Naval Postgraduate School

Monterey, California NPS-08-92-001

AD-A259 189

COMPILATION OF ABSTRACTS OF THESES SUBMITTED BY CANDIDATES FOR DEGREES

OCTOBER 1990 TO SEPTEMBER 1991

DTIC
ELECTE
DEC 2 9 1992
S D
A

92-32897

Approved for Public Release;
Distribution Unlimited

NAVAL POSTGRADUATE SCHOOL
Monterey, CA 93943-5000

Rear Admiral R. W. West, Jr.
Superintendent

H. Shull
Provost

The work reported herein was supported by various Department of Defense activities and Federal Government agencies.

Reproduction of this report is authorized.

Reviewed by:

P. J. Marto

Released by:

Harrison Shull
Provost

DTIC QUALITY INSPECTED 5

Accesion For	
NTIS CRA&I	☑
DTIC TAB	☐
Unannounced	☐
Justification	
By	
Distribution /	
Availability Codes	
Dist	Avail and / or Special
A-1	

REPORT DOCUMENTATION PAGE

Form Approved
OMB No 0704-0188

1a REPORT SECURITY CLASSIFICATION: Unclassified	1b RESTRICTIVE MARKINGS
2a SECURITY CLASSIFICATION AUTHORITY	3 DISTRIBUTION / AVAILABILITY OF REPORT: Approved for public release; distribution unlimited
2b DECLASSIFICATION / DOWNGRADING SCHEDULE	
4 PERFORMING ORGANIZATION REPORT NUMBER(S)	5 MONITORING ORGANIZATION REPORT NUMBER(S)
6a NAME OF PERFORMING ORGANIZATION / 6b OFFICE SYMBOL (If applicable)	7a NAME OF MONITORING ORGANIZATION
6c ADDRESS (City, State, and ZIP Code): Monterey, CA 93943-5000	7b ADDRESS (City, State, and ZIP Code)
8a NAME OF FUNDING / SPONSORING ORGANIZATION / 8b OFFICE SYMBOL (If applicable)	9 PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER
8c ADDRESS (City, State, and ZIP Code)	10 SOURCE OF FUNDING NUMBERS: PROGRAM ELEMENT NO / PROJECT NO / TASK NO / WORK UNIT ACCESSION NO

11 TITLE (Include Security Classification)

COMPILATION OF ABSTRACTS OF THESES SUBMITTED BY CANDIDATES FOR DEGREES

12 PERSONAL AUTHOR(S)

Students of the Naval Postgraduate School/Candidates for degrees.

13a TYPE OF REPORT	13b TIME COVERED	14 DATE OF REPORT (Year, Month, Day)	15 PAGE COUNT
Summary	FROM 10/1/90 TO 9/30/91		430

16 SUPPLEMENTARY NOTATION

17 COSATI CODES			18 SUBJECT TERMS (Continue on reverse if necessary and identify by block number)
FIELD	GROUP	SUB-GROUP	

19 ABSTRACT (Continue on reverse if necessary and identify by block number)

This publication contains the abstracts of theses submitted during the period 1 October 1990 - 30 September 1991 by candidates for Doctoral, Master's and Engineer's degrees at the Naval Postgraduate School, Monterey, CA 93943-5000

20 DISTRIBUTION / AVAILABILITY OF ABSTRACT	21 ABSTRACT SECURITY CLASSIFICATION
☒ UNCLASSIFIED/UNLIMITED ☐ SAME AS RPT ☐ DTIC USERS	Unclassified
22a NAME OF RESPONSIBLE INDIVIDUAL: Dr. G. T. Howard	22b TELEPHONE (Include Area Code): (408) 646-2098 / 22c OFFICE SYMBOL: 08

DD Form 1473, JUN 86 — Previous editions are obsolete — S/N 0102-LF-014-6603

NAVAL POSTGRADUATE SCHOOL
Monterey, California

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

This publication contains unclassified abstracts of theses submitted for the degrees of Doctor of Philosophy, Engineer, Master of Science, and Master of Arts/Science during the period of 1 October 1990 - 30 September 1991.

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

Additional information about programs and curricula at the Naval Postgraduate School can be obtained from the Director of Programs, Code 03. For further information about student and faculty research at the school, contact the Dean of Research, Code 08, Naval Postgraduate School, Monterey, California, 93943-5000

NAVAL POSTGRADUATE SCHOOL
Monterey, California

Copies of publications with unlimited distribution may be obtained from either of the following agencies depending upon the particular circumstances:

Individuals affiliated with a research and development activity within the U.S. Government or its associated contractors, subcontractors, or grantees, under current U.S. Government contract, order from:

DEFENSE TECHNICAL INFORMATION CENTER
Cameron Station
Alexandria, VA 22314-5000

Organizations or individuals who do not fall within the above categories may order from:

NATIONAL TECHNICAL INFORMATION SERVICE
U.S. Department of Commerce
Springfield, VA 22161

A given document may be obtained by submitting a bibliographic citation including: 1) author, 2) title, 3) publication date, 4) the Naval Postgraduate School Report Number or reference to the document as a Naval Postgraduate School thesis.

General inquiries concerning faculty and student research at the Naval Postgraduate School may be addressed to:

Superintendent
Naval Postgraduate School
Research Office, Code 08
Monterey, CA 93943-5000

TABLE OF CONTENTS

ADVANCED DEGREES

DOCTOR OF PHILOSOPHY		PAGE
Manuel A. Abreu Lieutenant, Portuguese Navy	Nonlinear Transformation of Directional Wave Spectra in Shallow Water	3
David Aviv Major, Israeli Air Force	Detection of Abrupt Changes in Statistical Models	3
Charles B. Cameron Lieutenant Commander, U.S. Navy	Recovering Signals from Optical Fiber Interferometric Sensors	4
Mark R. Kindl Major, U.S. Army	A Stochastic Approach to Path-Planning in the Weighted Region Problem	4
Christophe Prazuck Lieutenant Commander, French Navy	Anomalous Diurnal Currents in the Vicinity of the Yermak Plateau	5
Richard L. Ressler Major, U.S. Army	An Investigation of Nonlinear Controls and Regression-Adjusted Estimators for Variance Reduction in Computer Simulation	5
James G. Stevens Major, U.S. Army	An Investigation of Multrivariate Adaptive Regression Splines for Modeling and Analysis of Univariate and Semi-Multivariate Time Series Systems	6
AERONAUTICAL ENGINEER		
George P. Christopoulos Lieutenant, Hellenic Navy	Oscillating-Flow Wind Tunnel Studies for a Circulation Control Circular Cylinder	9
Christopher C. Collins Lieutenant, U.S. Navy	Preliminary Investigation of the Shock-Boundary Layer Interaction in a Simulated Fan Passage	9
James F. Small Lieutenant Commander, U.S. Navy	Flow Visualization and Wake Analysis for Standard and Modified Configurations of the AN/ALQ-78 Antenna Pod	10
Steven R. Wright Lieutenant, U.S. Navy	A Wing Rock Model for the F-14A Aircraft	10

ELECTRICAL ENGINEER

Bruce E. Watkins **Lieutenant, U.S. Navy**	**Data Compression Using Artifical Neural Networks**	**13**

MECHANICAL ENGINEER

Robert A. Egger **Lieutenant, U.S. Navy**	**Enhancement of Boiling Heat Transfer in Di-Electric Fluids**	**17**
Michael R. Kendall **Lieutenant, U.S. Navy**	**Effects of Centrifugal Instabilities on Laminar/ Turbulent Transition in Curved Channels with 40 to 1 Aspect Ratios**	**17**
Christopher J. Putzig **Lieutenant, U.S. Navy**	**Numerical Experiments in Unsteady Flows Through the Use of Full Navier-Stokes Equations**	**18**

MASTER OF SCIENCE DEGREES

AERONAUTICAL ENGINEERING

Kent R. Aitcheson Lieutenant, U.S. Navy	Stability and Control Flight Testing of a Half-Scale Pioneer Remotely Piloted Vehicle	21
Richard B. Bobbitt Lieutenant Commander, U.S. Navy	Escape Strategies for Turboprop Aircraft in Microburst Windshear	21
Robert M. Bray Captain, U.S. Marine Corps	A Wind Tunnel Study of the Pioneer Remotely Piloted Vehicle	22
Scott A. Bruce Lieutenant Commander, U.S. Navy	Human Powered Helicopter: A Program for Design and Construction	22
Steven D. Culpepper Lieutenant, U.S. Navy	Structural Considerations for Aircraft Payload Modification-P-3C Zero Fuel Weight Increase	23
Keith J. Fruge Captain, U.S. Army	Design and Testing of a Caseless Solid-Fuel Integral-Rocket Ramjet Engine for Use in Small Tactical Missiles	23
Darcey M. Hansen	Store Separation Methodology Analysis	24
Edward A. Healy, Jr. Captain, U.S. Army	Studies in Chaos Using Stochastic Methods	24
Eric P. Johnson Lieutenant Commander, U.S. Navy	Composite Strength Statistics from Fiber Strength Statistics	25
Hong-on Kim Major, Korean Air Force	Multiple-Wavelength Transmission Measurements in Rocket Motor Plumes	25
James J. McGovern Lieutenant, U.S. Navy	Flight Operations for Higher Harmonic Control Research	26
Harry F. Molyneux Lieutenant Commander, U.S. Navy	An Aeronautical Engineering User's Manual to the HP-28S Handheld Calculator	26
Robert D. Moran, Jr. Captain, U.S. Marine Corps	Simulation of a Rotorcraft in Turbulent Flows	27
John T. Parker Lieutenant, U.S. Navy	A User's Manual for the Naval Postgraduate School Aircraft Synthesis Program	27
Robert J. Russell Lieutenant, U.S. Naval Reserve	A Continuing Study of Altitude Determination Deficiencies of the Service Aircraft Instrumentation Package (SAIP)	28

AERONAUTICAL ENGINEERING (cont.)

Michael S. Shelton Lieutenant Commander, U.S. Navy	Development of a 1/7-Scale F/A-18 UAV for Supermaneuverability Research	28
Michael A. Shutty	Dynamic Modeling and Modal Analysis of an Air-to-Air Missile	29
Kevin T. Wilhelm Lieutenant Commander, U.S. Navy	Development and Testing of an Unmanned Air Vehicle Telemetry System	29

ASTRONAUTICAL ENGINEERING

Lyle J. Kellman Captain, U.S. Army	Modification and Experimental Validation of a Combined Optical and Collection Probe for Solid Propellant Exhaust Analysis	33
Michael J. Szostak Lieutenant Commander, U.S. Navy	Prediction of Attitude Stability of Asymmetric Dual-Spin Stabilized Spacecraft Using Improved Liquid Slosh Model	33
Richard J. Watkins, Jr. Lieutenant, U.S. Navy	The Attitude Control of Flexible Spacecraft	33

APPLIED MATHEMATICS

Philip F. Beaver Captain, U.S. Army	Fractals and Chaos	37
Andre M. Cuerington Captain, U.S. Army	The Shortest Path Problem in the Plane with Obstacles: Bounds on Path Lengths and *Shortest Paths Within Homotopy* Classes	37
John R. Green Captain, U.S. Army	Comparing Combat Models Using Analytical Surrogates	38
Kevin D. Jenkins Captain, U.S. Marine Corps	The Shortest Path Problem in the Plane with Obstacles: A Graph Modeling Approach to Producing Finite Search Lists of Homotopy Classes	38
Hsin-Yun Li Lieutenant Commander, Republic of China Navy	A Probabilistic Derivation of Stirling's Formula	39
Michael D. Phillips Captain, U.S. Army	Sturm-Liouville Eigenfunctions Expressed in Determinant Form	39
Vincent J. van Joolen Lieutenant, U.S. Navy	Calculation of Chip Temperatures using ELLPACK	39

APPLIED SCIENCE

Ronald C. Adamo Lieutenant Commander, U.S. Navy	Adaptive Windows via Kalman Filtering in the Spectral Domain	43
Earl C. Bowers Lieutenant, U.S. Navy	Investigation of a Heat Driven Thermoacoustic Prime Mover above Onset of Self-Oscillation	43
Jerome L. Cleveland, Jr. Lieutenant Commander, U.S. Navy	Comparative Analysis of the SAFARI Model with NATIVE 1 Data in the VLF Regime	44
John R. Mitchell Lieutenant, U.S. Navy	Acoustic Propagation Loss Modeling for Dabob Bay, WA	44
John C. Nygaard Lieutenant, U.S. Navy	Estimation of Range Error in Bistatic Sonar	44
Joanne E. Olcott Lieutenant Commander, U.S. Navy	Fiber-Optic Flexural Disk Accelerometer	45
F. Wynn Polnicky Lieutenant, Canadian Navy	Recursive Ray Acoustics for Three-Dimensional Sound-Speed Profiles	45
Richard M. Shaffer	Evaluation of the MPA's Detection and Allocation Models Utilized by the ASW Systems Evaluation Tool (ASSET)	46
Michael P. Taylor Lieutenant, U.S. Navy	Accuracy Assessment for the Auxiliary Tracking System	46
Paul W. Vebber Lieutenant, U.S. Navy	An Examination of Target Tracking in the Antisubmarine Warfare Systems Evaluation Tool (ASSET)	46

COMPUTER SCIENCE

Vicki Sue Abel Lieutenant Commander, U.S. Navy and Medio Monti Captain, U.S. Marine Corps	VIEWER - A User Interface for Failure Region Analysis	49
Wilhelm F. Anderson Lieutenant Commander, U.S. Navy	NPSME - An Interactive Tool for Material Characteristics Specification	49
Huseyin Aygun Lieutenant Junior Grade Turkish Navy	Design and Implementation of a Multimedia DBMS: Complex Query Processing	49

COMPUTER SCIENCE (cont.)

Suleyman Bayramoglu Lieutenant Junior Grade Turkish Navy	The Design and Implementation of an Expander and Consistency Checker for the Hierarchical Real-Time Constraints of Computer Aided Prototyping Systems (CAPS)	50
Joseph Bonsignore, Jr. Captain, U.S. Marine Corps	Underwater Multi-dimensional Path Planning for the Naval Postgraduate School Autonomous Underwater Vehicle II	50
Judy A. Browning Captain, U.S. Army	An Empirical Study of Fault Detection by Static Units-Consistency Analysis	51
Michael S. Buchner Captain, U.S. Army	Computer Fear and Anxiety in the United States Army	51
Carl P. Cecil Major, U.S. Army	NPSNET-MES: Semi-Automated Forces Integration	51
Jerry A. Crane Major, U.S. Army	Searching for Shortest and Safest Paths Along Obstacle Common Tangents	52
Gard J. Clark Lieutenant, U.S. Navy	DFQL: A Graphical Dataflow Query Language	52
Mary Ann Cummings	The Development of User Interface Tools for the Computer Aided Prototyping System	53
Edward V. Davis, Jr. Major, U.S. Marine Corps	Software Testing for Evolutionary Iterative Rapid Prototyping	53
Bruce Eikenberg Captain, U.S. Marine Corps	Internetworking with Internet Protocal (IP) and Transmission Control Protocol (TCP) Within the Military	53
Jose Luiz Timbo Elmiro Lieutenant, Brazilian Navy	A Formal Model of the MAC Layer of an Improved FDDI Protocol	54
Charles A. Floyd Commander, U.S. Navy	Design and Implementation of a Collision Avoidance System for the NPS Autonomos Underwater Vehicle (AUV II) Utilizing Ultrasonic Sensors	54
Kevin A. Fontes Lieutenant, U.S. Navy	An Object-Oriented Approach to Computer Architecture Simulation	54
Janet A. Gill	Safety Analysis of Heterogeneous-Multiprocessor Control System Software	55

COMPUTER SCIENCE (cont.)

Lelon L. Ginn Lieutenant, U.S. Navy	An Empirical Approach to Analysis of Similarities Between Software Failure Regions	55
James D. Hendricks Lieutenant, U.S. Navy and Jeffrey A. Kulp Lieutenant, U S. Navy	Design and Implementation of the Maintenance Data System Module for the ARGOS Paperless Ship System	56
Gary A. Hilton, Jr. Captain, U.S. Army	A Stochastic Approach to Solving the 2 1/2 Dimensional Weighted Region Problem	56
Richard T. Irwin Lieutenant, U.S. Navy and Willie K. Bolick Lieutenant, U.S. Navy	The Integration System for the Low Cost Combat Direction System	57
Thomas A. Jurewicz Commander, U.S. Navy	A Real Time Autonomous Underwater Vehicle Dynamic Simulator	57
Heung-Taek Kim Captain, ROK Navy	Interface-Driven Software Development Tool	58
David M. King Lieutenant, U.S. Navy and Richard M. Prevatt, III Lieutenant Commander, U.S. Navy	Rapid Production of Graphical User Interfaces	58
Jeffrey A. Kulp Lieutenant, U.S. Navy and James D. Hendricks Lieutenant, U.S. Navy	Design and Implementation of the Maintenance Data System Module for the ARGOS Paperless Ship System	59
Olav Kvaslerud Major, Norwegian Air Force	Application of High Speed Networks	59
Matthew L. Laskowski Lieutenant Commander, U.S. Navy	Neural Network Decision Support Systems for the Department of Defense: An Exploration	60
Ioannis M. Leontakianakos Lieutenant, Hellenic Navy	Design and Implementation of Control Command Check System (CCCS) a Multimedia DBMS for Security Applications	60
John G. Levine Captain, U.S. Army	An Efficient Heurstic Scheduler for Hard Real-Time Systems	61
Garry W. Lewis Captain, U.S. Marine Corps and Andrew P. Dwyer Captain, U.S. Marine Corps	The Development of a Design Database for the Computer Aided Prototyping System	61

COMPUTER SCIENCE (cont.)

Ming-Tien Ling Captain, Taiwan ROC Army	An Intelligent Training System for Helicopter Recognition	62
Randall L. Mackey Captain, U.S. Army	NPSNET: Hierarchical Data Structures for Real-Time Three-Dimensional Visual Simulation	62
Christopher Magrino Lieutenant, U.S. Navy	Three Dimensional Guidance for the NPS Autonomous Underwater Vehicle	62
Jeffrey J. Mahoney Lieutenant, U.S. Navy	Development of a Graphical Interface for a Maintenance Management Database System	63
John K. McDowell Lieutenant, U.S. Navy	A Reusable Component Retrieval System for Prototyping	63
Elizabeth M. McGinn Lieutenant, U.S. Navy	A Hypermedia Approach to the Design of an Intelligent Tutoring System	64
James G. Monahan Lieutenant, U.S. Navy	NPSNET: Physically Based Modeling Enhancements to an Object File Format	64
Medio Monti Captain, U.S. Marine Corps and Vicki S. Abel Lieutenant Commander, U.S. Navy	VIEWER - A User Interface for Failure Region Analysis	65
William D. Osborne Captain, U.S. Army	NPSNET: An Accurate Low-Cost Technique for Real-Time Display of Transient Events: Vehicle Collisions, Explosions and Terrain Modifications	65
Partoyo Major, Indonesian Army	The Implementation of Form-based Interface for Relational Database	65
Charles B. Peabody Captain, U.S. Marine Corps	Design of a Graphical User Interface for a Multimedia DBMS: Query Management Facility	66
Jane S. Polcrack Captain, U.S. Army	Using Solid Modeling Techniques to Construct Three-Dimensional Icons for a Visual Simulator	66
Richard M. Prevatt, III Lieutenant Commander, U.S. Navy amd David M. King Lieutenant, U.S. Navy	Rapid Production of Graphical User Interfaces	67
Randy J. Rachal Lieutenant, U.S. Navy	Design and Implementation of a Concrete Interface Generation System	67

COMPUTER SCIENCE (cont.)

Robert E. Scurlock, Jr. Captain, U.S. Army	Design of an Intelligent Tutoring System Shell	68
Solomon R. Sherfey, III Lieutenant, U.S. Navy	A Mobile Robot Sonar System	68
James F. Stascavage Lieutenant, U.S. Navy	Boiler Model: A Qualitative Model-Based Reasoning System Implemented in Ada	69
Rosemary E. Stewart Captain, U.S. Army	Design and Implementation of a Multimedia DBMS: Modification and Deletion	69
Suprapto Captain, Indonesian Air Force	Design and Implementation of Visual Interface to Database	70
John V. Waite	An Ada Object Oriented Missile Flight Simulation	70
Phillip D. West Lieutenant, U.S. Navy	NPSNET: Object Animation Script Interpretation System	70
Wilfrid P. Wilkinson Lieutenant, U.S. Navy	Mission Executor for an Autonomous Underwater Vehicle	71
James M. Wright Lieutenant Commander, U.S. Navy	Securing Applications in Personal Computers: The Relay Race Approach	71
Goo Hwang Yong Major, ROK Army	Optimal Configuration of Digital Communication Network	71

ELECTRICAL ENGINEERING

John W. Ailes Lieutenant, U.S. Navy	Automatic Digital Hardware Synthesis Using VHDL	75
Ibrahim Aksu Lieutenant Junior Grade Turkish Navy	Performance Analysis of Image Motion Analysis Algorithms	75
Soliman Al-Amro Major, Saudi Arabian Army	Communication Network Survivability	75
Erkan Aykac Lieutenant Junior Grade Turkish Navy	Enhancement of Image Processing Capabilities for Different Environments	76
Jasa Barus Captain, Indonesian Air Force	An Analysis of Aliasing in Built-in Self Test Procedure	76

ELECTRICAL ENGINEERING (cont.)

