problems in the Soviet armed forces highlights this point.

Master of Arts in
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THE SOVIETS AND THE FALKLANDS WAR: OPPORTUNITY IN LATIN AMERICA

John D. Snively
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The author presents the thesis that the Soviets were offered an opportunity to increase their influence in Latin America as a result of the 1982 Falkland Islands War. When the Reagan administration announced overt support for Britain in April 1982, Argentina and other Latin American nations reacted in a highly critical manner, thereby indicating an opportunity for the Soviets to increase their influence. Due to many factors however, including the Soviet inability to properly deduce Argentine intentions, and Argentine nationalism, the Soviets were unable to significantly increase their influence in this area.

This thesis examines the historical and political background of the Falklands crisis, and the economic relationship which existed between the Soviets and the Argentines at that time. In addition, the Soviet reaction to the conflict is discussed. The thesis concludes with a presentation of the author's opinions on the ramifications of the Soviet reaction.

Master of Arts in
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USSR LOCAL WAR DOCTRINE AS RATIONALE FOR THE DEVELOPMENT OF THE SOVIET CTOL AIRCRAFT CARRIER

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This thesis attempts to determine whether the apparent shift in Soviet "local war" doctrine, reflecting an increased willingness to involve Soviet military force in Third World crises, provided an important rationale for the construction of the first legitimate attack aircraft carrier. Following a historical chronology of Soviet perceptions about aircraft carriers, this study details Soviet thought on aircraft carriers in general and their utility in particular, during the period 1969-1977; the juncture wherein the apparent shift in their doctrine and the formal decision to build the carrier occurred. It is the contention of this writer that the nearly simultaneous occurrence of these events was more than mere coincidence. Moscow has long understood the utility of navies as a political and military tool in Third World crises and may have decided to provide this branch of their armed forces with increased capabilities to intervene more decisively and to effect terms favorable to Soviet foreign policy objectives.

Master of Arts in
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PROSPECTS FOR INCREASED U.S.--JAPAN DEFENSE BURDEN-SHARING

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This thesis examines current and future trends in U.S.--Japanese defense burden-sharing. To understand the current state of Japanese defense policy, a broad historical survey is provided. This is followed by an examination of key world "players" views on increasing Japan's defense expenditures to meet the challenges of the future. Finally, various views on the likely direction Japan should follow in terms of its security relationship with the United States are provided from a Japanese and American perspective.

Master of Arts in
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IMPLICATIONS OF THE SOVIET MILITARY PRESENCE IN SOUTHEAST ASIA

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This thesis considers the implications of the Soviet military presence in Southeast Asia. It shows the inadequacy of Soviet attempts to build influence in the region through use of non military means and subsequent Soviet reliance on military assistance programs and military deployments to gain influence. The reaction by regional nations and the United States to the military presence is described. Conclusions are reached concerning the threat posed by the Soviet military presence to both regional states and the United States. The likelihood of a long term Soviet military presence in Indochina is explored in relation to U.S. and regional security. The current United States response to the threat is detailed and a future course of action is suggested.

Master of Arts in
National Security Affairs
December 1984

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A STATISTICAL ANALYSIS OF VENEZUELAN DEFENSE SPENDING

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B.A., Chapman College, 1979

Venezuelan military expenditures have been studied many times. Relatively few of these studies have examined the patterns of government spending policies in terms of the amount and share of government budgets allocated to defense. This thesis was undertaken to prove a reliable, systematic method for the purpose of predicting future Venezuelan defense expenditures can be made with the sole use of economic factors as variables.

Master of Arts in
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THE SOVIET ANTI-SLOC DEBATE IN OPEN LITERATURE

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This thesis examines and analyzes the Soviet anti-SLOC debate as it appears in open literature from the publication of Gorshkov's Sea Power of the State in late 1975 through the conclusion of the "Theory of the Navy Debate" in mid 1983. The thesis, with note taken of the Russian/Soviet cultural background, focuses on both Soviet historical assessments of the significance of anti-SLOC operations during World War II/The Great Patriotic War and of anti-SLOC operations considered as a modern problem of naval strategy and naval art. The anti-SLOC debate, in both its historical and modern context, reflected the priorities of Soviet military doctrine of the time and the planning uncertainties associated with transitional periods. The "Theory of the Navy" debate addressed, and may have resolved, critical issues of the unity of naval doctrine with Soviet military doctrine which were first raised in the anti-SLOC debate.

Master of Arts in
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March 1985

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THE SOVIET INVASION OF AFGHANISTAN: TRENDS AND PRECEDENT IN SOVIET FOREIGN POLICY

Jacob P. Wilkins
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The Soviet invasion of Afghanistan has been explained routinely in terms of Soviet vital security interests inherent in that region's geopolitical setting. It nevertheless can be interpreted as the culmination of a trend in Soviet Third World policy toward the use of direct, unmitigated force in pursuit of national interests. This study examines the significance of Moscow's decision to intervene in Afghanistan, in the context of overall Soviet policymaking. Additionally, the impact of recent reverses experienced by the Soviet Afghanistan policy on future Soviet decisionmaking is assayed.

Master of Arts in
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December 1984

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THE KING AND THE SHAH: MODERNIZATION, DEPENDENCE AND REGIME STABILITY

John C. Wright
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M.B.A., Southern Illinois University, 1977

Critics of America's support for conservative monarchs in the Middle East have pointed out disturbing parallels between the current situation in Morocco and conditions that existed in Iran prior to the fall of the shah. The purpose of this thesis is to assess the validity of such comparisons.

The author analyses the forces leading to revolution in Iran in terms of five categories: domestic, Islamic, leadership, economic and foreign. The stability of the Moroccan regime is then assessed using these categories as a guide. Because of its clear bearing on future developments in the country, Morocco's war in the Western Sahara is also discussed even though it falls outside of the categories drawn from the Iranian experience.

The author concludes that, although it is impossible to rule out an assassin's bullet or a military coup, an indigeneous mass uprising comparable to that which lead to the fall of the shah does not appear imminent in Morocco. The king's stability is based on several factors absent in the Iranian case, including his wider power base, his role as an Islamic leader, the historic identification of his crown with nationalism, increased opportunities for political participation, restrained foreign associations and, most importantly, superior royal leadership.

Master of Arts in
National Security Affairs
June 1985

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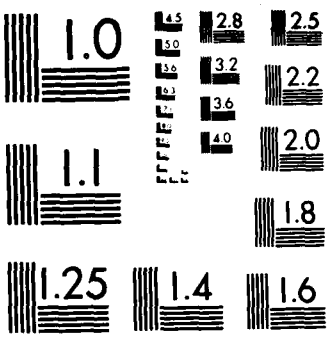
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