Jean D. Bernier Major, Canadian Forces	Read Time Imaging and Infrared Background Scene Analysis Using the Naval Postgraduate School Infrared Search and Target Designation (NPS-IRSTD) System	76
Aldo E. Bresani Lieutenant, Peruvian Navy	Performance Enhancement of the NPS Transient Electromagnetic Scattering Laboratory	77
Long Wee Chang Major, ROS Air Force	Effects of Video Bandwidth on the Performance of a Square Law Detector with Gaussian IF and Video Filters	77
Ting-Hsun Chang Lieutenant, Taiwan Navy	Profile Sampling Dependence of the MLAYER Program	77
Edwin K. Chaulk Lieutenant, Canadian Armed Forces	Arrival Time Tracking of Partially Resolved Acoustic Rays with Application to Ocean Acoustic Tomography	78
Colin R. Cooper	Second and Third Order Minimum Time Controllers and Missile Adjoints	78
Daniel L. Devany Lieutenant, U.S. Navy	Sound Propagation in the Inhomogeneous Ocean	78
Daniel A. Ellrick Captain, U.S. Marine Corps	An Antenna Design for PANSAT using NEC	79
John C. Eremic Lieutenant, U.S. Navy	Iterative Methods for Estimation of 2-D AR Parameters Using a Data-Adaptive Toeplitz Approximation Algorithm	79
David E. Gilbert Lieutenant, U.S. Navy	Investigation into Efficient Conversion Methods Between Residue and Binary Systems	79
Stephen J. Glaser Lieutenant, U.S. Navy	The Development of a Thermal Analysis Model Builder for a Printed Circuit Board	80
M. Kadri Hekimoglu Captain, Turkish Air Force	Video-Text Processing by Using Motorola 68020 CPU and its Environment	80
Fatih Ildiz Lieutenant Junior Grade Turkish Navy	Estimation of Motion Parameters from Image Sequences	81
Spridon G. Konidaris Lieutenant Junior Grade Hellenic Navy	Electromagnetic Scattering from Rough Surface using the On-Surface Radiation Boundary Condition (OSRC) Method	81

ELECTRICAL ENGINEERING (cont.)

Brent L. Leatherman **Lieutenant, U.S. Navy**	**An Approach to Integration of Real-Time Software for a Autonomous Underwater Vehicle**	**81**
Yeaw-Lip Lee	**Particle-Sizing System for Scanning Electron Microscope Images of Solid-Propellant Combustion Exhaust**	**82**
Michael R. Linzey **Lieutenant, U.S. Coast Guard**	**Investigation of an Equivalent Circuit for an Inductive Strip in Finline with Dielectric**	**82**
Chung-Kuei Lu **Lieutenant Commander, ROC Navy**	**A Design of Floating Point FFT Using Genesil Silicon Compiler**	**82**
Han-Chung Lu **Lieutenant Commander, ROC Navy**	**Using Expert Systems in Mine Warfare**	**83**
Keith O. Lyles **Lieutenant, U.S. Navy**	**Natural Resonances of Slotted Cylinder Configurations**	**83**
Gary L. May **Lieutenant, U.S. Navy**	**Pole-Zero Modeling of Transient Waveforms: A Comparison of Methods with Application to Acoustic Signals**	**84**
Norman C. Messa **Lieutenant, U.S. Navy**	**Design Implementation into Field Programmable Gate Arrays**	**84**
Frank J. Mika	**Fast Correlation Applied to Passive Ranging**	**85**
David F. Moore **Lieutenant, U.S. Navy**	**Passive Sonar Target Recognition Using a Back-Propagating Neural Network**	**85**
John P. Muir **Captain, Canadian Forces**	**Experimental Results for Inductive Strips in Inhomogeneous Finline**	**85**
Brian P. Murphy **Lieutenant, U.S. Navy**	**Image Processing Techniques for Acoustic Images**	**86**
Sabri Onur Oral **Lieutenant Junior Grade** **Turkish Navy**	**The Minimization of Multiple Valued Logic Expressions Using Parallel Processors**	**86**
Gerald L. Painter **Lieutenant, U.S. Navy**	**Computer Simulated Missile-Target Engagement with a Luenberger Observer and a Ground Observer**	**86**
Dimas Pinzon, Jr. **Major, U.S. Marine Corps**	**Analysis of Radiation Damaged and Annealed Gallium Arsenide and Indium Phosphide Solar Cells Using Deep Level Transient Spectroscopy Techniques**	**87**

ELECTRICAL ENGINEERING (cont.)

Ralph C. Raisor Lieutenant, U.S. Navy	Parasitic Free Switched Capacitor Composite Operational Amplifiers	87
John F. Riley Lieutenant, U.S. Navy	Performance of a Fast Frequency-Hopped Noncoherent MFSK Receiver with Ratio-Statistic Combining over Rician Fading Channels with Partial-Band Interference	88
Patric K. Roesch Lieutenant, U.S. Navy	The Development of a Model Builder for a Microcircuit Substrate	88
Brian M. Schmanske Captain, U.S. Marine Corps	Commercial Filters in the Topological Approach to Power Line Noise Isolation	88
Philip F. Spratt	Development of Noise Jamming Techniques for the ULQ-21S ECM System	89
Kim J. Tran	A Ring Model for Local/Mobile Communications with Correct Packet Capture	89
Alejandro R. Ugarte Lieutenant, Argentine Navy	Modeling for Improved Minimum Resolvable Temperature Difference Measurements	89
Muhittin Uner Lieutenant Junior Grade Turkish Navy	Frequency, Amplitude, and Phase Tracking of Nonsinusoidal Signal in Noise with Extended Kalman Filter	90
Kent C.M. Varnum Lieutenant, U.S. Navy	Nonchoherent Detection of Coherent Optical Heterodyne Signals Corrupted by Laser Phase Noise	90
Thomas W. Vece Lieutenant, U.S. Navy	Effects of Non-Uniform Windowing on the Performance of a Fast Frequency-Hopped Noncoherent MFSK Receiver Over Rician Fading Channels with Partial-Band Interference and Doppler Shift	91
Joseph A. Willhelm, Jr. Lieutenant Commander, U.S. Navy	Computer Aided Thermal Analysis of a Microcircuit Structure	91
David J. Wilson Major, U.S. Marine Corps	A Comparison of High-Latitude Ionosphere Propagation Predictions from AMBCOM with Measured Data	92
John W. Wisniewski Lieutenant, U.S. Navy	Implementation of Multi-Frequency Modulation with Trellis Encoding and Viterbi Decoding Using a Digital Signal Processing Board	92
Hee Byung Yoon Lieutenant, Korean Navy	The Error Performance Analysis Over Cyclic Redundancy Check Codes	93

ENGINEERING ACOUSTICS

Steven L. Alkov Lieutenant, U.S. Navy	Multifrequency Acoustic Resonators with Variable Nonuniformity	97
Earl C. Bowers Lieutenant, U.S. Navy	Investigation of a Heat Driven Thermoacoustic Prime Mover Above Onset of Self-Oscillation	97
Chih-Lyeu Chen Lieutenant Commander, ROC Navy	Experimental Investigation of Energy Dissipation in Finite-Amplitude Standing Waves	98
Brian R. Galvin Lieutenant, U.S. Navy	Numerical Studies of Localized Vibrating Structures in Nonlinear Lattices	98
Peter W. Jacobus Lieutenant, U.S. Navy	Underwater Sound Radiation from Large Raindrops	99
F. Wynn Polnicky Lieutenant, Canadian Navy	Recursive Ray Acoustics for Three-Dimensional Sound-Speed Profiles	99
Candace J. Robertson	Ocean Bottom Simulation Using Fractal Geometry	100

ENGINEERING SCIENCE

Chi-Shun Chao Lieutenant, Taiwan ROC Navy	A Frequency Domain Based Approach to on Line System Identification	103
Miao Chin Commander, ROC Navy	Complementary Metal Oxide Silicon Cyclic Redundancy Check Generator	103
Yu-Chi Chin Commander, ROC Navy	The Navigation Data-Logger for a Suitcase Navigation System	103
Ismail bin Dewa Lieutenant Commander Royal Malaysian Navy	VLSI Implementation of Fuzzy Logic Operator Unit	104
Syed Agha Hussain Major, Pakistan Army	System Evaluation of a Frequency Hopping Combat Net Radio	104
Ahmet C. Karaagac Lieutenant Junior Grade Turkish Navy	Noncoherent Detection of BFSK Signals with Linear and Nonlinear Diversity Combining Over Rician Fading Channels with Partial Band Interference	104
Beng Hock Tan	Resonant Acoustic Determination of Complex Elastic Moduli	105

HYDROGRAPHIC SCIENCE

Dennis Bredthauer	Evaluation of Absolute Positioning Using the Defense Mapping Agency's GASP Program	109
Barry Grinker Lieutenant Commander Israeli Navy	Accuracy of Shipborne Kinematic GPS Surveying	110
Margaret F. Haskell	Precision of the Long Baseline Acoustic Navigation System Used by Pegasus	110
Arnold F. Steed	A Heuristic Search Method of Selecting Range-Range Sites for Hydrographic Surveys	111

INFORMATION SYSTEMS

Carolyn L. Applegate Lieutenant, U.S. Navy	Highlights of Total Quality Management in the Department of Defense: Lessons Learned, Quality Measurements and Innovative Practices	115
Kathy A. Bannick Captain, U.S. Marine Corps	Breakdown of Software Expenditures in the Department of Defense, United States and in the World	115
Curtis G. Barefield, Jr. Lieutenant, U.S. Navy	A Performance Analysis of View Materialization Strategies for General Expressions	116
Ricardo A. Bartra Second Lieutenant Peru Air Force	Integration of the Peruvian Air Force Information Systems Through an Integrated LAN/WAN	116
Basil B. Bates, Jr. Lieutenant Commander, U.S. Navy and Nicholas K.K. Mato Lieutenant, U.S. Navy	Quantitative Measurement of Automation: An Assessment of APADE	117
Mark H. Besore Captain, U.S. Army	Benefit Analysis of Proposed Information Systems	117
Renae M. Beyer Major, U.S. Army	The Problem of Unique Names Violations in Database Integration	118
James R. Booth Lieutenant Commander, U.S. Navy and John L. Bryant, Jr. Lieutenant, U.S. Navy	Evaluation of User Information Satisfaction of the Automated Quality of Care Evaluation Support System	118

INFORMATION SYSTEMS (cont.)

Ronald A. Boxall Lieutenant, U.S. Navy	SPEEDS: An Approach to Support Programming Environments Using Expert Database Systems	119
Terrance C. Brady Major, U.S. Marine Corps	Improved Classified Material Control Through the Application of a Database Management System	119
Mack L. Brewer Captain, U.S. Marine Corps	Implementation of a Configuration Management System for a Local Area Network	119
Teresa N. Briede Lieutenant, U.S. Navy	Conceptual Data Model for Administrative Functions of a Typical Naval Ship, to Include: Personnel, Training, Ship Secretary, Welfare and Recreation, Command Career Counselor, Public Affairs Officer, Educational Services Officer, Master at Arms, and Legal	120
Nancy C. Browne Captain, U.S. Army	Speech Recognition and the Telecommunications Emergency Decision Support System	120
John L. Bryant, Jr. Lieutenant, U.S. Navy and James R. Booth Lieutenant Commander, U.S. Navy	Evaluation of User Information Satisfaction of the Automated Quality of Care Evaluation Support System	121
Robert L. Buckley Lieutenant Commander, U.S. Navy	An Analysis of Mission Critial Computer Software in Naval Aviation	121
William T. Carney Lieutenant, U.S. Navy	Development of the Damage Control Systems Assist Tool	121
Mitchel Carthon Major, U.S. Marine Corps	The Telecommunications Emergency Decision Support System as a Crisis Management Decision Support System	122
Theresa J. Childs Captain, U.S. Marine Corps	Plain English Techniques for Writing Manuals and a Proposed DSS for Basic Instruction Manual Writing Procedures	122
Nancy K. Clark Lieutenant Commander, U.S. Navy	Alternatives for Developing User Documentation for Applications Software	122
Robert W. Clipper, Jr. Lieutenant, U.S. Navy and John D. Fowler Commander, U.S. Navy	Considerations for Conversion of Microfiche to Optical Storage	123
John A. Coley Lieutenant Commander, U.S. Navy	User Authentication: A State-of-the-Art Review	123

INFORMATION SYSTEMS (cont.)

James W. Connor, Jr. Lieutenant Commander, U.S. Navy	ESKAPE/CF: A Knowledge Acquisition Tool for Expert Systems Using Cognitive Feedback	124
Louis A. Cortez Lieutenant, U.S. Navy and Thomas J. Kaiser Lieutenant Commander, U.S. Navy	U.S. Coast Guard Fleet Mix Planning: A Decision Support System Prototype	124
Leonard A. Crump, Jr. Major, U.S. Army and James G. Pound Lieutenant, U.S. Navy	DE-CERTS: A Decision Support System for a Comparative Evaluation Method for Risk Management Methodologies and Tools	125
Angela W. Cyrus Lieutenant, U.S. Navy	Measuring the Effectiveness of Information Systems	125
Daniel E. Delaney Lieutenant, U.S. Navy and George T. Skrtich Lieutenant, U.S. Navy	A Micro Computer Based Procurement Systems: An Application of Reverse Engineering Techniques	126
Thomas A. Ditri Lieutenant, U.S. Navy	Upgrade and Enhancement of the A.S. Department Financial Management Information System; Development of the FMIS Property Management Module	126
William A. Durbin Lieutenant, U.S. Navy	Reducing the Effects of Irrelevant Information with Cognitive Feedback	127
Michael A. Elizondo Lieutenant, USNR	Dimensional Analysis of Structural Steel Beam Design	127
Carol P. Elliott Lieutenant, U.S. Navy	Participation and Error Rates of the Internal Revenue Service Electronic Filing System: Empirical Evidence and Implementation Lessons	128
Rita V. Espiritu Lieutenant Commander, U.S. Navy	Local Are Network Compatibility Issues	128
David P. Faulk Lieutenant, U.S. Navy	Cost Models and the Corporate Information Management (CIM) Initiative	128
John D. Fowler Commander, U.S. Navy and Robert W. Clipper, Jr. Lieutenant, U.S. Navy	Considerations for Conversion of Micro-fiche to Optical Storage	129
John B. Frank, Jr. Commander, U.S. Navy	Designing the User Interface: Considering the Concept of Complexity	129

INFORMATION SYSTEMS (cont.)

Rafael A. Gacel Captain, U.S. Marine Corps	The Top Ten Critical MIS Issues in the Department of Defense	130
Cheryl L. Gonzalez Lieutenant Commander, USNR	Information Resource Management Aboard USS Corinth (CG-44): A Case Study	130
Robert D. Goodwin, Jr. Lieutenant, U.S. Navy	Feedback in Dynamic Decision Making: An Experiment in Software Project Management	130
Gary M. Griggs Captain, U.S. Army	Decision Support Systems: A Framework for Evaluation and Justification	131
Dennis R. Grimes Lieutenant Commander, U.S. Navy	An ADPE Protest Primer: Lessons Learned from GSBCA Protest Decisions	131
Michael S. Haas Captain, U.S. Marine Corps and Mary L. Hochstetler Captain, U.S. Marine Corps	Information Engineering of the Curricular Officers' Segment of Unified Student Academic Database System for NPS	132
Margaret Y. Hall Lieutenant, U.S. Navy	Measuring the Perceived Effectiveness of the Internal Revenue Service's (IRS) Direct Filing System from the End-User Perspective	132
William M. Hantjis Lieutenant Commander, USNR and Donald A. Kelley, Jr. Lieutenant, U.S. Navy	*An Analysis of Socio/Cultural Impact of CIM on the Department of Defense and Possible Implementation Strategy*	133
Michael J. Hardebeck Lieutenant, U.S. Navy	Decision Making for Software Project Management in a Multi-Project Environment: An Experimental Investigation	133
Michael S. Hill Lieutenant, U.S. Navy	TCP/IP Implementation Considerations for Administrative Sciences Department Local Area Networks	134
Mary L. Hochstetler Captain, U.S. Marine Corps and Michael S. Haas Captain, U.S. Marine Corps	Information Engineering of the Curricular Officers' Segment of a Unified Student Academic Database System for NPS	134
Lyn E. Hurd Lieutenant, U.S. Navy	Evaluation of User Information Satisfaction of the Composite Health Care System	135
Thomas R. Ivan *Captain, U.S. Marine Corps*	Comparison of Data Integrity Models	135
Francis B. Jones Lieutenant, U.S. Navy	Human Factors in Network Security	135

INFORMATION SYSTEMS (cont.)

Thomas J. Kaiser Lieutenant Commander, U.S. Navy and Louis A. Cortez Lieutenant, U.S. Navy	U.S. Coast Guard Fleet Mix Planning: A Decision Support System Prototype	136
Donald A. Kelley, Jr. Lieutenant, U.S. Navy and William M. Hantjis Lieutenant Commander, USNR	An Analysis of Socio/Cultural Impact of CIM on the Department of Defense and Possible Implementation Strategy	136
Alexander D. Korzyk Major, U.S. Army	Architectural Guidelines for Multimedia and Hypermedia Data Interchange: Computer Aided Acquisition and Logistics Support/ Concurrent Engineering (CALS/CE) and Electronic Commerce/Electronic Data Interchange (EC/EDI)A	137
Stephen M. Lardner Lieutenant, U.S. Navy	The Evolution of User Satisfaction as a Surrogate Measure of Information System Effectiveness	137
Paul K. Larson Lieutenant, U.S. Coast Guard	A Testbed to Evaluate Cognitive Feedback Theories	137
George M. LaVenture Lieutenant, U.S. Navy	Software and the Virus Threat: Providing Authenticity in Distribution	138
Gerard M. Lewis Lieutenant, U.S. Navy	Naval Postgraduate School 1990 Mainframe Procurement: A Case Study	138
Eric J. Lindenbaum Lieutenant, U.S. Navy	Enhanced Productivity Tools: An Analysis of Their Procurement, Implementation and Operations	138
Richard B. Lorentzen Lieutenant, U.S. Navy	Requirements Analysis and Design for Implementation of a Satellite Link for a Local Area Computer Network	139
Stuart N. Manning Lieutenant, U.S. Navy	A Conceptual Design for the Telecommunications Emergency Decision Support System (TEDSS)	139
Bradford L. Martin Captain, U.S. Marine Corps	Integrated Financial Reporting for a Small Business	140
Nicholas K.K. Mato Lieutenant, U.S. Navy and Basil B. Bates, Jr. Lieutenant Commander, U.S. Navy	Quantiative Measurement of Automation: an Assessment of APADE	140

INFORMATION SYSTEMS (cont.)

Mark F. McKeon Major, U.S. Marine Corps	Tasking and Communication Flows in the F/A-18D Cockpit: Issues, Problems and Possible Solutions	141
Gretchen O. Merryman Lieutenant, USNR	Electronic Filing Evaluation of Tax Programs	141
Richard L. Miller Commander, U.S. Navy	Training Methodologies for Dependent Speech Recognition (SR) Systems	141
Alan R. Moeller Major, U.S. Army	The Impact of Selected Modifications to the Defense Investigative Service Credit Report Acquisition Process	142
Daniel J. Montgomery Lieutenant Commander, U.S. Navy	Conceptual Data Model for Administrative Functions of a Typical Naval Ship, to Include: Drug and Alcohol Program Advisor, Watch, Quarter and Station Bill, Safety, Medical and Security	142
John B. O'Conner Lieutenant Commander, U.S. Navy	An Expert System for Aviation Squadron Flight Scheduling	143
Pamela H. Patrick Lieutenant, U.S. Navy	Transmission Control Protocol/Internet Protocol: An Ethernet Implementation	143
James G. Pound Lieutenant, U.S. Navy and Leonard A. Crump, Jr. Major, U.S. Army	DE-CERTS: A Decision Support System for a Comparative Evaluation Method for Risk Management Methodologies and Tools	143
Stephen H. Ramsey Lieutenant, U.S. Navy	SPAN: A Decision Support System for Security Plan Analysis	144
Matthew G. Rausch Lieutenant Commander, U.S. Navy	The State of Group Support System Research Through a Survey of Papers 1980 to 1991	144
William G. Reagle Captain, U.S. Army and Mark D. VanUs Captain, U.S. Army	Design and Implementation of a Decision Support System to Aid in the Forecasting and Scheduling of Administrative Sciences Courses	145
Gregory M. Regens Captain, U.S. Army	An Analysis of Data Validity for Measures of Effectiveness of Information Systems	145
Nancy A. Reinhard Lieutenant, USNR	The Effect of Task Complexity on User Interfaces: A Comparison of Command Language Interface and Direct Manipulation Interface	146

INFORMATION SYSTEMS (cont.)

Donovan R. Rhead **Lieutenant, U.S. Navy**	**Security Considerations in Distributed Systems**	**146**
George J. Salitsky **Lieutenant, U.S. Navy**	**A Prototype Semantic Integrity Front End Expert System for a Relational Database**	**146**
Donald A. Schmieley **Lieutenant, U.S. Navy**	**A Personal Computer Based DSS for Computer-Family Selection**	**147**
Frederick J. Schwarz, II **Lieutenant Commander, U.S. Navy**	**Strategic Planning for DFAS-Cleveland Expert Systems**	**147**
David D. Schweizer **Lieutenant, U.S. Navy** **and James P. Steele, III** **Lieutenant, U.S. Navy**	**Corporate Information Management: A Case Study**	**147**
Sidney R. Settlemyer **Lieutenant, U.S. Navy**	**Design and Implementation of a Nuclear Weapons Management Submodule: Shipboard Security Force System**	**148**
Jean M. Shkapsky **Lieutenant Commander, USNR**	**Analysis of Training-Related Issues in the Transition to Ada in the DoN**	**148**
Jane H. Smith **Major, U.S. Army**	**Personality Types and Affinity for Computers**	**148**
Richard W. Smith **Lieutenant, U.S. Navy**	**Investigating the Utility of Coupling COCOMO with a System Dynamics Simulation of Software Development**	**149**
Jesse T. South **Lieutenant, U.S. Navy**	**A Performance Analysis of View Materialization Strategies for Select-Project-*Join Expressions***	**149**
James P. Steele, III **Lieutenant, U.S. Navy** **and David D. Schweizer** **Lieutenant, U.S. Navy**	**Corporate Information Managment: A Case Study**	**150**
Robert E. Steffensen **Major, U.S. Marine Corps**	**Information Systems Planning Methodologies: A Framework for Comparison and Selection**	**150**
Larry W. Stone **Lieutenant, U.S. Navy**	**Local Area Network Analysis**	**150**

INFORMATION SYSTEMS (cont.)

Mark H. Stone, Jr. Lieutenant Commander, U.S. Navy	The Development of a Knowledge Base for use in an Expert System Advisor for Aircraft Maintenance Scheduling (ESAAMS)	151
Neil B. Strand Lieutenant, U.S. Navy	A Neural Model of Bilateral Negotiation Consisting of One and Two Issues	151
Frank E. Sutton Lieutenant, U.S. Navy	Hypercard Database Technology as Applied to a Threat Evaluator Reference Tool	151
Barbara L. Treharne Captain, U.S. Army	The Impact of Verbal Report Protocol Analysis on a Model of Human-Computer Interface Cognitive Processing	152
Robert A. VanMeter Lieutenant Commander, USNR	Is Hypertext a Solution to Implementing an ADP Security Program in DoN? Issues and Problems	152
Mark D. VanUs Captain, U.S. Army and William G. Reagle Captain, U.S. Army	Design and Implementation of a Decision Support System to Aid in the Forecasting and Scheduling of Administrative Sciences Courses	153
Joseph P. Voboril Lieutenant, U.S. Navy	A Graphical Browser Interface for the Naval Environmental Operational Nowcasting System	153
Craig J. Voth Lieutenant, U.S. Navy	Selecting a Method to Gather Management Information for the Naval Plant Representative Office after Conversion to a Defense Plant Representative Office	154
Charles G. Walker, Jr. Lieutenant, U.S. Navy	Economic Analysis of Information Systems	154
Edward A. Whitehouse Lieutenant, U.S. Navy	An Evaluation of COMNAVSURFPAC's Information Engineering Initiative for the Modernization of Type Commander Headquarters Automated Information System (THAIS)	155
George A. Zolla, Jr. Commander, USNR	TARPS: A Prototype Expert System for Training and Administration of Reserves (TAR) Officer Placement	155

MANAGEMENT

Michael G. Ahern **Lieutenant Commander, U.S. Navy**	**Allocating the Increased Operational Costs in Retail Prices at the Defense Electronics Supply Center as a Result of Defense Managment Report Decision 901**	**159**
Christian W. Andrieu **Lieutenant Commander, U.S. Navy**	**Testing, Validation, and Verification of an Expert System Advisor for Aircraft Maintenance Scheduling (ESAAMS)**	**159**
Scott L. Archer **Lieutenant, U.S. Navy** **and John D. Walker** **Lieutenant, U.S. Navy**	**An Analysis of the Navy's Overseas Screening Policy**	**160**
David F. Baucom **Lieutenant, U.S. Navy**	**Accounting for the Commercial Use of Government Furnished Property**	**160**
Bradley R. Bosch **Lieutenant, USNR**	**A Process for Making On-Going Improvements for Dispensing Medication: Using a TQM Approach**	**161**
Robert K. Briede **Lieutenant, U.S. Navy**	**Optimization of Sealift Ship Types in the Ready Reserve Fleet (RRF) and Maritime Prepositioned Ship (MPS) Fleets**	**161**
Rodney E. Bryant **Lieutenant Commander, U.S. Navy** **and Paul R. Jensen** **Lieutenant Commander, U.S. Navy**	**Introduction to Financial Management for Foreign Military Staff Officers**	**162**
Carl E. Carson, III **Lieutenant Commander, USNR** **and Michael R. Wrinkle** **Commander, USNR**	**Comparative Cost Analysis of P-3 Active and Reserve Aviation Forces: The Economics of Proposed Force Mix Alternatives**	**162**
Daniel W. Chang **Lieutenant Commander, U.S. Navy** **and Natalie A. Quick** **Lieutenant, U.S. Navy**	**Profile of an Effective Engineering Manager at the Naval Avionics Center**	**163**
Peter B. Clark **Lieutenant, U.S. Navy**	**Fleet Level Budgeting: 1981 to 1997**	**163**
Michael D. Conn **Lieutenant, USNR**	**An Examination of the Cost Reimbursement Policies and Procedures Followed by DoD when Providing Services to Private Organizations**	**164**

MANAGEMENT (cont.)

Richard O. Cowart Lieutenant, U.S. Navy	A Feasibility on the Implementation of the Red/Yellow/Green Program	164
Charles Cyrus Lieutenant, U.S. Navy	An Analysis of the Feasibility of Consolidating Contracting Functions in Hawaii	165
Barbara J. Davis Lieutenant, U.S. Navy and A. Renee Gutierrez Lieutenant, U.S. Navy	Gener Induced Differences in Naval Fitness Reports	165
Michael D. Downs Lieutenant Commander, U.S. Navy	Flight Hour Cost Variance in the Naval Air Reserve: An Analysis of Possible Sources	166
Michael A. Durnan Lieutenant Commander, U.S. Navy	Resource Management Strategy in the French Navy	166
Douglas R. Eades Lieutenant, U.S. Navy	An Analysis of the Material Returns Program	166
Patrick J. Fitzsimmons Major, U.S. Marine Corps	Negotiations: Experienced vs. Inexperienced Negotiators	167
Neil S. Ford Lieutenant Commander, U.S. Navy and Nicholas W. Zimmon Lieutenant, U.S. Navy	A Data-Based Financial Management Information System (FMIS) for Administrative Sciences Department	167
Lizabeth L. Fruth Lieutenant, U.S. Navy	A Guide for Marina and Harbor Managers	167
Hidetoshi Fujita Lieutenant Commander Japan Maritime Self Defense Force	Triggers of the Great Depression: Comparing Economic Climates in the 1920s with the 1980s	168
Mary A. Fults Lieutenant, U.S. Navy	Strategic Sealift: Decisions Today to Ensure Tomorrow	168
Matthew T. Gardner-Brown Lieutenant, U.S. Navy	Household Goods Shipments: "Tender of Service for Unpacking" a Cost Savings Proposal	168
John S. Gauthier Lieutenant, U.S. Navy	Factors Affecting Japanese Defense Policy	169
John L. Gebhart Lieutenant Commander, U.S. Navy	An Evaluation of the Navy's Red/Yellow/Green Program Test	169

MANAGEMENT (cont.)

Cory W. Gildersleeve Lieutenant, U.S. Navy	Strategy and Logistics for the New World Order	169
Daniel J. Gillan Captain, U.S. Marine Corps	An Analysis of Specific Contracting Issues Regarding the Development and Acquisition of Expert Systems	170
Eldit Givaty	The Suitability of Award Fee Contracts for the Israeli Ministry of Defense (MOD)	170
Thomas D. Goodwin Lieutenant, U.S. Navy	An Implementation Study of an Accounting System Design for the Naval Avionics Center	171
David J. Graff Lieutenant, U.S. Navy	Deming's Management Philosophy and the Defense Industrial Base	171
Amalie R. Fite Gulf Lieutenant Commander, U.S. Navy	The Military Health Service System: Beneficiary Satisfaction and an Option for Change	171
A. Renee Gutierrez Lieutenant, U.S. Navy and Barbara J. Davis Lieutenant, U.S. Navy	Gender Induced Differences in Naval Fitness Reports	172
Shelly M. Hammon Lieutenant, U.S. Navy	Economic Analysis of Waterfront Operations at Naval Station Long Beach	172
David M. Harp Lieutenant, U.S. Navy	A Management Case Analysis of the Department of Defense Contractor Risk Assessment Guide Program	173
Steven J. Harris Lieutenant Commander, U.S. Navy and William S. Munson Lieutenant, U.S. Navy	An Analysis of Depot Level Repairables Carcass Management and Position Controls Under the Advanced Traceability and Control (ATAC) Program	173
William D. Hatch, II Lieutenant, U.S. Navy and Lori D. Swinney Lieutenant, U.S. Navy	Physical Readiness Testing of Surface Warfare Officers	174
William S. Hicks, III Lieutenant, U.S. Navy and James F. Hunter Lieutenant, U.S. Navy	Unit Costing at the Naval Postgraduate School	174

MANAGEMENT (cont.)

Henry J. Hill Lieutenant, U.S. Navy	Impact of Altering the Delinquent Debt Threshold Used for Background Investigation Expansion on the Denial Rate of Security Clearances	175
Joseph E. Hines Lieutenant, U.S. Navy and Samuel C. Howard Lieutenant, U.S. Navy	College Resources and the Performance of Black Naval Officers	175
Randall L. Hoffman Lieutenant Commander, U.S. Navy	An Analysis of Reimbursable Costs and Expense Items for the Base Operating Support Contract at Naval Submarine Base Bangor	176
Tracy D. Hofmann Lieutenant, U.S. Navy and James A. Worcester Lieutenant, U.S. Navy	Navy Family Housing: A Study of Adequacy Standards and Their Relationship to the Variable Housing Allowance	176
Stephen E. Honan Lieutenant Commander, U.S. Navy	An Account for Saving Active Pay (ASAP): An Employer-Sponsored Savings Plan for Active Duty Military Personnel	177
Masao Hosoya Lieutenant Commander Japan Maritime Self Defense Force	Computer Aided Newspaper Content Analysis	177
Samuel C. Howard Lieutenant, U.S. Navy and Joseph E. Hines Lieutenant, U.S. Navy	College Resources and the Performance of Black Naval Officers	178
Tsu-Sung Hsieh Lieutenant, ROC Navy	Civilian Earnings of Non-Retiree Officers	178
Andrew D. Huff Lieutenant Commander, U.S. Navy	Implementation of a Mentor-Protege Program by a Major Department of Defense Contractor	179
James F. Hunter Lieutenant, U.S. Navy and William S. Hicks, III Lieutenant, U.S. Navy	Unit Costing at the Naval Postgraduate School	179
Graham D. Ininns Lieutenant, U.S. Navy	Applying Resource Based Relative Value Scales to the Champus Program	179

MANAGEMENT (cont.)

James T. Jackson, Jr. Commander, U.S. Navy and Mario R. Maddox Lieutenant, U.S. Navy	The Role of the Broadened Opportunity for Officer Selection and Training (BOOST) Program in Supporting the Navy's Minority Accession Policies	180
Kevin A. Jackson Captain, U.S. Marine Corps	Weight Standards and Marine Corps Attrition	180
Walter W. Jacunski Lieutenant, U.S. Navy	Achieving Quality in Procurement Through Automation	181
Thomas E. Jarrell Lieutenant Commander, U.S. Navy	Cost Analysis for the Proposed Consolidation of Carrier Airborne Early Warning (VAW) Fleet Replacement Squadrons (FRS)	181
Paul R. Jensen Lieutenant Commander, U.S. Navy and Rodney E. Bryant Lieutenant Commander, U.S. Navy	Introduction to Financial Management for Foreign Military Staff Officers	181
Oke I. Johnson Major, U.S. Marine Corps	Marine Corps Warrant Officers: A Community in Turmoil	182
William A. Johnson Captain, U.S. Marine Corps	What Constitutes National Security in the Semiconductor Industry? A Look at the Competing Views Surrounding DoD's Support of Semiconductors	182
William C. Johnson Lieutenant Commander, U.S. Navy	Marginal Cost of Training a Naval Flight Officer	182
Koesnadi Kardi Major, Indonesian Air Force	Innovations in Basic Flight Training for the Indonesian Air Force	183
Bernadette A. Kernen Lieutenant, U.S. Navy	Problems in Navy Reimbursable Accounting	183
Phillip R. Kessler Lieutenant, U.S. Navy	Ready Reserve Force: West Coast Activation in Support of Operation Desert Shield	183
Bedirhan Koc First Lieutenant Turkish Army	Markovian Analysis of Youth Labor Force Transition Probabilities	184
John G. Koran, III Captain, U.S. Marine Corps	Manpower Management for Joint Specialty Officers: A Comparative Analysis	184

MANAGEMENT (cont.)

Gregory T. Kuhn Lieutenant, U.S. Navy	Improving Small Purchase Operations at the National Naval Medical Center Bethesda, Maryland	184
Ernani M. Lacson Lieutenant, U.S. Navy and Harold R. Morgan, Jr. Lieutenant, U.S. Navy	Total Quality Leadership as it Applies to the Surface Navy	185
Julito P. Laluan Lieutenant, U.S. Navy	Military Health Care System: Comparing Obstetrics Costs Between a Military Treatment Facility and CHAMPUS	185
Reiner W. Lambert Lieutenant, U.S. Navy	Budget Execution: A Management Guide for Naval Security Group Commanding Officers, Officers in Charge and Department Heads	186
Jeffrey J. Lauff Lieutenant Commander, U.S. Navy	An Analysis of Non-Department of Defense and Department of Defense Special Background Investigative Procedures Used in Developing Sources that Indicate the Presence of an Issue	186
James M. Laury Lieutenant, U.S. Navy and David L. McNamara Lieutenant, U.S. Navy	An Examination of the Effects of First-Term Career Progression on Navy A-School Attrition and the Experiences of A-School Students after Attrition	186
Annette C. Lee Captain, U.S. Army	The Attrition Rate at DLI	187
Raymond J. Lewis Lieutenant, U.S. Navy	Naval Leadership: A Study of Views on Leadership Competencies and Methods to Reinforce Leadership Skills	187
Mario R. Maddox Lieutenant, U.S. Navy James T. Jackson, Jr. Commander, U.S. Navy	The Role of the Broadened Opportunity for Officer Selection and Training (BOOST) Program in Supporting the Navy's Minority Accession Policies	188
Anacleto M. Magsombol Lieutenant, U.S. Navy	Navy Stock Account (NSA) Material Expenditure Errors	188
Robert M. Maholchic Lieutenant Commander, U.S. Navy	Fleet Replacement Squadron Consolidation: A Cost Model Applied	189
Charles P. Martello Lieutenant Commander, U.S. Navy	NATO Burden-sharing: Redefinition for a Changing European Threat	189

MANAGEMENT (cont.)

David L. McNamara Lieutenant, U.S. Navy and James M. Laury Lieutenant, U.S. Navy	An Examination of the Effects of First-Term Career Progression on Navy A-School Attrition and the Experiences of A-School Students after Attrition	189
Carolyn J. Miller Lieutenant Commander, U.S. Navy	Post-Service Earnings of Veterans: A Survey and Further Research	190
Kenneth S. Mitchell Lieutenant, U.S. Navy	Turbulence and Change in Department Spending Patterns Case Study: Department of Agriculture	190
Daryce L. Moore Lieutenant Commander, U.S. Navy	Total Force: The Reserve Recall Process and Desert Shield/Desert Storm	191
Howard E. Moore, III Lieutenant Commander, U.S. Navy	Commander, U.S. Naval Surface Forces, Pacific Budget Process	191
Harold R. Morgan, Jr. Lieutenant, U.S. Navy and Ernani M. Lacson Lieutenant, U.S. Navy	Total Quality Leadership as it Applies to the Surface Navy	192
Valerie A. Moule Lieutenant Commander, U.S. Navy	Lost Opportunity: The High Quality, Reduced Military Force of the 1990s: Is There a Role for the Nation's Disadvantaged Youth?	192
William S. Munson Lieutenant, U.S. Navy and Steven J. Harris Lieutenant Commander, U.S. Navy	An Analysis of Depot Level Repairables Carcass Management and Position Controls Under the Advanced Traceability and Control (ATAC) Program	193
John P. Neagley Lieutenant, U.S. Navy and Robert T. O'Brien, Jr. Captain, U.S. Army	Market Allocation of Agricultural Water Resources in the Salinas River Valley	193
Robert T. O'Brien, Jr. Captain, U.S. Army and John P. Neagley Lieutenant, U.S. Navy	Market Allocation of Agricultural Water Resources in the Salinas River Valley	194
Arthur J. Ohanian Lieutenant Commander, U.S. Navy and Richard D. Suttie Lieutenant Commander, U.S. Navy	The Political Economy of Military Base Closure	194

MANAGEMENT (cont.)

Miguel A. Fonseca Palomino **Second Lieutenant, Peru Air Force**	**Local Area Network Strategies and Guidelines for a Peruvian Air Force Computer Center**	**195**
Darlis Pangaribuan ***Captain, Indonesian Air Force***	**Total Quality Management in Information Systems**	**195**
James D. Peters **Lieutenant, U.S. Navy**	**Effect of Prime Contractor Financial Position on Major Weapon System Cost and Delivery Performance**	**195**
Michael W. Peterson **Lieutenant, U.S. Navy**	**Analysis of the Asbestos Permissible Exposure Level Threshold Standard**	**196**
James T. Pullen **Lieutenant Commander, U.S. Navy** **and Mary G. Ritchie** **Lieutenant, U.S. Navy**	**Aviation Depot Level Repairable System Gains**	**196**
John F. Qua **Lieutenant, U.S. Navy**	**Optimum Levels of Work in Process (WIP) for Navy Field Contracting Organizations: A Decision Rule**	**197**
Natalie A. Quick ***Lieutenant, U.S. Navy*** **and Daniel W. Chang** **Lieutenant Commander, U.S. Navy**	**Profile of an Effective Engineering Manager at the Naval Avionics Center**	**197**
Patrick F. Rammel **Commander, U.S. Navy**	**Case Study Analysis of United States Navy Financial Field Activity**	**198**
Herschel H. Rector **Lieutenant, U.S. Navy**	**An Historical Analysis of DoN Procurement Appropriations During Fiscal Years 1981 through 1989**	**198**
Valerie L. Reynolds **Lieutenant, U.S. Navy**	**Issues Surrounding the Deployability of Single and Dual-Service Parents in the Navy**	**198**
Mary G. Ritchie **Lieutenant, U.S. Navy** **and James T. Pullen** **Lieutenant Commander, U.S. Navy**	**Aviation Depot Level Repairable System Gains**	**199**
Robert J. Ritchie **Lieutenant Commander, U.S. Navy**	**The Effect of Extension in System Technology on Contractor Costs and Production Schedules During the Procurement of Air-Launched Tactical Munitions**	**199**

MANAGEMENT (cont.)

Michael W. Robinson Lieutenant, U.S. Navy	A Dictionary of Acquisition and Contracting Terms	200
Edward C. Romero	Impact of the Defense Critical Technologies Plan on Weapon Systems Test and Evaluation	200
Kenneth C. Rose Lieutenant Commander, U.S. Navy and Elizabeth A. Wallace Lieutenant, U.S. Navy	Divorce and Family Support Services: Problems and Prospects for the U.S. Navy	201
Eddie B. Ross Lieutenant Commander, U.S. Navy	Management Control of Aviation Career Incentive Pay for Selected Reservists of the Naval Reserve	201
Timothy J. Ross Lieutenant, U.S. Navy	Management of Demand Based Inventory Aboard Submarine Tenders Servicing Attack (SSN) Submarines	202
Charles T. Rouse Captain, U.S. Marine Corps	The Marine Corps' Permanent Change of Station (PCS) Move Model	202
John L. Russell Lieutenant, U.S. Navy	The Army Technology Base: Issues and Comparisons	202
Rolando C. Salvanera Lieutenant, U.S. Navy	Implementing Total Quality Management at the Intermediate Level of Aircraft Maintenance	203
Vernon T. Sapp Major, U.S. Marine Corps	Impact of New DoD Directives on Marine Corps Acquisition Policy at Milestone IV	203
Don F. Schade Lieutenant Commander, U.S. Navy	Fixed-Price-Award-Fee: An Economic, Motivational, and Contracting Theory Analysis	204
Carl E. Schauppner Lieutenant, U.S. Navy	The Ramifications of Compensation Limitations in Personal Services Contracts for Direct Health Care Providers	204
Fred O. Schellhammer Lieutenant Commander, U.S. Navy	A Study of Foreign Acquisition of U.S. Firms Prior to the Exon-Florio Amendment	205
John B. Simpson Captain, U.S. Army	How Implementation of TQM and the Development of a Process Improvement Model, Within a Forward Support Battalion, Can Improve Preparation of the Material Condition Status Report (DA Form 2406)	205

MANAGEMENT (cont.)

James A. Sinkiewicz **Lieutenant, U.S. Navy**	**Predicting Enlistment Behavior from Stated Intentions and Demographic Characteristics**	**206**
George T. Skrtich **Lieutenant, U.S. Navy** **and Daniel E. Delaney** **Lieutenant, U.S. Navy**	**A Micro Computer Based Procurement Systems: An Applicatio of Reverse Engineering Techniques**	**206**
David A. Smith **Lieutenant, U.S. Navy**	**A Classification and Analysis of *National Contract Management Journal* Articles from 1966 Through 1989**	**207**
George S. Smith **Lieutenant, U.S. Navy**	**Management of the Navy Flying Hour Program: Responsibilities and Challenges for the Type Commander**	**207**
Jane R. Smith **Lieutenant Commander, U.S. Navy** **and Julie E. Webb** **Lieutenant Commander, U.S. Navy**	**Work-load Planning for Navy Stock Points**	**208**
Patrick W. Snellings **Lieutenant Commander, U.S. Navy**	**An Analysis of the Economic Effects of U.S. Energy Efficiency Standards**	**208**
Suzanne K. Spangler **Lieutenant Commander, U.S. Navy**	**An Analysis of the Variables in the Decision to Revert from a Dual Source to Sole Source Acquisition Method**	**208**
John K. Spendley **Lieutenant, U.S. Navy**	**Effectiveness of the U.S. Navy's Basic Skills Enhancement Program Entitled Functional Applied Skills Training (FAST)**	**209**
James F. Stader **Lieutenant, U.S. Navy**	**Economic Analysis of Understanding and Implementing Design Criteria for Acoustic Suppression in Military Residential Units**	**209**
Robin J. Stauffer **Captain, U.S. Army**	**A Comparative Analysis of the Army Special Operations Forces Support Structure to the Infantry Division (Light) Support Structure**	**210**
Blair P. Stephenson **Lieutenant, U.S. Navy**	**The Role and Function of the Navy Office of Legislative Affairs in the Congressional Program Authorization and Budget Process**	**210**

MANAGEMENT (cont.)

Subandijo **Major, Indonesian Air Force**	***Improving* the Indonesian Air Force Technician Skill Through Technology Transfer**	**211**
Thomas J. Summerour, Jr. **Lieutenant Commander, U.S. Navy** **and Dennis E. Wilson** **Lieutenant Commander, U.S. Navy**	***Automated Contracting*: A Productivity Study**	**211**
Richard D. Suttie **Lieutenant Commander, U.S. Navy** **and Arthur J. Ohanian** **Lieutenant Commander, U.S. Navy**	**The Political Economy of Military Base Closure**	**212**
Lori D. Swinney **Lieutenant, U.S. Navy** **and William D. Hatch, II** **Lieutenant, U.S. Navy**	**Physical Readiness Testing of Surface Warfare Officers**	**212**
Robbie G. Turner **Lieutenant, U.S. Navy**	**Minority Women Officers in the Navy: Past, Present, and Future Prospects**	**213**
Penny B. Turner **Lieutenant Commander, U.S. Navy**	**Retention in the Navy Nurse Corps**	**213**
Henry P. Van Oss **Lieutenant Commander, USNR**	**An Economic Analysis of the Alternatives for Providing Military Family Housing at NPS Monterey, California**	**213**
Jonathan E. Vanscoy **Lieutenant, U.S. Navy**	**Congress and the Navy Budget: The Impact of the Budget Process on the FY 1990 Navy Program Budget**	**214**
Robert F. Vellella **Lieutenant, U.S. Navy**	**The Organization and Functioning of the Legislative Liaison Offices of the Military Departments**	**214**
John D. Walker **Lieutenant, U.S. Navy** **and Scott L. Archer** **Lieutenant, U.S. Navy**	**An Analysis of the Navy's Overseas Screening Policy**	**215**
Elizabeth A. Wallace **Lieutenant, U.S. Navy** **and Kenneth C. Rose** **Lieutenant Commander, U.S. Navy**	**Divorce and Family Support Services: Problems and Prospects for the U.S. Navy**	**215**

MANAGEMENT (cont.)

Julie E. Webb **Lieutenant Commander, U.S. Navy** **and Jane R. Smith** **Lieutenant Commander, U.S. Navy**	**Work-load Planning for Navy Stock Points**	**216**
Dana Weiner **Lieutenant, U.S. Navy**	**Navy A-School Academic Setbacks: Their Cost and Implications for Retention and Performance**	**216**
Zvi Weingart **Lieutenant Commander** **Israeli Navy**	**Inventory Models for Slow Moving Items for the Israeli Navy**	**216**
Brian L. Wenger **Lieutenant, U.S. Navy**	**A Taxonomical Structure for Classifying the Goods Purchased by the Federal Government**	**217**
Stephen D. Westhoven **Lieutenant, U.S. Navy**	**Inventory Accuracy in NISTARS Controlled Non-mechanized Warehouses**	**217**
Kevin R. Wheelock **Lieutenant, U.S. Navy**	**An Analysis of a Navy Stock Fund Inventory Valuation Model**	**218**
Thomas B. Williams **Lieutenant Commander, U.S. Navy**	**Effects of Types of Cognitions on Performance in Oral Briefings**	**218**
Ricky L. Williamson **Lieutenant, U.S. Navy** **and James C. Workman** **Lieutenant, U.S. Navy**	**Budget Reduction in the Navy**	**219**
Dennis E. Wilson **Lieutenant Commander, U.S. Navy** **and Thomas J. Summerour, Jr.** **Lieutenant Commander, U.S. Navy**	**Automated Contracting: A Productivity Study**	**219**
Richard L. Wilson **Lieutenant, U.S. Navy**	**A Model Procedure Integrating Total Quality Management into the Source Selection Process**	**220**
Robert E. Wilson **Lieutenant, U.S. Navy**	**A Dictionary of Acquisition and Contracting Terms**	**220**
Jeffrey G. Wolf **Lieutenant Commander, U.S. Navy**	**Cost and Schedule Growth During Weapon System Acquisition: An Investigation of the Impact of Selected Economic and Political Factors**	**220**

MANAGEMENT (cont.)

James A. Worcester Lieutenant, U.S. Navy and Tracy D. Hofmann Lieutenant, U.S. Navy	Navy Family Housing: A Study of Adequacy Standards and Their Relationship to the Variable Housing Allowance	221
James C. Workman Lieutenant, U.S. Navy and Ricky L. Williamson Lieutenant, U.S. Navy	Budget Reduction in the Navy	221
Michael R. Wrinkle Commander, USNR and Carl E. Carson, III Lieutenant Commander, USNR	Comparative Cost Analysis of P-3 Active and Reserve Aviation Forces: The Economics of Proposed Force Mix Alternatives	222
Roland J. Yardley Lieutenant, U.S. Navy	An Analysis of the Effect of ASVAB Waivers on A-School Academic Attrition	222
Nicholas W. Zimmon Lieutenant, U.S. Navy and Neil S. Ford Lieutenant Commander, U.S. Navy	A Data-Based Financial Management Information System (FMIS) for Administrative Sciences Department	223

MECHANICAL ENGINEERING

Juan C. Acosta, R. Lieutenant Commander Colombian Navy	Modeling of Explorative Procedures for Remote Object Identification	227
Erhan Murat Akdeniz Lieutenant Junior Grade Turkish Navy	Effects of Power Pulsations on Natural Convection from Discrete Heat Sources	227
Erol Aytar Lieutenant Junior Grade Turkish Navy	Natural Convection Immersion Cooling of an Array of Heated Protrusions in an Enclosure Filled with Dielectric Liquid: Effects of Enclosure Width and Fluid Prandtl Number	228
Steven C. Cade Lieutenant, U.S. Navy	An Investigation of the Interatomic Bonding Characteristics of a Ti-51at% Al Alloy by X-ray Diffraction	228
David K. Carlson Lieutenant, U.S. Navy	Artificial Neural Networks and Their Applications in Diagnostics of Incipient Faults in Rotating Machinery	229

MECHANICAL ENGINEERING (cont.)

Scott V. Chilman Lieutenant, U.S. Navy	Nucleate Boiling Characteristics of R-113 in a Small Enchanced Tube Bundle	229
Salvatore Ciriello, Jr. Lieutenant, U.S. Navy	Heat Transfer, Adiabatic Effectiveness and Injectant Distributions Downstream of Single and Double Rows of Film-Cooling Holes with Simple and Compound Angles	230
Lawrence W. Comerford Lieutenant, U.S. Navy	A Study of the Microstructural Basis for the Strength and Toughness Properties of Overaged HSLA-100 Steel	230
Robert A. Egger Lieutenant, U.S. Navy	Enhancement of Boiling Heat Transfer in Di-Electric Fluids	231
Ali Sukru Eren Lieutenant Junior Grade Turkish Navy	Heat Transfer Enhancement Due to Bubble Pumping in FC-72 Near the Saturation Temperature	231
Daniel C. Espinosa Lieutenant, U.S. Navy	Visualization of Gas Tungsten Arc Weld Pools	231
Steven J. Fuqua Lieutenant, U.S. Navy	Study of the Transition to Turbulence within a Curved Rectangular Channel with 40 to 1 Aspect Ratio	232
Christopher P. Harper Lieutenant, U.S. Navy	Effect of Alumina Particle Additions on the Aging Kinetics of 2014-Aluminum Matrix Composites	232
Michael R. Kendall Lieutenant, U.S. Navy	Effects of Centrifugal Instabilities on Laminar/Turbulent Transition in Curved Channels with 40 to 1 Aspect Ratios	233
Alan M. Marsilio Lieutenant, U.S. Coast Guard	Use of Hopfield Networks for System Identification and Failure Detection in Autonomous Underwater Vehicles	233
Raymond W. Martin Lieutenant, U.S. Coast Guard	Studies of Intermetallic Growth in Cu-Solder Systems and Wettability at Solid-Liquid Interfaces	234
Timothy G. McCarthy Lieutenant, U.S. Navy	Numerical Field Model Simulation of Full-Scale Fire Tests in a Closed Spherical/ Cylindrical Vessel Using Advanced Computer Graphics Techniques	234
Michael B. McLean Lieutenant, U.S. Navy	Dynamic Performance of Small Diameter Tunnel Thrusters	234

MECHANICAL ENGINEERING (cont.)

Thomas C. Mohr **Lieutenant, U.S. Navy**	**A Study of the Microstructural Basis for the Strength and Toughness Properties of Water-Quenched and Air-Cooled HSLA-100, HSLA-100 with Increased Copper, and a ULCB Steel**	**235**
Darrell S. Morrow **Lieutenant, U.S. Navy**	**Transition Phenomena in a Straight Channel with a 40 to 1 Aspect Ratio with and without Imposed Pulsations Part I: Near-Wall and Central Region Profiles**	**236**
Agelos G. Papasotiriou **Lieutenant, Hellenic Navy**	**Three Dimensional Pursuit Guidance and Control of Submersible Vehicles**	**236**
Scott A. Potter **Lieutenant, U.S. Navy**	**Full Pose and Partial Pose Calibration of a Six Degree of Freedom Robot Manipulator Arm**	**237**
Christopher J. Putzig **Lieutenant, U.S. Navy**	**Numerical Experiments in Unsteady Flows Through the Use of Full Navier-Stokes Equations**	**237**
Arthur K. Samora **Lieutenant, U.S. Navy**	**Sliding Mode Control of Motions of Towed Ships**	**237**
Daniel M. Seigenthaler **Lieutenant, U.S. Navy**	**Effect of Thermal Residual Stresses on the Stress-Strain Behavior of Metal-Matrix Composites**	**238**
Bradley J. Smith **Lieutenant, U.S. Navy**	**Study of Transition Phenomena in a Straight Channel with 40 to 1 Aspect Ratio with and without Imposed Pulsations Part Two: Reynolds Number Surveys**	**238**
Dean C. Sugiyama **Lieutenant, U.S. Navy**	**Nucleate Pool Boiling of R-114 and R-114/ Oil Mixtures from Single Enhanced Tubes**	**239**
Prouttichai Suwandee **Lieutenant Commander** **Royal Thai Navy**	**Orientation Guidance and Control for Marine Vehicles in the Horizontal Plane**	**239**
Yavuz Turkgenci **First Lieutenant** **Turkish Army**	**Compliance of a Robotic Finger Joint**	**239**
Te-Kang Wang **Captain, ROC Army**	**A Powder X-ray Diffraction Study of Two Aluminum-Lithium Based Alloys**	**240**

MECHANICAL ENGINEERING (cont.)

Michael W. Wendel Lieutenant, U.S. Navy	The Effects of Shipboard Steering Machinery Dynamics on Rudder Roll Stabilization Systems	240
Michael J. Wiegand Lieutenant, U.S. Navy	Comparison of Unconstrained and Constrained Calibration Methods	240
Mickie K. Wiser Lieutenant, U.S. Navy	Ship Roll Mode Information Extracted from Sea Trial Data	241

METEOROLOGY

Bayani J. Almario, Jr. Captain, U.S. Air Force	Precipitation Analyses Using SSM/I Measurements for Selected ERICA Cyclones	245
James D. Dykes Captain, U.S. Air Force	Multispectral Analysis of Nighttime Low Clouds Over the Ocean	245
Elizabeth B. Gardner Captain, U.S. Air Force	Mesoscale Vertical Structure of an Explosive Oceanic Cyclone	246
Terry K. Jarrett	A Prototype Climate Information System	246

METEOROLOGY AND PHYSICAL OCEANOGRAPHY

Carlos A. Andrade Lieutenant Commander Colombian Navy	Mesocale Variability of the Caribbean Sea from GEOSAT	249
Jeffrey L. Bacon Lieutenant Commander, U.S. Navy	A Numerical Study of the Effects of Wind Forcing on the Chilean Current System	249
Frank W. Baker Lieutenant, U.S. Navy	The Effect of Latent Heat Release on the ERICA IOP-5 Cyclone	250
Eric J. Bayler Lieutenant Commander, U.S. Navy	Seasonal Wind and Ocean Thermal Forcing Influences on the Generation of the Leeuwin Current and its Eddies	250
Ricardo Carvalho de Almeida Lieutenant Commander Brazilian Navy	Simulation of Atmospheric Frontogenesis with a Semi-Lagrangian Numerical Model	251
Thomas H. Cecere Lieutenant, U.S. Navy	An Evaluation of the Naval Oceanic Vertical Aerosol Model During Key90	251

METEOROLOGY AND PHYSICAL OCEANOGRAPHY (cont.)

Don T. Conlee Lieutenant, U.S. Navy	Satellite Image Display and Processing with Microcomputers: A Proof-of-Concept for the Navy Oceanographic Data Distribution System (NODDS)	252
Lisa E. Frailey Lieutenant, U.S. Navy	Integrated Microwave and Infrared Precipitation Analyses	252
Susan N. Greer Lieutenant, U.S. Navy	Mesocale Surface Analysis of the ERICA IOP-5 Cyclone	253
Mark J. Gunzelman Lieutenant, U.S. Navy	Tropical Cyclone Motion Due to Environmental Interactions Represented by Empirical Orthogonal Functions of the Vorticity Fields	253
Stephanie W. Hamilton Lieutenant, U.S. Navy	Meteorological Features During Phase I of the Coordinated Eastern Arctic Experiment (CLEAREX) from 17 September 1988 to 7 January 1989	254
John E. Joseph Lieutenant, U.S. Navy	Acoustic Tomography in the Greenland Sea	255
Adam A. Kippes Lieutenant Commander, U.S. Navy	Characteristics of Upper-Level and Boundary Layer Forcing in Western Pacific Cyclones	255
Timothy P. Mahony Lieutenant, U.S. Navy	Water Vapor Influence on Satellite-Measured Aerosol Characteristics	256
James R. Mallette, Jr. Lieutenant, U.S. Navy	A Diagnostic Study of the Velocity Structure of a Meandering Jet in the California Current System using a Primitive Equation Model	256
Charles C. McGlothin, Jr. Lieutenant, U.S. Navy	Ambient Sound in the Ocean Induced by Heavy Precipitation and the Subsequent Predictability of Rainfall Rate	257
Douglas M. Taggart Lieutenant Commander, U.S. Navy	Determination of Near-Surface Velocity Fields in the CTZ Using Combined Altimetric and Inverse Modelling Techniques	257
David W. Titley Lieutenant Commander, U.S. Navy	A Diagnostic Study of Rapidly Developing Cyclones Using Surface-Based Q Vectors	258

METEOROLOGY AND PHYSICAL OCEANOGRAPHY (cont.)

Jonathan W. White Lieutenant, U.S. Navy	Optical Effects on Ocean Mixed Layer Dynamics	258

NATIONAL SECURITY AFFAIRS

Glen C. Ackermann Lieutenant, U.S. Navy	Responding to the Threat from Third World Air Defense Systems: A Comparison of U.S. Policy Options	261
Tamara K. Adams Captain, U.S. Air Force	Potential Threats to Spanish Security: Implications for the United States and NATO	261
Thomas E. Arnold Lieutenant Commander, U.S. Navy	Japan's Roles in U.S. National Security Strategy: Strategic Ally and Economic Adversary	262
Stephen P. Black Lieutenant Commander, U.S. Navy	Crossing Shadows: Polish Sovereignty, Post-Communist Foreign Policy and European Security	262
Steven B. Bolstad Lieutenant, U.S. Navy	Opportunity in Danger: Manstein's East Front Strategy from 19 Nov 1942 to 18 Mar 1943	263
Paul C. Brown Lieutenant, U.S. Navy	Naval Arms Control: A Post-Cold War Reappraisal	263
Thomas J. Chassee Lieutenant, U.S. Navy and Michael M. Cobb Lieutenant, U.S. Navy	Narcotics and National Security: Refining the Military Option	264
Michael M. Cobb Lieutenant, U.S. Navy and Thomas J. Chassee Lieutenant, U.S. Navy	Narcotics and National Security: Refining the Military Option	264
Harold H. Collins Lieutenant Commander, U.S. Navy	The United States and Brazil: A Naval Partnership for the Twenty-First Century?	265
Michael J. Collins Lieutenant, U.S. Navy	Evaluating the Military Potential of a Developing Nation's Space Program: A Case Study of Brazil	265
Michael J. Corrigan Lieutenant, U.S. Navy	Gorbachev, The Generals, and the 'Turn to the Right'	266

Tito Prem Dua Lieutenant, U.S. Navy	India and the Persian Gulf Crisis: From Global Idealism to Regional Realities	266
Robert J. Dukat Captain, U.S. Air Force	Japanese Technology and U.S. National Security	266
Kaye M. Emerson Lieutenant, U.S. Navy	Defence Procurement in the United Kingdom: Which Way Will it Go?	267
Dale T. Frankenberger Lieutenant Commander, U.S. Navy	The Growth of the Japanese Economy: Challenges to American National Security	267
Thomas A. Fries Captain, U.S. Air Force	The Supreme Soviet and Soviet Defense Policy	267
Cory W. Gildersleeve Lieutenant, U.S. Navy	Strategy and Logistics for the New World Order	268
Carl R. Graham Lieutenant, U.S. Navy	A Democratic Call to Arms: Public Opinion and Intervention Policy	268
Janice M. Graham Lieutenant, U.S. Navy	Current Developments and Prospects for the Future: French Security Policy in a Changing World	269
John L. Green Lieutenant Commander, U.S. Navy	The Baltic: A Sea in Transition	269
Kenneth S. Harbin Major, U.S. Marine Corps	The Expanding Sino-Thai Military Relationship: Implications for U.S. Policy in Thailand	270
Annette M. Haynes Lieutenant, U.S. Navy	Indian Naval Development: Power Projection in the Indian Ocean?	270
Randall M. Hendrickson Lieutenant, U.S. Navy	Arms Control With a Democracy?: Negotiating With the New Soviet Union	271
Abigail S. Howell Lieutenant Commander, U.S. Navy	Media Diplomacy: The Negotiator's Dilemma	271
Ricky L. Keeling Captain, U.S. Air Force	The Hungarian Revolution of 1989: Perspectives and Prospects for Kozotteuropa	272
Stephanie S. Kessler Lieutenant, U.S. Navy	Cuba's Involvement in Angola and Ethiopia: A Question of Autonomy in Cuba's Relationship with the Soviet Union	272

NATIONAL SECURITY AFFAIRS (cont.)

Kurt W. King **Lieutenant, U.S. Navy**	**Sino-U.S. Economic Relations: Problems and Perspectives**	**272**
Kenneth L. Knotts, Jr. **Captain, U.S. Air Force**	**Mikhail Gorbachev's "New Thinking": Implications for Western Security**	**273**
Patrick J. Kolbas **Lieutenant, U.S. Navy**	**Beyond Armageddon: Deterrence with Less**	**273**
Russell G. Lanker **Lieutenant Commander, U.S. Navy**	**Competing Claims Among Argentina, Chile, and Great Britain in the Antarctic: Economic and Geopolitical Undercurrents**	**274**
David B. Lasher **Lieutenant, U.S. Navy**	**Encouraging Democratic Transitions: The Problematic Impact of United States' Involvement**	**274**
Thomas E. Leard **Captain, U.S. Marine Corps**	**Marine Corps Intelligence for War as it Really is**	**275**
Clyde J. McCaleb, III **Lieutenant Commander, U.S. Navy**	**Arbitrary Budget Cuts and the U.S. National Security Posture**	**275**
Thomas A. Murphy **Lieutenant, U.S. Navy**	**Prospects for United States-Mexican Cooperation in the War on Drug Trafficking**	**276**
Jeanne M. Nazimek **Lieutenant, U.S. Navy**	**The Impact of the Intifada on Palestinian Leadership Development**	**276**
Glenn J. Olarte **Lieutenant, U.S. Navy**	**Panamanian Politics: The Legacy of Torrijismo and Prospects for Demilitarization**	**276**
Tenise L. Pettigrew **Lieutenant, U.S. Navy**	**The Changing Role of Vietnam in Southeast Asia: Beyond the Cold War**	**277**
Evan R. Pilling **Lieutenant, U.S. Navy**	**Indian Surface Combatants: Sea Power for the 1990s**	**277**
Stephen P. Recca **Lieutenant, U.S. Navy**	**Nordic Nonalignment/Neutrality Policies in the 1990s: Implications for U.S. Security**	**277**
John J. Shea **Lieutenant, U.S. Navy**	**Explaining Success and Failure in Counterinsurgency**	**278**
Lowell S. Stanton **Lieutenant, U.S. Navy**	**U.S./NATO Sea-Based Non-Strategic Nuclear Deterrence: Paradox or Pitfall?**	**278**

NATIONAL SECURITY AFFAIRS (cont.)

William D. Stephens Captain, U.S. Air Force	The Roots of Social Protest in the Philippines and Their Effect on U.S.-R.P. Relations	279
Robert A. Stoufer Lieutenant, U.S. Navy	The United States in the Framework of ASEAN Security: Post-Cold War Prospects and Alternatives	279
Susan L. Theodorelos Lieutenant, U.S. Navy	NATO's Out-of-Area Dilemma	280
Michael R. Weiss Lieutenant Commander, U.S. Navy	The Education and Development of Strategic Planners in the Navy	280
Steven A. White Lieutenant, U.S. Navy	The Baltic Question as it Relates to European Security	280
Paul M. Whitfield Lieutenant, U.S. Navy	The Hidden Dimension of Strategic Planning: Explorations in the Formation of Perspectives	281
Karen D. Willis Lieutenant, U.S. Navy	Antarctic Treaty 1991: A U.S. Position	281
Jimmy C. Woodard Lieutenant Commander, U.S. Navy	The U.S. Maritime Strategy in the North Atlantic and Norwegian Sea: An Evolving Strategy in Need of Reassessment	281

OPERATIONS RESEARCH

Rui Almeida Lieutenant, Portuguese Navy	Probability Models for Defense Against Missile Attacks	285
Alan A. Anderson Major, U.S. Army	Methodologies for the High Resolution Modeling of Minefield Dynamics	285
Edward M. Biggers Commander, U.S. Navy	Cost Estimation of Contractor Provided Supply Support for Aviation Simulators	285
Cheryl A. Bither Captain, U.S. Army and Julie A. Dougherty Lieutenant, U.S. Navy	A Modeling Strategy for Large-Scale Optimization Based on Analysis and Visualization Principles	286
Arthur F. Brock Lieutenant, U.S. Navy	Second Order Approximation for Variance of SEP	286

OPERATIONS RESEARCH (cont.)

Daniel C. Buning Captain, U.S. Army	US Army's Delayed Entry Program: Attrition Modeling	287
William G. Castaneda Lieutenant, U.S. Navy	Shipboard Electrical Consumption Profile Analysis	287
Charles A. Chase, VII Captain, U.S. Army	The Fidelity Enhancement Process	288
Richard L. Darden Lieutenant, U.S. Navy	Naval Gunfire Support: An Expandable, Object-Oriented, Process-Based Simulation	288
Julie A. Dougherty Lieutenant, U.S. Navy and Cheryl A. Bither Captain, U.S. Army	A Modeling Strategy for Large-Scale Optimization Based on Analysis and Visualization Principles	289
Allen C. East Captain, U.S. Army	Comparison of Tank Engagement Ranges from an Operational Field Test to the Janus (A) Combat Model	289
Michael W. Feil Captain, U.S. Army	A Sensitivity Analysis of the Janus (A) Combat Simulation that Supports the Use of Janus (A) in Army Training	290
Matthew A. Finlon Major, U.S. Marine Corps	Analysis of the Field Artillery Battalion Organization Using a Markov Chain	290
Charles V. Fletcher Captain, U.S. Army	A Force Structure Design Model	290
James J. Galvin, Jr. Captain, U.S. Army	Correlational Analysis of Survey and Model-Generated Workload Values	291
Malcolm W. Garland Captain, U.S. Army	KHAFJI: A Combat Simulation	291
Susan C. Geshan Lieutenant, U.S. Navy	Signature Verification for Access Control	292
Tammy L. Glaser Lieutenant, U.S. Navy	A Single-Commodity Mine Transshipment Problem	292
John R. Green Captain, U.S. Army	Comparing Combat Models Using Analytical Surrogates	293
Ahmet E. Gurdal Lieutenant Junior Grade Turkish Navy	Basic Computer Models for Manpower Planning	293

OPERATIONS RESEARCH (cont.)

Steven J. Hutchison Captain, U.S. Army	An Analysis of Light Infantry Effectiveness in Mid-to High Intensity Conflict Deliberate Attack Missions	294
Catherine A. Johnson Captain, U.S. Marine Corps	Mathematical Model of a Marine Corps Amphibious Landing Using Intelligence Estimates	294
Stephen H. Kelley Lieutenant, U.S. Navy	Load Sharing in Anti-Air Warfare Coordination: Criteria and a Simulation Test Plan	295
Sook Han Kim Captain, ROK Army	The Economic Choice of the Transportation Routes for Logistics Materiels	295
Aristomenis P. Lalis Lieutenant Commander Hellenic Navy	Sensitivity Analysis of the Modern Naval Combat Model	295
Dong Keun Lee Major, ROK Army	Optimal Routing of Military Convoys Through a Road Network	296
Hung Heng Lim Major, Singapore Army	A Wartime Sustainability Model for a Small Country	296
Chang-yun Lo Commander, ROC Navy	Optimizing Ship Air-Defense Evaluation Model Using Simulation and Inductive Learning	296
Kok-Hua Loh Lieutenant Colonel, ROS Air Force	Modelling Strategic Strikes Against Transportation Networks	297
Wolfgang F. Maskos Major, German Army	Optimal Assignment of Marine Recruits to Occupational Training	297
Jeffrey T. Miles Captain, U.S. Army	A Methodology for Capturing and Analyzing Data from Technology Base Seminar Wargames	298
Christopher Morey Captain, U.S. Army	Optimization Models for Synchronization Planning	298
Kok Chuan Ng	The Social Discount Rate: Some Implications of the Budget-Constrained Opportunity Cost Approach	299
Homero F. Oliveira Major, Brazilian Air Force	Design and Implementation of a Toolbox of Modularized C Programs to Construct, Analyze and Test Network Optimization Algorithms	299

OPERATIONS RESEARCH (cont.)

Altan Ozkil **First Lieutenant, Turkish Army**	**Pyrotechnic Device Reliability**	**300**
John M. Page **Captain, U.S. Army**	**The Optimal Force Mix and Allocation of Fires for the Future Field Artillery**	**300**
Rae Yoon Park **Major, ROK Army**	**Crew Training and the Reliability of a Battalion Fire Support System**	**300**
Eugene P. Paulo **Captain, U.S. Army**	**Comparison of Janus and Field Test Aircraft Detection Ranges for the Line-of-Sight Forward Heavy System**	**301**
Grigorios J. Raptis **Lieutenant Commander** **Hellenic Navy**	**A Comparison of Three Numerical Methods for Updating Regressions**	**301**
Khan Hasham Bin Siddique **Lieutenant Commander** **Pakistan Navy**	**Development of Automated Assignment Model for Sailors in Pakistan Navy**	**301**
Sukhdev Singh **Lieutenant Commander** **Royal Malaysian Navy**	**Optimal Maintenance Policies Applicable to Repairable Systems Onboard Ships**	**302**
Bryan F. Smith	**A Model of an Integrated Air Defense System (IADS) for the TACOPS Program**	**302**
Jose Batista de Souza Neto **Lieutenant, Brazilian Navy**	**Effects of Non-normal Outlier-prone Error Distribution on Kalman Filter Track**	**302**
Philip D. Rodgers **Lieutenant, U.S. Navy**	**A Linear Programming Based Decision Support Aid for Navy Enlisted Strength Planning**	**303**
Robert L. Steinrauf **Captain, U.S. Army**	**Network Interdiction Models**	**303**
John E. Tomko **Lieutenant, U.S. Coast Guard**	**Optimization of the United States Coast Guard Force Structure**	**303**
Robert B. Vassian **Lieutenant Commander, U.S. Navy**	**Analysis of the Relationship Between Demand and Carcass Returns at the Navy Ships' Parts Control Center**	**304**
Michael S. Wells **Lieutenant, U.S. Navy**	**Implementation and Analysis of a Smart Submarine in the Active Sonobuoy Model**	**304**

OPERATION RESEARCH (cont.)

Michael B. West Captain, U.S. Marine Corps	Object-Oriented Modelling and Analysis of a Marine Corps Communications Architecture	305
Kah-Chee Yee	Approximate Confidence Limit Procedures for Complex Systems	305

PHYSICAL OCEANOGRAPHY

Stephen L. Buss Lieutenant, U.S. Navy	A Numerical Study of Time-Dependent Wind Forcing Off the West Coast of Portugal, 1987-1988	309
John M. Emblidge Lieutenant, U.S. Navy	A Feasibility Study of Ocean Acoustic Tomography in the Barents Sea	309
Gary R. Frogner Lieutenant, U.S. Navy	Monitoring of Global Acoustic Transmissions: Signal Processing and Preliminary Data Analysis	310
Erhan Gezgin Lieutenant Junior Grade Turkish Navy	A Study on Hydrographic Conditions and Salt Budget Calculation for the Gulf of Farallones with the Data Collected in August 1990	310
Manuel Pardo Lieutenant Commander Spanish Navy	Characterization of the Clock in a New Inexpensive GPS Receiver: the Magnavox MX4200	310
Fernando M.M. Pimentel Lieutenant, Portuguese Navy	Computation of Acoustic Normal Modes in the Ocean Using Asymptotic Expansion Methods	311
Stephen L. Sielbeck Lieutenant Commander U.S. Coast Guard	Bottom Trapped Waves at Tidal Frequencies Off Point Sur, California	311
Georgios Th. Tziagidis Lieutenant, Hellenic Navy	An Analysis of Hydrographic Data Collected Off Point Sur, California in June 1990	312
Pao-Kun Wu Lieutenant Commander Chinese Navy	Cloud Effects on Ocean Mixed Layer in the Northeast Pacific Ocean	312

PHYSICS

Sean M. Connors Lieutenant, U.S. Navy	Effects of High Energy Electron Irradiation on a $YBa_2Cu_3O_7$ High Temperature Superconductor	315
Gregory A. Cord Lieutenant, U.S. Navy	Free Electron Laser Short Pulse Simulation and Two-Mode Sideband Analysis	315
Richard W. Evert Lieutenant, U.S. Navy	Arcjet Plume Ionization Effects on Exposed Solar Array Conducting Surfaces	316
Abdullah Gedik Captain, Turkish Army	Energy Threshold for Laser Induced Breakdown on a Metal Surface Under High and Ultra High Vacuum Conditions	316
Michael P. Hallal, Jr. Lieutenant, U.S. Navy	The Onset of Breakdown in a Fast Pulsed Vacuum Diode	316
Mark J. Hellstern Lieutenant, U.S. Navy	Emittance Measurement of the Naval Postgraduate School Linear Accelerator Using Optical Transition Radiation Techniques	317
Bryan D. Mack Lieutenant, U.S. Navy	An Analysis of Middle Ultraviolet Emissions of Molecular Nitrogen and Nitric Oxide and Vacuum Calibration of an Ultraviolet Spectrograph	317
Brian J. Musselman Lieutenant, U.S. Coast Guard	A Study of the Diffraction Behavior and Resolution Criteria for Pattern Recognition for a Proposed Multiplexed Imaging Technique	318
Jung-Hyun Park Captain, ROK Army	High-Gain, High-Power Free Electron Lasers	318
Joseph P. Sargent, Jr. Lieutenant, U.S. Coast Guard	A Design, Fabriciation and Test of a Precision Positioning Servo Drive for a Multiplexed Imaging System	318

SYSTEMS ENGINEERING

Aldo E. Bresani Lieutenant, Peruvian Navy	Performance Enhancement of the NPS Transient Electromagnetic Scattering Laboratory	321
Byung Gook Choi Captain, ROK Army	The Design of a FLIR Sensor for the Korean Army RPV	321

SYSTEM ENGINEERING (cont.)

An-Te Deng Lieutenant Colonel, ROC Army	VHDL Behavioral Description of Discrete Cosine Transform in Image Compression	321
Antonio Gala Captain, U.S. Army	Analysis and Evaluation of Project Evergreen Data	322
Shinji Hirakawa Lieutenant Japan Maritime Self Defense Force	Passive Determination of Temperature and Range Using Spectral Band Measurements of Photon Emittance	322
Wen-Cheng Hsiung Lieutenant Commander, ROC Navy	A Prototype Rule Based System for Electronic Warfare	322
Gregory A. Lazarakos Lieutenant Junior Grade Hellenic Navy	Radar Target Identification by Natural Resonances: Evaluation of Signal Processing Algorithms	323
Kaing Yeun Lee Major, ROK Air Force	Performance of Fast Frequency-Hopped Noncoherent MFSK Conventional and Self-Normalization Receivers over Rician- and Rayleigh-faded Channel with Partial-Band Interference	323
Sabri Onur Oral Lieutenant Junior Grade Turkish Navy	The Minimization of Multiple V..lued Logic Expressions Using Parallel Processors	324
Kaluri V. Ranga Rao	Adaptive Digital Notch Filtering	324
Alejandro R. Ugarte Lieutenant Argentine Navy	Modeling for Improved Minimum Resolvable Temperature Difference Measurements	325
David S. Wood Captain, U.S. Marine Corps	Thermistor Validation and Path Radiance Effects in Ship Thermal Image Measurements	325

SYSTEMS TECHNOLOGY

Robert P. Costello Lieutenant, U.S. Navy	The Influence of Distance and Direction on Ground Combat Strength	329
Michael D. Hall	Low Probability of Intercept/Low Probability of Detection (LPI/LPD) Communications Techniques and Special Operations	329

SYSTEMS TECHNOLOGY (cont.)

Karen M. Kempton **Captain, U.S. Air Force**	**A Management Proposal for Determining the Effects of Combat Stress on the Man-Machine Interface of Complex Information Display Systems**	**330**
Stephen C. Kessner **Captain, U.S. Air Force**	**A Methodology for Evaluating the Relationship Between Measures of Evaluation: The STF Approach**	**330**
Marvin Knorr, Jr. **Major, U.S. Marine Corps**	**The Development of German Doctrine and Command and Control and Its Application to Supporting Arms, 1832-1945**	**330**
James M. Leist **Lieutenant, U.S. Navy**	**Mass Conflagration: An Analysis and Adaptation of the Shipboard Damage Control Organization**	**331**
Stephen F. Schaaf **Lieutenant, U.S. Navy**	**NAVSPASUR Sensor Performance Study**	**331**
Richard E. Volz, Jr. **Captain, U.S. Army**	**Army JTIDS: A C^3 Case Study**	**331**
Michael Woodgerd ***Captain, U.S. Army***	**If You Don't Like This, You May Resign and Go Home: Commanders' Considerations in Assaulting a Fortified Position**	**332**

SYSTEMS TECHNOLOGY (COMMAND, CONTROL, AND COMMUNICATIONS)

Philip L. Cochran, III **Captain, U.S. Marine Corps** **and Michael J. Foley** **Captain, U.S. Marine Corps**	**An Assessment of the Marine Tactical Command and Control System (MTACCS)**	**335**
Michael J. Foley **Captain, U.S. Marine Corps** **and Philip L. Cochran, III** **Captain, U.S. Marine Corps**	**An Assessment of the Marine Tactical Command and Control System (MTACCS)**	**335**
Samuel M. Liberto **Captain, U.S. Air Force**	**Computer Software Project Management: An Introduction**	**336**
Craig S. McLane **Major, U.S. Air Force**	**Structured Analysis of the Scheduling System for B-52 Aircrew Training**	**336**

SYSTEMS TECHNOLOGY (SPACE SYSTEMS OPERATIONS)

Kevin R. Andersen **Lieutenant, U.S. Navy**	**Design of an Enhanced Interactive Satellite Communications System Analysis Program**	**339**
Walter Anhorn	**Design of Fast Earth-Return Trajectories from a Lunar Base**	**339**
Eugene S. Benvenutti, Jr. **Captain, U.S. Marine Corps**	**Selection and Specification of a Data Link Protocol for VSAT Based Inter-LAN Communications**	**339**
David E. Eyler **Lieutenant Commander, U.S. Navy**	**Management of the Fleet Satellite Communications Satellite Acquisition for the Naval Postgraduate School**	**340**
Gregory A. Heruth, Sr. **Lieutenant, U.S. Navy**	**An Educatinal Space Seminar to Increase American Student Interest in Space Careers**	**340**
Joseph F. Mark **Commander, U.S. Navy**	**A Prototype Multi-media Data Base for Tracking Interface Relationships and Performing Cost Tradeoffs for the Sea Launch and Recovery (SEALAR) Space Launch System**	**340**
Clifton E. Perkins, Jr. **Lieutenant Commander, U.S. Navy**	**A Comparison of the UHF Follow-on and MILSTAR Satellite Communication Systems**	**341**
Steven R. Plystak **Lieutenant, U.S. Navy**	**Trade Study of Three Oxygen Processors for the Martian Atmosphere**	**341**
Jonathan K. Schreiber **Lieutenant Commander, U.S. Navy**	**A Comparison of Heavy Lift Launch Vehicle Options for the 1990s**	**342**
Andrew H. Wilson **Lieutenant, U.S. Navy**	**NOAA's Weather Satellites: Economically Beneficial Pathfinders**	**342**
Yan Chun Wong **Major, U.S. Marine Corps**	**Satellite Anomalies and Electrostatic Surface Discharges**	**343**
Nolan B. Young **Major, U.S. Army**	**Using the Global Positioning System (GPS) to Fulfill the Position/Location Requirements of the National Training Center (NTC) and Other U.S. Army Instrumented Testing and Training Ranges**	**343**

TELECOMMUNICATIONS SYSTEMS MANAGEMENT

Frederick C. Adams, Jr. Lieutenant, U.S. Navy	Improving the LAMPS Mk III SH-60B HF Communication System	347
Steven M. Barker Lieutenant, U.S. Coast Guard	Radiomen Staffing Levels for the United States Coast Guard Pacific Area Communication System	347
John R. Bucher Captain, U.S. Marine Corps	An Overview of Cellular Telecommunications	347
J.D. Chung Major, ROK Army	Electronic Data Interchange	348
Christine S. Downing Lieutenant, U.S. Navy and Jerry W. Leugers Lieutenant Commander, U.S. Navy	A Study of the Feasibility of a Merge Between the Radioman and Data Processing Technician Ratings	348
Gary Edwards Lieutenant, U.S. Navy	Local Area Networks with Fiber Optics	348
Aristides I. Fasoulas Lieutenant Commander Hellenic Navy	INMARSAT Communications System: A Systems Approach	349
Richard N. Fox Lieutenant, U.S. Navy	Effect of Economic Techniques on Radio Frequency Utilization	349
William C. Glidden Lieutenant, U.S. Coast Guard	The Coast Guard's VHF-FM National Distress System: Analysis for Recapitalization	350
Joseph J. Kinder Lieutenant, U.S. Navy	The Impact of the Defense Message System (DMS) on the United States Surface Navy	350
Carol L. Larson Lieutenant, U.S. Navy	An Integrated Approach to the Selection Process of Independent Research and Development Projects	351
Jerry W. Leugers Lieutenant Commander, U.S. Navy and Christine S. Downing Lieutenant, U.S. Navy	A Study of the Feasibility of a Merge Between the Radioman and Data Processing Technician Ratings	351
Constantinos P. Leventis Lieutenant Commander Hellenic Navy	Speech Recognition Application in C.I.C.	352

TELECOMMUNICATIONS SYSTEMS MANAGEMENT (cont.)

Peter S. Marsh **Lieutenant, U.S. Coast Guard**	**United States Coast Guard Operational Information Systems: Improving Functionality and Cross-Functionality**	**352**
Kathleen A. McClurg **Lieutenant, U.S. Navy**	**Naval Record Communications: Demand Reduction for the Naval Telecommunications System**	**353**
Vernon M. Skelly **Lieutenant, U.S. Navy**	**A Cost-Effectiveness Analysis of Alternative Guided Media for the Backbone Cable Plant Portion of the Base Information Transfer System**	**353**
Curtis A. Stock **Lieutenant, U.S. Coast Guard**	**Coast Guard Coastal Patrol Boat Communications Demand: An Economic Approach**	**354**
Joseph R. Stone **Lieutenant, U.S. Navy**	**Evaluation and Selection of a Telecommunications System at the Naval Postgraduate School BOQ**	**354**
Eduardo A. Trotta **Major, Argentine Army**	**A Framework for Improving Integrative Factors in C^3 I Systems of the Argentine Army**	**354**
Yu-Lin Wang **Lieutenant Commander, ROC Navy**	**The Development Framework of the Integrated Digital Communication Network for R.O.C. Armed Forces**	**355**
Robert J. Wilson **Lieutenant, U.S. Coast Guard**	**Decision-Making Guide for the Proposed Coast Guard Differential Global Positioning System**	**355**

DOCTOR
OF
PHILOSOPHY

NONLINEAR TRANSFORMATION OF DIRECTIONAL WAVE SPECTRA IN SHALLOW WATER

Manuel A. Abreu-Lieutenant, Portuguese Navy
B.S., Escola Naval, Portugal, 1983
M.S., Naval Postgraduate School, 1989
Doctor of Philosophy in Physical Oceanography-September 1991
Advisors: Edward B. Thornton-Department of Oceanography &
Andres Larraza-Department of Physics

A shallow water, nonlinear spectral wave transformation model is developed for conditions of a mild sloping bottom ($\mu = \nabla h/kh < 1$) and small amplitude effects ($\epsilon = \eta /h < 1$). Nonlinearities and combined shoaling and refraction effects act on the same time and length scales. The evolution equation of the wave action is prescribed by the wave Boltzmann equation, whereby resonant collinear triad interactions transfer energy among Fourier components. Combined shoaling and refraction effects are taken into account through the geometrical optics approximation. A numerical solution of the three wave collision integral is developed, and the steady state wave Boltzmann equation is integrated using a piecewise ray method. The model is tested using the high resolution frequency-directional wave spectrum of Freilich, Guza and Elgar (1990) that shows nonlinear transfers of energy between both harmonic and non-harmonic frequencies. A digitized version of the measured frequency-directional spectrum at 10 meter depth is evolved 246 meter shoreward over a bathymetry of straight and parallel bottom contours to 4 meter depth. The model predicts the prominent spectral features in the measured wave field. The model results are in general superior to estimates using linear, finite depth wave theory, and they compare well with the observations in the region of the spectrum dominated by nonlinear effects.

DETECTION OF ABRUPT CHANGES IN STATISTICAL MODELS

David Aviv-Major, Israeli Air Force
B.S., Ben Gurion University, 1981
M.S., Tel-Aviv University, 1987
Doctor of Philosophy in Electrical Engineering-June 1991
Dissertation Supervisors: Roberto Cristi & C.W. Therrien
Department of Electrical and Computer Engineering

This dissertation investigates different types of disorder problems by using sequential procedures for on-line implementation. The problem is considered within the framework of detecting abrupt changes in an observed random process when the disorder can occur at unknown times. The focus of this work is on quickest detection methods for cumsum procedures implemented for different parametric and nonparametric nonlinearities and their performance evaluation. Both the non-Bayesian (Maximum-Likelihood) and the Bayesian frameworks are presented but the focus is mainly on non-Bayesian methods for which detailed analysis is provided. The use of Brownian motion approximations is also included and provides an additional viewpoint of analyzing the performance for both the non-Bayesian and Bayesian methods.

RECOVERING SIGNALS FROM OPTICAL FIBER INTERFEROMETRIC SENSORS

Charles B. Cameron-Lieutenant Commander, United States Navy
B.S., University of Toronto, 1977
M.S.E.E., Naval Postgraduate School, 1989
Electrical Engineer, Naval Postgraduate School, 1989
Doctor of Philosophy in Electrical Engineering-June 1991
Advisor: Steven L. Garrett-Department of Physics

This dissertation examines three methods of recovering signals cheaply from one class of highly sensitive Optical Fiber Interferometric Sensors (OFIS). This class of sensors consists of a laser light source; a 2X2 optical fiber coupler to split the beam in two; a differential transducer which converts a signal of interest into optical phase shift in the laser light transmitted through the two optical fiber in the interferometer; and a 3X3 optical fiber coupler which recombines the two beams, producing interference which can be detected electronically. The three outputs can be operated on symmetrically or asymmetrically to recover the signal of interest. The use of the 3X3 coupler permits Passive Homodyne Demodulation of the phase-modulated signals provided by the interferometer without feedback control or modulation of the laser itself and without requiring the use of electronics within the interferometer. One of the three methods discussed in this dissertation performs symmetric demodulation with analog electronics. Another uses analog-to-digital conversion of the signals and performs asymmetric demodulation. The three methods are characterized by their harmonic distortion, minimum detectable signal, bandwidth, dynamic range, noise, complexity, and approximate cost.

A STOCHASTIC APPROACH TO PATH-PLANNING IN THE WEIGHTED REGION PROBLEM

Mark Richard Kindl-Major, United States Army
B.S., United States Military Academy, 1974
M.S., Naval Postgraduate School, 1983
Doctor of Philosophy in Computer Science-March 1991
Advisor: Man-Tak Shing-Department of Computer Science

Planning efficient long-range movement is a fundamental requirement of most military operations. Intelligent mobile autonomous vehicles designed for battlefield support missions must have this capability. We propose an efficient heuristic algorithm for planning near-optimal high-level routes through complex terrain maps, modeled by the Weighted-Region Problem (WRP). The algorithm is driven by our adaptation of the combinatorial optimization technique called simulated annealing. The WRP provides a cartographically powerful representation for planar maps. Terrain features are modeled by polygonal homogeneous-cost regions. A cost coefficient assigned to each region indicates the relative cost per unit distance for movement in that region by a point agent on the ground. Region cost coefficients are assumed to be invariant with direction of movement. Given a start and a goal point, a solution (not necessarily optimal) is a set of piecewise-linear connected segments, spanning from start to goal. The cost of a solution path is the sum of the weighted lengths of all segments in the path, where the weighted length of each segment is the product of its Euclidean length and the cost coefficient of the region it crosses. Ideally, we seek the least cost path. However, as problem instances approach the actual complexity of the battlefield, faster solutions become more desirable than absolute optimality. We introduce heuristics designed to reduce the search space independently of start and goal location, this allowing map preprocessing. We use other heuristics to improve the efficiency of local cost function optimization as well as the annealing process itself.

ANOMALOUS DIURNAL CURRENTS IN THE VICINITY OF THE YERMAK PLATEAU

Christophe Prazuck-Lieutenant Commander, French Navy
Ingenieur de l'Ecole Navale, 1981
Doctor of Philosophy in Physical Oceanography-June 1991
Advisor: Roland W. Garwood-Department of Oceanography

Unexpectedly strong diurnal tidal currents, in a region dominated by semi-diurnal tidal surface displacements, were observed in the ARCTEMIZ 86 and 87 and CEAREX 89 records of buoy drift over the Yermak Plateau, a submarine feature north of Svalbard. Similar diurnal currents were observed during the FRAM III, FRAM IV experiments. Data Analysis of the positions of the thirty satellite-tracked drifting buoys provides a description of the diurnal current field with good spatial coverage. This statistical description shows that tidal diurnal currents are enhanced over the entire plateau region. However, specific smaller regions above the plateau (order of 90 km) exhibit locally an even stronger and highly polarized response to the tide that has not been explained until now. Firstly, a simple analytic model is used to show that the variation in the steepness of the slopes of the plateau could be responsible for significant spatial variations in the diurnal current field. Secondly, a numerical model shows that the variation in the curvature of the plateau is also important. Furthermore, the numerical model shows that the curvature of the topography causes the Yermak Plateau to act like a filter, responding resonantly to forcing with periods ranging from approximately 20 to 35 hours.

AN INVESTIGATION OF NONLINEAR CONTROLS AND REGRESSION-ADJUSTED ESTIMATORS FOR VARIANCE REDUCTION IN COMPUTER SIMULATION

Richard L. Ressler-Major, United States Army
B.A., University of Pennsylvania, 1978
M.S., Naval Postgraduate School, 1987
Doctor of Philosophy in Operations Research-March 1991
Advisor: Peter A.W. Lewis-Department of Operations Research

This dissertation develops new techniques for variance reduction in computer simulation. It demonstrates that applying nonlinear transformations to control variables can increase their effectiveness over linear controls. It shows how one can reduce the variance of quantile estimates, where the quantile of interest is a continuous and strictly monotone transformation of the control quantile, by transforming the control quantile with a different continuous and strictly monotone transformation. Asymptotic expansions are developed to validate the improved performance of the nonlinear control for the quantile estimate. Finally, in the realm of regenerative simulation, regression-adjusted techniques are applied to controlled regenerative estimates. The resulting estimates have a greatly reduced estimated mean square error.

AN INVESTIGATION OF MULTIVARIATE ADAPTIVE REGRESSION SPLINES FOR MODELING AND ANALYSIS OF UNIVARIATE AND SEMI-MULTIVARIATE TIME SERIES SYSTEMS

James G. Stevens-Major, United States Army
B.S., United States Military Academy, 1977
M.S., Naval Postgraduate School, 1987
Doctor of Philosophy in Operations Research-September 1991
Advisor: Peter A.W. Lewis-Department of Operations Research

This dissertation investigates the use of multivariate adaptive regression splines (MARS), due to Friedman, for nonlinear regression modeling and analysis of time series systems. MARS can be conceptualized as a generalization of recursive partitioning that uses spline fitting in lieu of other simple fitting functions. MARS is a computationally intensive methodology that fits a nonparametric regression model in the form of an expansion in product spline basis functions of predictor variables chosen during a forward and backward recursive partitioning strategy. The MARS algorithm produces continuous nonlinear regression models for high dimensional data using a combination of predictor variable interactions and partitions of the predictor variable space. By letting the predictor variables in the MARS algorithm be lagged values of a time series system, one obtains a univariate (ASTAR) or semi-multivariate (SMASTAR) adaptive spline threshold autoregressive model for non-linear autoregressive threshold modeling and analysis of time series, thereby extending the threshold autoregression (TAR) time series methodology developed by Tong. The models seem well suited for taking into account the complex interactions among multivariate, cross-correlated, lagged predictor variables of a time series system. A significant feature of this time series application of MARS is its ability to produce models with limit cycles when modeling time series data that exhibit periodic behavior. In a physical context, limit cycles represent a stationary state of sustained oscillations. A difficulty faced during regression modeling is the problem of model selection, i.e., choosing the appropriate model dimension and model predictor variables. Currently, a modified form of generalized cross validation (GCV^*), first suggested by Craven and Wahba, is used for model selection within the MARS algorithm. However, one question that immediately develops is whether GCV^* is the 'best' criterion for model selection when using serially and cross-correlated time series data. Using MSE as a measure of performance, simulations show that other model selection criteria, in particular the Schwarz-Rissanen (SC) criterion, can improve model selection over GCV^*.

AERONAUTICAL ENGINEER

OSCILLATING-FLOW WIND TUNNEL STUDIES FOR A CIRCULATION CONTROL CIRCULAR CYLINDER

George P. Christopoulos-Lieutenant, Hellenic Navy
B.S., Hellinic Naval Academy, 1982
M.S., Naval Postgraduate School, 1990
Master of Aeronautical Engineering-March 1991
Advisors: Louis V. Schmidt & Richard M. Howard-Department of Aeronautics & Astronautics

A two-dimensional circulation control (4.25-inch diameter by 24-inch span) model was designed for installation in the Naval Postgraduate School oscillating flow, low speed wind tunnel. An adjustable, tangential blowing slot was included in the design to provide a circulation control capability using the Coanda flow effect aft of the spanwise slot. Orifice locations were defined for obtaining surface static pressures which could be subsequently processed to yield section lift and drag coefficients. While the model was being fabricated, pressure system calibrations were made to determine the dynamic transfer function from a simulation of the model's static pressure orifice when connected to the pressure transducer. Similar transfer functions were determined for a static pressure probe. The existing data acquisition system was used to process the sampled digital data sequence. Clear-tunnel flow calibrations were performed in the (2-foot by 2-foot by 18.6- foot long) test section at a mid-length test station using a hot-wire and the calibrated static pressure probe. An oscillating velocity was superimposed upon a mean free stream motion using an existing rotating mechanism of four synchronized shutter at the end of the test section. Analytic estimates of both static pressure and velocity perturbations correlated well with experimental results for a frequency range of 14 to 40 Hz with a fixed value of shutter blockage. A surprising result confirmed by these tests was that, although the amplitude of the velocity perturbation wave remained relatively constant at 5 percent of the mean free stream velocity, the amplitude of the static pressure wave showed a periodic dependence upon the frequency of the harmonic blockage source.

PRELIMINARY INVESTIGATION OF THE SHOCK-BOUNDARY LAYER INTERACTION IN A SIMULATED FAN PASSAGE

Christopher Clay Collins-Lieutenant, United States Navy
B.S.E.E., United States Naval Academy, 1984
Aeronautical Engineer-March 1991
Advisor: R.P. Shreeve-Department of Aeronautical Engineering

A two-dimensional, two-passage simulation of the relative flow through a transonic fan at $M = 1.4$ was designed with a view to providing an apparatus in which to assess the effectiveness of passive vortex generator techniques in alleviating shock-boundary layer interaction effects. The design of the model and the results of six tests in the transonic cascade blowdown wind tunnel are described. Schlieren photographs of the shock structure were obtained at back pressures lower than the design value. The back-pressure control valve was identified as being critical to completing the experimental simulation. The flow through the cascade geometry was computed at design pressure ratio using an Euler code. Modifications to the grid are recommended before thin-layer Navier-Stokes calculations are performed.

FLOW VISUALIZATION AND WAKE ANALYSIS FOR STANDARD AND MODIFIED CONFIGURATIONS OF THE AN/ALQ-78 ANTENNA POD

James F. Small-Lieutenant, United States Navy
B.S., United States Naval Academy, 1978
M.S., Naval Postgraduate School, 1990
Master of Aeronautical Engineering-March 1991
Advisors: S.K. Hebbar & M. F. Platzer-Department of Aeronautics & Astronautics

A low-speed wind tunnel investigation was conducted to compare the aerodynamic flow field characteristics for standard and modified configurations of a 20 percent scale model of the AN/ALQ-78 electronic support measures system antenna pod. The modification consisted of replacing the standard quasi-conically shaped radome with a cylindrical radome and adapter collar. The research was requested by the Naval Air Systems Command (NAVAIRSYSCOM) as part of a risk and feasibility assessment in preparation for possible full-scale flight tests of the modified configuration. Wake flow visualization was conducted to determine the general characteristics of the flow field. Base pressure measurements were made to assess three-dimensional effects. The presence of coherent vortex shedding in the wake was investigated using a cross-probe constant temperature hot-film anemometer and spectrum analyzer. The Reynolds number varied from 4x104 to 6x 105 with the upper value approximately equal to one-eighth that of the full- scale pod in flight. Asymmetric vortex shedding was visualized in the wakes of both configurations at subcritical Reynolds numbers. The modified configuration exhibited a pronounced region of quasi-two-dimensional flow during wake visualization and base pressure tests, indicating a significant increase in the aerodynamic forces acting on the pod stucture. Spectral analysis of the hot-film output confirmed the presence of coherent vortex shedding in the wakes of both models at subcritical Reynolds numbers.

A WING ROCK MODEL FOR THE F-14A AIRCRAFT

Steven Roland Wright, Lieutenant, United States Navy
B.S., United States Naval Academy, 1984
M.S., Naval Postgraduate School, 1990
Aeronautical Engineer-March 1991
Advisor: Louis V. Schmidt-Department of Aeronautical & Astronautical Engineering

An investigation of inertial coupling and its contribution to wing rock in the F-14A aircraft has been conducted. Wind tunnel data was used to obtain the stability parameters for angles of attack from zero to 25 degrees, after which linear and nonlinear analyses of the equations of motion were completed. The linearized analysis of the uncoupled longitudinal and lateral-directional equations was included to provide a baseline for comparison with the fully coupled, nonlinear equations. In both cases, the equations of motion were solved numerically and time history traces produced to illustrate aircraft response. Results indicate that a stable short period mode can feed damping energy into an unstable dutch roll mode via the coupling of the equations to produce a stable limit cycle very similar to those experienced in the aircraft. Numerous suggestions for follow on research are presented.

ELECTRICAL ENGINEER

DATA COMPRESSION USING ARTIFICIAL NEURAL NETWORKS

Bruce E. Watkins-Lieutenant, United States Navy
B.S., University of California, Santa Barbara, 1984
Electrical Engineer-September 1991
Advisor: Murali Tummala-Department of Electrical and Computer Engineering

This thesis investigates the application of artificial neural networks for the compression of image data. An algorithm is developed using the competitive learning paradigm which takes advantage of the parallel processing and classification capability of neural networks to produce an efficient implementation of vector quantization. Multi-Stage, tree searched, and classification vector quantization codebook design techniques are adapted to the neural network design to reduce the computational cost and hardware requirements. The results show that the new algorithm provides a substantial reduction in computational costs and an improvement in performance.

MECHANICAL ENGINEER

ENHANCEMENT OF BOILING HEAT TRANSFER IN DI-ELECTRIC FLUIDS

Robert A. Egger-Lieutenant, United States Navy
B.E. Mechanical Engineering, Cleveland State University, 1985
Mechanical Engineer-September 1991
Advisor: Matthew D. Kelleher-Department of Mechanical Engineering

Direct application of two-phase heat transfer in the liquid cooling of electronic components in fluorinated hydrocarbons (FC-72), is severely inhibited by the excessive amount of superheat required to initiate nucleate boiling. To conduct an experimental study of nucleate pool boiling of FC-72, an experimental test chamber was constructed. This chamber utilized five horizontal platinum wires of 0.05 mm diameter spaced 2.0 cm vertically from each other. The lowest wire was progressively heated from the natural convection region through nucleate boiling, and a study was made on the effects of the boiling wake plume on the heat transfer rate of the upper wires.

EFFECTS OF CENTRIFUGAL INSTABILITIES ON LAMINAR/TURBULENT TRANSITION IN CURVED CHANNELS WITH 40 TO 1 ASPECT RATIOS

Michael R. Kendall-Lieutenant, United States Navy
B.S., University of the State of New York, 1985
Mechanical Engineer-June 1991
Advisor: Phillip M. Ligrani-Department of Mechanical Engineering

Dean vortices in curved channels with 40 to 1 aspect ratios were measured and studied over the range of Dean numbers from 50 to 450. At low Dean numbers (<50) the flow is fully laminar. At higher Dean numbers, the development of vortex pairs as the primary instability was a function of Dean number and the angle of curvature. Higher Dean numbers required less curvature to produce the vortices. At Dean numbers from 75 to 200, secondary instabilities developed in the form of vortex pair undulations, vortex pair twisting, and in the form of events where vortex pairs appear and disappear. These secondary instabilities are also a function of Dean number and curvature. Twisting leads to increases in longitudinal fluctuating intensities, particularly in the upwash region from the concave wall, which are especially significant at Dean numbers above 150. Fluctuation increases eventually lead to fully turbulent conditions and depend on location in the spanwise/radial plane relative to a vortex pair structure, where upwash regions from the concave wall are the most unstable. Fully turbulent flow develops at Dean numbers greater than about 400.

NUMERICAL EXPERIMENTS IN UNSTEADY FLOWS THROUGH THE USE OF FULL NAVIER-STOKES EQUATIONS

Christopher J. Putzig-Lieutenant, United States Navy
B.S., University of Idaho, 1983
Mechanical Engineer-June 1991
Master of Science in Mechanical Engineering-June 1991
Advisor: Turgut Sarpkaya-Department of Mechanical Engineering

The numerical simulations of impulsively started flow, non-impulsively started flow, sinusoidally-oscillating flow, and, finally, co-existing flow (with mean and oscillatory components) past a circular cylinder have been investigated in great detail through the use of several compact schemes with the Navier-Stokes vorticity/stream function formulation for various Reynolds numbers, frequency parameters,, and ambient flow/oscillating flow combinations using VAX-3520 and NASA's Supercomputers. Extensive sensitivity analysis has been performed to delineate the effects of time step, outer boundary nodal points on the cylinder, and the use of higher order polynomials in the calculation of the gradient of wall vorticity. The results have been compared with those obtained by others, whenever available, and with those obtained experimentally. In many cases the predicted wake region, vorticity and pressure distributions, and the time-variation of the force coefficients have shown excellent agreement with those obtained experimentally.

MASTER OF SCIENCE
IN
AERONAUTICAL ENGINEERING

STABILITY AND CONTROL FLIGHT TESTING OF A HALF-SCALE PIONEER REMOTELY PILOTED VEHICLE

Kent R. Aitcheson-Lieutenant, United States Navy
B.A., Whitworth College, 1976
Master of Science in Aeronautical Engineering-September 1991
Advisor: Richard M. Howard-Department of Aeronautics and Astronautics

Stability and control flight testing was conducted on a half-scale Pioneer remotely piloted vehicle. The aircraft was instrumented with sensors to measure flight control deflections, angle of attack, side slip angle, and airspeed. A developmental telemetry transmitter was installed to send the information to a ground based receiver where it was recorded for computer processing. Flight tests were conducted to characterize longitudinal static stability by varying the center of gravity to determine the neutral point. Directional static stability was characterized using steady heading side slip flight tests. The telemetry system's performance was acceptable and the directional stability data correlated favorably with data gathered from wind tunnel testing and computational methods. Longitudinal stability was more difficult to characterize due to limitations of elevator deflection resolution and the amount of data gathered. Additional flight testing will be conducted to tune the telemetry system with the data collection sensors, and to increase the Pioneer static stability data base.

ESCAPE STRATEGIES FOR TURBOPROP AIRCRAFT IN MICROBURST WINDSHEAR

Richard B. Bobbitt-Lieutenant Commander, United States Navy
B.S., University of South Florida, 1978
Master of Science in Aeronautical Engineering-March 1991
Advisor: Richard M. Howard-Department of Aeronautics & Astronautics

A quantitative analysis was carried out on the performance of turboprop aircraft within a microburst windshear. The objective of the analysis was to provide specific flight procedures for optimal navigation through the windshear. The microburst windshear model used in the analysis embodied the severe characteristics of the microburst encountered by Delta Flight 191 during an approach to landing at Dallas/Ft. Worth, 2 August, 1985. Different escape strategies were tested using the flight performance characteristics of the U.S. Navy's P-3 "Orion" and T-44 " Pegasus" aircraft. The three flight phases investigated were approach to landing, takeoff, and the low altitude ASW mission. Results from the analysis were coupled with the pilot's view-point from which conclusions were drawn. The results of the analysis support a constant-pitch angle escape procedure. The same procedural steps can be used for both aircraft in any configuration or situation with the difference being the degree of pitch to employ. The conclusions are in a format for integrating specific microburst escape procedures within the NATOPS programs for the P-3 and T-44 aircraft.

A WIND TUNNEL STUDY OF THE PIONEER REMOTELY PILOTED VEHICLE

Robert M. Bray-Captain, United States Marine Corps
B.S.E., Purdue University, 1982
Master of Science in Aeronautical Engineering-June 1991
Advisor: Richard M. Howard-Department of Aeronautics & Astronautics

Remotely Piloted Vehicles (RPVs) performed impressively well in the recent Gulf War. The Pioneer RPV has been fielded as the ground-launched, short-range RPV for the Marine Corps and as a RATO-launched, short-range RPV operating off of the Navy's battleships. A realistic flight simulation of the Pioneer RPV for training system operators was desired. A 0.4-scale model of the Pioneer RPV was tested in the Wichita State University 7 by 10 foot wind tunnel to acquire its aerodynamic coefficients. A collateral benefit was the calculation of the Pioneer RPV's flight performance. Graphs and tables of the stability and control derivatives necessary for a six-degree-of-freedom simulation are included in this thesis. Additionally, performance predictions were calculated using these newly acquired aerodynamic data and engine test data from the Naval Air Propulsion Center. Preliminary comparisons indicate good correlation between the wind tunnel based performance predictions and actual flight data.

HUMAN POWERED HELICOPTER: A PROGRAM FOR DESIGN AND CONSTRUCTION

Scott Alan Bruce-Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1979
Master of Science in Aeronautical Engineering-June 1991
Advisor: E. Robert Wood-Department of Aeronautics & Astronautics

The various aspects of helicopter design and human-powered aircraft design were studied to present a program to build a human-powered helicopter (HPH) at the Naval Postgraduate School (NPS). The HPH will be designed to meet the requirements for the AHS-Sikorsky Award. The helicopter design is refined, and the feasibility of construction is assessed. In addition to pursuing a significant historical achievement, the program seeks to enchance the helicopter and composite programs of the Aeronautical Engineering curriculum at the NPS. Benefits to NPS in terms of research topics and a research aircraft are presented. Potential future uses for ultra-low-powered aircraft technology are also outlined.

STRUCTURAL CONSIDERATIONS FOR AIRCRAFT PAYLOAD MODIFICATION- P-3C ZERO FUEL WEIGHT INCREASE

Steven D. Culpepper-Lieutenant, United States Navy
B.S., United States Naval Academy, 1983
Master in Aeronautical Engineering-March 1991
Advisor: Edward M. Wu-Department of Aeronautics & Astronautics

The Navy is considering the feasibility of increasing the patrol aircraft P-3 zero fuel weight enabling avionics and payload growth. This analysis examines the consequences to the structural requirements of the center section wing box. Two solutions to the structures field equations are investigated: a simplified hand solution for preliminary feasibility calculations and a more precise solution for preliminary feasibility calculations and a more precise solution for design analysis. Together, the solutions provide a necessary check for the results. The simplified solution employs the Euler-Bernoulli assumption which generates a set of integrals expressed in terms of the assumed displacements. These integrals, when combined with simplified geometric shapes and symmetry, ultimately produce a decoupled matrix solution. The precise solution uses a PC based finite element method which simultaneously solves the field equations for basic elements to be linked together with the appropriate boundary conditions. For the current 135,000 pound gross weight lg load condition, the internal stresses calculated by finite element are in accord with those by simplified hand calculation. Extension from this modeling will generate design criterion for the target 95,000 pound zero fuel weight aircraft as well as alternate flight or taxi conditions.

DESIGN AND TESTING OF A CASELESS SOLID-FUEL INTEGRAL-ROCKET RAMJET ENGINE FOR USE IN SMALL TACTICAL MISSILES

Keith J. Fruge-Captain, United States Army
B.S., United States Military Academy, 1981
Master of Science in Aeronautical Engineering-September 1991
Advisor David W. Netzer-Department of Aeronautics and Astronautics

An investigation was conducted to determine the feasibility of a low-cost, caseless, solid-fuel integral-rocket ramjet (IRSFRJ) that has no ejecta. Analytical design of a ramjet powered air-to-ground missile capable of being fired from a remotely piloted vehicle or helicopter was accomplished using current JANNAF and Air Force computer codes. The results showed that an IRSFRJ powered missile can exceed the velocity and range of current systems by more than a two to one ratio, without an increase in missile length and weight. A caseless IRSFRJ with a non-ejecting port cover was designed and tested. The experimental results of the static tests showed that a low-cost, caseless IRSFRJ with a non-ejecting port cover is a viable design. Rocket-ramjet transition was demonstrated and ramjet ignition was found to be insensitive to the booster tail-off to air-injection timing sequence.

STORE SEPARATION METHODOLOGY ANALYSIS

Darcy Michael Hansen
B.S., Arizona State University, 1983
Master of Science in Aeronautical Engineering-September 1991
Advisors: Oscar Biblarz & Louis Schmidt
Department of Aeronautical and Astronautical Engineering

Various computational methods and operational computer codes used to predict the aerodynamic coefficients and separation trajectories of aircraft stores are reviewed. The semi-empirical aeroprediction code Missile DATCOM is used to obtain the coefficients of the modeled store. These coefficients, together with the modeled ejection forces, are used in free-stream state-space equations of motion to predict the store trajectory. The results are compared with the NEAR store separation code which provides accurate trajectory profiles, for speeds below the subsonic Mach critical speed, by use of a vortex-lattice and panel method. Modification of the Missile DATCOM aerodynamic coefficients provides single-point state-space prediction of the store pitch trajectory to within 30% of the NEAR code values. Store trajectories were restricted to the first 0.2 seconds of free-flight.

STUDIES IN CHAOS USING STOCHASTIC METHODS

Edward A. Healy, Jr.-Captain, United States Army
B.S., United States Military Academy, 1981
Master of Science in Aeronautical Engineering-June 1991
Advisor: Ramesh Kolar-Department of Aeronautics and Astronautics

Methods of chaos have been used to classify many heretofore inexplicable nonlinear dynamical systems in fields as diverse as ecology to engineering and economics to meteorology. This thesis presents the mathematical background needed to understand chaos as well as the engineering techniques used to study the nature of dynamical systems. Several dynamical systems are studied using two probabilistic measures of chaos, fractal correlation dimension and the multivariate scaling analysis. A new technique for developing a multivariate scaling analysis using a time embedding procedure is presented. The dynamical systems studied include the Lorenz equations, Duffing's equation and helicopter flight vibrations.

COMPOSITE STRENGTH STATISTICS FROM FIBER STRENGTH STATISTICS

Eric P. Johnson-Lieutenant Commander, United States Navy
B.S.M.E., University of Kansas, 1978
Master of Science in Aeronautical Engineering-June 1991
Advisor: Edward M. Wu-Department of Aeronautics & Astronautics

Utilization of composites in critical design applications requires an extensive engineering experience data base which is generally lacking, especially for rapidly developing constituent fibers. As a supplement, an accurate reliability theory can be applied in design. This investigation is a part of a research effort to develop a probabilistic model of composite reliability capable of using data produced in small laboratory test samples to predict the behavior of large structures with respect to their actual dimensions. This work included testing of composite strength which was then used in exploring the methodology of predicting composite reliability from the parent single filament fiber strength statistics. This required testing of a coordinated set of test samples which consisted of a composite and its parent fibers. Previously collected fiber strength statistics from two different production spools were used in conjunction with the current effort. This investigation established that, for a well made composite, the Local Load Sharing Model of reliability prediction exhibited outstanding correlation with experimental data and was sufficiently sensitive to predict deficient composite strength due to a specific fiber spool with an abnormally weak lower tail. In addition, it provided an upper bound on the composite reliability. This investigation is unique in that it used a coordinated set of data with an unambiguous genesis of parent fiber and subsequent composite. The findings of this investigation are also definitive in that six orders of extrapolation of size in reliability prediction has been verified.

MULTIPLE-WAVELENGTH TRANSMISSION MEASUREMENTS IN ROCKET MOTOR PLUMES

Hong-on Kim-Major, Korean Air Force
B.S., Korean Air Force Academy, 1981
Master of Science in Aeronautical Engineering-September 1991
Advisor: David W. Netzer-Department of Aeronautical and Astronautical Engineering

Multiple-wavelength light transmission measurements were used to measure the mean particle size (d_{32}), index of refraction (m) and standard deviation (σ) of the small particles in the edge of the plume of a small solid propellant rocket motor. The results have shown that the multiple-wavelength light transmission measurement technique can be used to obtain these variables. The technique was shown to be more sensitive to changes in d_{32} and standard deviation (σ) than to m. A GAP/AP/4.7% aluminum propellant burned at 25 atm produced particles with $d_{32}=0.150\pm0.006\ \mu$, $\sigma=1.50\pm0.04$ and $m\approx1.63\pm0.13$. The good correlation of the data indicated that only submicron particles were present in the edge of the plume.

FLIGHT OPERATIONS FOR HIGHER HARMONIC CONTROL RESEARCH

James Joseph McGovern-Lieutenant, United States Navy
B.S., United States Naval Academy, 1983
Master of Science in Aeronautical Engineering-March 1991
Advisor: E. Roberts Wood-Department of Aeronautics & Astronautics

The Department of Aeronautics and Astronautics at the Naval Postgraduate School (NPS) is interested in extending the useful life of Naval helicopters. Recognizing the need to reduce vibrations caused by aerodynamic loads on the rotor system, a Higher Harmonic Control (HHC) research effort has begun. The test vehicle of the HHC system is a Remotely Piloted Helicopter (RPH). This thesis contains an overview of the NPS HHC research effort including basic helicopter dynamics, HHC theory, and establishes research milestones. An RPH flight operations program was developed that included the first flights of two out of three RPH's being used in the research effort, identification of data and data acquisition requirements, and initial hover vibration tests. The vibration tests produced data of limited value. The two bladed RPH tested appears to produce peak accelerations at roughly twice the main rotor speed. This indicates that like a full scale helicopter, the largest vibrations do enter the airframe through the rotor system and are not a result of engine vibrations. Hence, RPH's are suitable for HHC research. This effort completed one portion of the long term HHC research and can lead to the practical and safe testing of a fully functioning HHC system.

AN AERONAUTICAL ENGINEERING USER'S MANUAL TO THE HP-28S HANDHELD CALCULATOR

Harry F. Molyneux-Lieutenant Commander, United States Navy
B.S., Purdue University, 1980
Master of Science in Aeronautical Engineering-March 1991
Advisor: Oscar Biblarz-Department of Aeronautics

Handheld calculators are now powerful enough to have become indispensible tools for the engineer and scientist. With enhanced equation solving capability and extensive user memory, the HP-28S introduces exciting new possibilities. The entire set of tables for one-dimensional gas dynamics can be accessed with unequalled accuracy and speed. But this enhanced power cannot be properly tapped without a preplanned user directory organization which takes advantage of the HP-28S internal structure. Experience has shown that many students buy expensive programmable calculators but underuse them, finding their powerfulness baffling and frustrating. They employ the same computational techniques with sophisticated $200 continuous-memory programmable machines as could be accomplished with a simple $20 scientific calculator. This manual contains a compendium of useful formulae, programming, and computational techniques for the popular HP-28S Pocket Calculator. In addition to helpful instructions on units conversion, directory organization, and problem-solving methodology which will benefit any HP-28S user, the Aeronautical Engineering student will find sections on Thermodynamics, Aerodynamics, and Controls which will prove useful in those fields of study.

SIMULATION OF A ROTORCRAFT IN TURBULENT FLOWS

Robert D. Moran, Jr.-Captain, United States Marine Corps
B.M.E., Villanova University, 1979
Master of Science in Aeronautical Engineering-September 1991
Advisor: James V. Healey-Department of Aeronautics and Astronautics

Accurate simulation of helicopters in an at-sea-shipboard environment is desired to provide realistic operating envelopes without incurring the enormous cost of real-time flight tests. This study examines the simulation of rotorcraft in turbulent flow by looking at previous attempts at helicopter-ship interfacing, current efforts in this area, and what will be needed in the future. Part of this study is devoted to the construction of an analytic model of the "tunnel strike" problem of the CH-46 Sea Knight helicopter that is based on measurements made over the flight deck of a model ship. A computer model was constructed, with the aim of modeling the "tunnel strike" during engagement aboard AOR type ships. The remainder of the study is concerned with the simulation of the motion of a helicopter in the turbulent wake of a DD-963 class ship. Results show that a sixth order transfer function can filter white noise to accurately model the turbulence spectra at specific points along a helicopter glide path in the wake. While a tunnel strike could not be successfully modeled using DYSCO software, a simple blade-element program was developed to show the aerodynamic forces on the rotor blades in a specific flow field over an AOR class ship flight deck. That program shows the location and magnitude of the aerodynamic forces contributing to the flapping of the rotor blades, which results in the rotor blades impacting the fuselage.

A USER'S MANUAL FOR THE NAVAL POSTGRADUATE SCHOOL AIRCRAFT SYNTHESIS PROGRAM

John T. Parker-Lieutenant, United States Navy
B.S., University of Maryland, 1984
Master of Science in Aeronautical Engineering-September 1991
Advisor: Conrad F. Newberry-Department of Aeronautics

A menu-driven computer program has been developed to serve as a users interface with ACSYNT, the NASA-AMES program for aircraft synthesis. The interface program, CREATE, drastically reduces the amount of time required to learn how to use ACSYNT, thus allowing the power of ACSYNT to be used more effectively by the Aircraft Design curriculum at the Naval Postgraduate School. CREATE has been developed to reduce the required number of inputs to ACSYNT and is ideal for use with the early phases of the Aeronautical Engineering Curriculum. It can provide a rapid feedback when examining the effects that different aircraft parameters have on the overall aircraft performance, thus enhancing the students understanding of the relationships between the numerous variables of aircraft studies. Included in the thesis are four examples that demonstrate some of the capabilities of ACSYNT and the use of CREATE.

A CONTINUING STUDY OF ALTITUDE DETERMINATION DEFICIENCIES OF THE SERVICE AIRCRAFT INSTRUMENTATION PACKAGE (SAIP)

Robert J. Russell-Lieutenant, United States Naval Reserve
B.S., Oregon State University, 1980
Master of Science in Aeronautical Engineering-September 1991
Advisor: Oscar Biblarz-Department of Aeronautical Engineering

After correcting test equipment used in a previous study of the SAIP for ambiguous grounding requirement, research was continued on aerodynamic factors affecting SAIP altitude measurement. Existing equations for incompressible flow over a cylinder and a sphere were used to model the static-pressure probe located on the front of the SAIP pod and an algorithm was derived for the computation of the pressure coefficient, C_p. Our low-speed wind tunnel data show an overpressure at the static pressure ports when the angle of attack (ϕ) is less than 14°. The five-inch diameter body of the SAIP, located aft of the static pressure probe, is responsible for creating a stagnation-like region at the front of the SAIP probe which envelops the static-port location. Calculation of the altitude error (Δ Z) using the model for C_p, corrected for compressibility, is within $\pm 15\%$ of the error observed in flight at Mach 0.60. Improvements in the compressibility correction as well as analyses using an aero-panel method are suggested before sufficiently reliable fixes to the SAIP can be proposed.

DEVELOPMENT OF A 1/7-SCALE F/A-18 UAV FOR SUPERMANEUVERABILITY RESEARCH

Michael S. Shelton-Lieutenant Commander, United States Navy
B. of AE., Auburn University, 1977
Master of Science in Aeronautical Engineering-September 1991
Advisor: Richard M. Howard-Department of Aeronautics and Astronautics

A 1/7-scale F/A-18 Hornet UAV was constructed for use in generic fighter high-angle-of-attack research. The aircraft, purchased as a kit, has been extensively modified to incorporate rudders and trailing edge flaps. In addition, an emergency parachute recovery system (EPRS) was installed for use in the event of departure from controlled flight, loss of radio signal, structural failure or any other anomaly that would preclude a normal landing recovery. Parachute performance data and design considerations are discussed. Aerodynamic and dynamic data have been determined, such as cg, moments of inertia, full and empty weights, surface areas, aspect ratio and wing loading. Preliminary performance estimations have been determined and the aircraft has been flown. Future research to include the employment of non-conventional yaw control methods using forebody strakes and possible pneumatic blowing is discussed. The need to pursue cooperative thesis research in the investigation of a Digital Flight Control System (DFCS), utilizing fly-by-wire active flight controls, is discussed. This UAV generic fighter program is planned as a multi-thesis student project, and this thesis documents the research and work of the second student involved with the project.

DYNAMIC MODELING AND MODAL ANALYSIS OF AN AIR-TO-AIR MISSILE

Michael Allen Shutty
B.S., Pennsylvania State University, 1983
Master of Science in Aeronautical Engineering-September 1991
Advisor: Edward M. Wu-Department of Aeronautics and Astronautics

The P-3 Orion patrol airplane has a need for an air-to-air missile system for defense against enemy aircraft on its long-range missions. In response to this need, the Naval Air Test Center was tasked in 1989 to conduct a P-3/AIM-9 (Sidewinder) integration program. In support of this program, a vibration test stand was established at NPS, and a ground vibration characterization was conducted to determine if a potential flutter problem existed. This test resulted in the development of a two degree-of-freedom lumped-mass model and experimental determination of the missile's resonance modes in pitch. With the recent termination of the P-7A, the P-3 community is now looking at the Orion II program to carry it into the 21st century. The Orion II will most likely have a beefed-up wing structure, necessitating an analysis of this wing in conjunction with the AIM-9 missile. This investigation responds to that requirement by concurrently developing a mathematical model of the AIM-9 missile using finite element methods to analytically determine its modal parameters, and setting up a modal test system to quantify the parameters of this model by experimentally determining the missile's natural frequencies, mode shapes and transient response. This fully instrumented test system and associated methodologies could then be the basis for conducting a comprehensive modal test of the AIM-9 missile system, as well as to quantify the vibration characteristics of other candidate missile systems for the P-3 and its eventual successor.

DEVELOPMENT AND TESTING OF AN UNMANNED AIR VEHICLE TELEMETRY SYSTEM

Kevin T. Wilhelm-Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1982
Master of Science in Aeronautical Engineering-September 1991
Advisor: *Richard M. Howard-Department of Aeronautics and Astronautics*

Unmanned Air Vehicles (UAVs) provide a low-cost, low-maintenance, and effective platform upon which experimentation can be performed to validate conceptual aerodynamic ideas. However, the UAV flight test data acquisition process is complex and requires a reliable recording system for post-flight data analysis. The thrust of this thesis was the development, construction, and validation of a viable telemetry system for data gathering and processing. Major areas of focus were: integration of the telemetry into a 1/8-scale model, radio-controlled F-16A airplane; telemetry circuitry optimization; recording and display of instrumented parameters; and data reduction techniques necessary to obtain useful information. A test flight was flown and data were gathered using a steady-heading side-slip maneuver to demonstrate successful integration of all supporting elements.

MASTER OF SCIENCE
IN
ASTRONAUTICAL ENGINEERING

MODIFICATION AND EXPERIMENTAL VALIDATION OF A COMBINED OPTICAL AND COLLECTION PROBE FOR SOLID PROPELLANT EXHAUST ANALYSIS

Lyle J. Kellman-Captain, United States Army
B.S., United States Military Academy, 1982
Master of Science in Astronautical Engineering-March 1991
Advisor: David W. Netzer-Department of Aeronautics & Astronautics

A combined optical and collection particle sizing probe was further developed and utilized for in situ measurements in the exhaust plumes of solid propellant rocket motors. Probe shock-swallowing capabilities were verified using schlieren observations under restricted motor operating conditions. Particle size number distributions obtained optically using a Malvern Mastersizer and from an automated data retrieval system for scanning electron microscope photographs of collected particles were in good agreement when referenced to common measurement limits. Most of the particles were smaller than 0.5μ, but a significant number were present with diameters to 10μ. A very few particles larger than 15μ were also present, some as single particles and some as agglomerates. SEM results showed that many particles were smaller than 0.2μ outside the measurement range of the Malvern instrument. Suggestions are made for futher improvements and validation procedures for the probe.

PREDICTION OF ATTITUDE STABILITY OF ASYMMETRIC DUAL-SPIN STABILIZED SPACECRAFT USING IMPROVED LIQUID SLOSH MODEL

Michael J. Szostak-Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1979
Master of Science in Astronautical Engineering-June 1991
Advisor: Brij N. Agrawal-Department of Aeronautics & Astronautics

The "rigid slug" method for modelling sloshing liquid fuel aboard dual-spin stabilized spacecraft has been shown to be inadequate by recent flight data. This "rigid slug" model and a uniform gravity model put forth by Abramson is examined in detail. The Abramson model is incorporated into a computer simulation written specifically to predict spacecraft attitude. An analysis is performed with both the modified and unmodified versions of this simulation to determine the boundaries of stability for rotor and platform asymmetries. The results show that the improved model is better able to predict spacecraft attitude stability.

THE ATTITUDE CONTROL OF FLEXIBLE SPACECRAFT

Richard Joseph Watkins Jr.-Lieutenant, United States Navy
B.S. ChE., Auburn University, 1983
Master of Science in Astronautical Engineering-June 1991
Advisor: Brij N. Agrawal-Department of Aeronautics & Astronautics

This thesis details the design of the Naval Postgraduate School's Flexible Spacecraft Simulator and the first attempts at simulation and control of the model. The effect of flexible structures on the attitude control of spacecraft has a topic of research for many years. Only recently has the technology to actually test models and theory on the ground been available. At the Naval Postgraduate School, an experimental testbed for research into this area has been constructed. This facility has a model of a satellite with a flexible arm floating on air pads to eliminate the effects of friction. A mathematical model of the system has been constructed and simulations of various maneuvers have been run, utilizing proportional-derivative (PD) control as well as a Linear-Quadratic-Gaussian (LQG) compensator. Results show that both PD and DQG work well for station keeping, but that the LQG compensator is better for slewing the arm.

MASTER OF SCIENCE
IN
APPLIED MATHEMATICS

FRACTALS AND CHAOS

Philip Frederick Beaver-Captain, United States Army
B.S., United States Military Academy, 1983
Master of Science in Applied Mathematics-June 1991
Advisor: Maurice D. Weir-Department of Mathematics

The study of fractal geometry and chaotic dynamical systems has received considerable attention in the past decade. Motivated by the interesting computer graphics produced by these fields, mathematicians have attempted to formalize the theoretical structure of the results, physicists have attempted to apply the theory to real world phenomena, and laymen have enjoyed much of the popular literature and television programs that the field has fostered. Unfortunately, the mathematics associated with these subjects has made them inaccessible to most undergraduates, even if they have a strong background in mathematics This thesis presents the basic ideas of fractal geometry and chaotic dynamical systems in a setting that can be understood by undergraduate students who have had a course in advanced calculus. We hope it will allow them to gain an appreciation of the fields and motivate them to pursue further study.

THE SHORTEST PATH PROBLEM IN THE PLANE WITH OBSTACLES: BOUNDS ON PATH LENGTHS AND SHORTEST PATHS WITHIN HOMOTOPY CLASSES

Andre M. Cuerington-Captain, United States Army
B.S., United States Military Academy, 1984
Master of Science in Applied Mathematics-June 1991
Advisor: John R. Thornton-Department of Mathematics

The problem of finding the shortest path between two points in the plane containing obstacles is considered. The set of such paths is uncountably infinite, making an exhaustive search impossible. This difficulty is overcome by reducing the size of the search space. The search is first restricted to a countably infinite set by focusing attention on the set of homotopy classes. By applying simple optimality principles, we obtain a finite list of such classes whose union contains the shortest path. This process of simplification is discussed in the thesis of CAPT Kevin D. Jenkins, U.S. Marine Corps. In this thesis we first discuss a computational investigation of two methods by which homotopy classes can be named. Next, a computational heuristic is presented that finds the lower bound for a path in a class. Finally, the true shortest path is found by searching these classes in order of increasing lower bound. One application of this study is in the area of robotic path planning.

COMPARING COMBAT MODELS USING ANALYTICAL SURROGATES

John Ross Green, Captain, United States Army
B.S., Siena College, 1981
Master of Science in Applied Mathematics-June 1991
Master of Science in Operations Research-June 1991
Advisor: Donald R. Barr-Department of Mathematics

The widespread availability of inexpensive high-speed computers has led to the development of complex, detailed, technical models of combat. These high resolution computer simulations and wargames are touted by their proponents as low-cost alternatives to extensive, high-cost field training exercises for the training of combat, and thus as useful training tools is unproven. direct comparison of simulations with field training exercises is often frustrated by the inherent complexities in each, and the shortage of quality data from field exercises. This thesis examines the feasibility of comparing these systems indirectly through the use of surrogate analytical models. A simple discrete time stochastic surrogate model is examined. Techniques for using the surrogate model to compare battle data are studied using simulated data from a simple combat model. Areas for further research are discussed.

THE SHORTEST PATH PROBLEM IN THE PLANE WITH OBSTACLES: A GRAPH MODELING APPROACH TO PRODUCING FINITE SEARCH LISTS OF HOMOTOPY CLASSES

Kevin Dean Jenkins-Captain, United States Marine Corps
B.S., Virginia Military Institute, 1985
Master of Science in Applied Mathematics-June 1991
Advisor: John R. Thornton-Department of Mathematics

The problem of finding the shortest path between two points in a plane containing obstacles is considered. The set of such paths is uncountably infinite, making an exhaustive search impossible. This difficulty is overcome by reducing the size of the search space. The search is first restricted to a countably infinite set by focusing attention on the set of homotopy classes. By applying simple optimality principles, a finite list of such classes is obtained whose union contains the shortest path. This process of simplification is accomplished by modeling the topology of the region with a graph. Optimality principles come into play during a graph traversal which is used to produce the finite search list. In addition, a computational investigation of two methods by which homotopy classes can be named is discussed, and properties of the graph models are investigated. The thesis of Captain Andre M. Cuerington, U.S. Army, calculates the actual shortest path using the search list produced here.

A PROBABLISTIC DERIVATION OF STIRLING'S FORMULA

Hsin-Yun Li-Lieutenant Commander, Republic of China Navy
B.S., Chinese Naval Academy, 1980
Master of Science in Applied Mathematics-March 1991
Advisor: Chris L. Frenzen-Department of Mathematics

Stirling's formula is one of the most frequently used results from asymptotics. It is used in probability and statistics, algorithm analysis and physics. In this thesis we shall give a new probabilistic derivation of Stirling's formula. Our motivation comes from sampling randomly with replacement from a group of n distinct alternatives. Usually repetition will occur before we obtain all n distinct alternatives consecutively. We shall show that Stirling's formula can be derived and interpreted as follows: as n---> ∞ the expected total number of distinct alternatives we must sample before all n are obtained consecutively is asymptotically equal to the expected number of attempts we make to obtain all n distinct alternatives consecutively times the expected number of distinct alternatives obtained per attempt.

STURM-LIOUVILLE EIGENFUNCTIONS EXPRESSED IN DETERMINANT FORM

Michael D. Phillips-Captain-United States Army
B.A., Cameron University, 1982
Master of Science in Applied Mathematics-June 1991
Advisor: Gordon E. Latta-Department of Mathematics

The purpose of this thesis is to investigate and establish Sturm-Liouville properties for special eigenfunctions which are expressed in determinant form. In particular, a special case is presented where the elements of the determinant are Legendre polynomials. This type of determinant has a probability background dealing in birth and death processes. The method of analysis used in this thesis is a new approach to solving this specific example. This investigation involves systems of differential equations and Prufer's analysis in the phase plane. The following are new results obtained in addition to solving the special case mentioned above. Special determinants of hypergeometric functions also possess Sturm-Liouville properties. As a special case, a different proof of Turan's Inequality is provided. Finally, several theorems are presented for Sturm-Liouville systems of differential equations with polynomial coefficients.

CALCULATION OF CHIP TEMPERATURES USING ELLPACK

Vincent J. van Joolen, Lieutenant, United States Navy
B.S., University of California, San Diego
Master of Science in Applied Mathematics-June 1991
Advisor: Beny Neta-Department of Mathematics

In this thesis we report on an experiment to solve a three dimensional elliptic problem using ELLPACK software. The physical problem arises when calculating the distribution of temperatures within an electronic package in order to assist in the design of appropriate cooling. ELLPACK software is modified here to solve three dimensional problems more general than the ones it was originally designed for.

MASTER OF SCIENCE
IN
APPLIED SCIENCE

ADAPTIVE WINDOWS VIA KALMAN FILTERING IN THE SPECTRAL DOMAIN

Ronald C. Adamo-Lieutenant Commander, United States Navy
B.S., Tulane University, 1980
Master of Science in Applied Science-March 1991
Advisor: Ralph D. Hippenstiel-Department of Electrical & Computer Engineering

Application of classical windows to time series data is a means of enhancing the performance of the periodogram. Use of these classical windows results in the broadening of the spectral mainlobe. A Kalman filter will smooth spectral data by dividing the periodogram of unwindowed time series data into piecewise constant segments, ideally into noise-only and signal-only segments. This allows for a more accurate representation of the mainlobe of the original periodogram. The Kalman filter was modified to alter the filter parameter B during filtering to provide maximun smoothing during the noise-only segment and maximum sensitivity in the vicinity of the spectral peak of the periodogram. This modification results in a smoothing of the noise-only portion of the periodogram while leaving the main spectral peak essentially unaltered. A second modification was made to substitute the original war values of the periodogram for the filter estimates during detected up-transitions while smoothing the noise-only segments in the same manner as in the original Kalman filter algorithm. This further enhances the preservation of the mainlobe of the periodogram and lowers the noise floor 1 to 3 dB over that of the original Kalman filter. These processes were further enhanced by stacking the output periodograms and displaying them as LOFAR output on the Sun workstation. NCAR graphics grey-toning subroutine is used to generate the LOFAR displays.

INVESTIGATION OF A HEAT DRIVEN THERMOACOUSTIC PRIME MOVER ABOVE ONSET OF SELF-OSCILLATION

Earl Clayton Bowers-Lieutenant, United States Navy
B.S., United States Naval Academy, 1985
Master of Science in Applied Science-September 1991
Master of Science in Engineering Acoustics-September 1991
Advisor: Anthony A. Atchley-Department of Physics

The goal of this thesis is to investigate the work output of a heat driven thermoacoustic prime mover above onset of self-oscillation. The exponentially growing sound wave, generated when a prime mover is initially "turned on", was digitally sampled for a helium filled prime mover at pressures ranging from 238 kPa to 500 kPa and at temperature differences ranging from onset to 400 K. This data was then digitally filtered by a 100 Hz band pass filter centered on the prime mover's fundamental frequency. A least mean squares fit was applied to the envelope of the filter's output in order to determine the temporal absorption coefficient ß. From ß, the quality factor was computed. These quality factors were then compared to thermoacoustic theory. The agreement between the theoretical predictions and the measured results is extremely good at high mean gas pressures. As the mean gas pressure decreases, however, the agreement between the theoretical value of onset and the predicted slope of the data, increasingly deviate.

COMPARATIVE ANALYSIS OF THE SAFARI MODEL WITH NATIVE 1 DATA IN THE VLF REGIME

Jerome L. Cleveland, Jr.-Lieutenant Commander, United States Navy
B.S., University of Florida
Master of Science in Applied Science-September 1991
Advisor: Alan B. Coppens-Department of Physics

Few underwater acoustic models have been validated in the Very Low Frequency (VLF) regime. The purpose here is to explore one model's abilities and compare it with ocean data once it is ascertained the model has converged to its final solution. A comparative analysis of data recorded in NATIVE 1 (the Noise and Transmission Loss in VLF Environments) Event 1 and results generated using the Seismo-Acoustic Fast field Algorithm for Range-Independent Environments (SAFARI) is the focus of this study, with emphasis on understanding some of the model's features.

ACOUSTIC PROPAGATION LOSS MODELING FOR DABOB BAY, WASHINGTON

John R. Mitchell-Lieutenant, United States Navy
B.S., Clemson University, 1984
Master of Science in Applied Science-September 1991
Advisor: Oscar B. Wilson, Jr.-Department of Physics

An analysis of the acoustic sound propagation in a multipath environment in an ocean at short ranges has been conducted using a Modified Time Delay Spectrometry (TDS) and an experimental continuous-wave technique. Data from the acoustic test range at Dabob Bay, Washington were analyzed to determine the relative amplitudes of the direct- and surface-reflected signals. The results show that, at moderate ranges and typical source and receiver depths, the surface-reflected sound is a significant contributor to the received sound level. The theory supporting both techniques is presented. Discussions and conclusions are drawn. Recommendations for future investigation are made.

ESTIMATION OF RANGE ERROR IN BISTATIC SONAR

John Charles Nygaard-Lieutenant, United States Navy
B.S., Auburn University, 1984
Master of Science in Applied Science-March 1991
Advisors: Alan B. Coppens & Harvey A. Dahl-Department of Physics

This thesis examines the range error propagation and uncertainties associated with bistatic sonar operations. An equation for determining range to the target from the receiver is explored for feasibility of practical applications. This particular equation does not require the separation distance between the source and receiver however, it does require an assumption of the mean sound speed over the two paths of the signal even though it could change drastically over a few miles. This thesis explores the contribution of eccentricity on the bistatic ellipse and the associated error. Examples demonstrate these effects by comparing cases of unequal mean sound speeds over the different paths at different values of eccentricity.

FIBER-OPTIC FLEXURAL DISK ACCELEROMETER

Joanne E. Olcott-Lieutenant Commander, United States Navy
B.S., Oregon State University
Master of Science in Applied Science-September 1991
Advisors: David A. Brown & Steven L. Garrett-Department of Physics

The fabrication and calibration of a fiber-optic flexural disk accelerometer is discussed in this thesis. The accelerometer is comprised of a cylindrical body with thin, flexible end plates (or disks) and an interior spindle coupling the disks together ensuring proper phasing. The sensing mechanism is comprised of single mode optical fiber wound into flat coils and epoxied on to the inside faces of the disks, forming the legs of a Michelson interferometer. The use of both legs of this fiber-optic interferometer as sensing elements provides a "push-pull" enhancement and effectively doubles the accelerometer's response while providing common-mode rejection of pressure and temperature variations. The acceleration sensitivity for a sensor consisting of two 1.8" by 1/25" disks is $\Delta \phi/a_c = 49$ radians/g with a resonance frequency of 2450 Hz. The fractional phase change per unit force is $\Delta \phi/\phi m a_c = 5.5 \times 10^{-6} N^{-1}$.

RECURSIVE RAY ACOUSTICS FOR THREE-DIMENSIONAL SOUND-SPEED PROFILES

F. Wynn Polnicky-Lieutenant, Canadian Navy
B.Math., University of Waterloo, Canada, 1976
Master of Science in Applied Science-September 1991
Master of Science in Engineering Acoustics-September 1991
Advisor: Lawrence J. Ziomek-Department of Electrical and Computer Engineering

A comparison of a simple recursive ray acoustics algorithm versus a ray acoustics algorithm based on solving a system of first-order ordinary differential equations was conducted. The recursive ray acoustics (RRA) algorithm was found to be accurate and relatively fast. The RRA algorithm is capable of handling sound speed as a function of all three spatial coordinates, and this capability was demonstrated. Two separate methods of representing a sound-speed profile (SSP) based on data points were examined: Akima cubic spline and spatial Fourier series (SFS). The SFS representation encountered difficulties in accurately modeling SSPs. Various techniques were applied to improve the SFS sound-speed representation. While accurate sound-speed fits were eventually achieved, difficulties remained in the SFS modeling of first and second-order derivatives of the sound-speed data. The RRA algorithm was tested using the SFS sound-speed representation and found to be significantly inaccurate. A demonstration was conducted of the ability of the SFS sound-speed representation to incorporate randomness in the SSP.

EVALUATION OF THE MPA'S DETECTION AND ALLOCATION MODELS UTILIZED BY THE ASW SYSTEMS EVALUATION TOOL (ASSET)

Richard M. Shaffer
Master of Science in Applied Science-September 1991
Advisor: James N. Eagle-Antisubmarine Warfare Academic Group

The primary objective of this thesis is to analyze and recommend improvements to the Maritime Patrol Aircraft (MPA) detection and allocation models utilized by the ASW Systems Evaluation Tool (ASSET), version 1.0. ASSET is a generic high-level ASW modeling tool, designed to aid CNO (OP-71) in the development and refinement of ASW top-level warfare requirements and the ASW Master Plan. ASSET's strengths lie in its C^3I modeling of submarine, MPA, and overhead surveillance in large scale ASW campaigns. To reduce the processing time required by ASSET, the current version of the MPA detection model contains simplifications which can limit its ability to effectively simulate some MPA tactical ASW scenarios. This thesis proposes two new MPA detection models which utilize the coverage area of a user-defined sonobuoy pattern and address the limitations of the current ASSET model. Also proposed is an MPA allocation scheme which should provide a higher cumulative detection probability.

ACCURACY ASSESSMENT FOR THE AUXILIARY TRACKING SYSTEM

Michael Paul Taylor-Lieutenant, United States Navy
B.S., United States Air Force Academy, 1985
Master of Science in Applied Science-September 1991
Advisor: Robert R. Read-Department of Operations Analysis

The Auxiliary Tracking System (ATS) is being developed to allow for an accurate underwater tracking capability that can be deployed anywhere in the world. A simulation was created to determine the impact upon the relative accuracy of the system due to a normally distributed noise. The simulation was used to look at the impact of range between targets and the depth spacing of the suspended transducers on the relative tracking accuracy.

AN EXAMINATION OF TARGET TRACKING IN THE ANTISUBMARINE WARFARE SYSTEMS EVALUATION TOOL (ASSET)

Paul William Vebber-Lieutenant, United States Navy
B.S., University of Wisconsin-Madison, 1984
Master of Science in Applied Science-September 1991
Advisor: James N. Eagle-Antisubmarine Warfare Academic Group

The role of the Maneuvering Target Statistical Tracker (MTST), a Kalman filter tracking algorithm based on the Integrated Ornstein-Uhlenbeck (IOU) motion process, in the Antisubmarine Warfare System Evaluation Tool (ASSET) is examined and its operation described. ASSET is a campaign simulation which models open-ocean ASW scenarios featuring prosecution of hostile submarines by friendly submarines and aircraft based on cues provided by data fusion centers. The heart of each data fusion center is an MTST which integrates new contact information into tracks. Comparing the level of sophistication of the tracking algorithm to that of the contact data provided to it, a number of simplifications are proposed. These include using reduced complexity IOU prediction and Kalman filter equations; the use of pre-processed variance data together with the true position of targets to estimate, rather than explicitly calculate, updated track states; and limiting contact processing based on information content. Results indicate a good simulation of tracker output is produced using a greatly simplified algorithm. This technique can be generalized to other types of simulations involving target tracking.

MASTER OF SCIENCE
IN
COMPUTER SCIENCE

VIEWER-A USER INTERFACE FOR FAILURE REGION ANALYSIS

Vicki Sue Abel-Lieutenant Commander, United States Navy
B.A., University of Dallas, 1979
Master of Science in Computer Science-December 1990
and
Medio Monti-Captain, United States Marine Corps
B.S., Allegheny College, 1979
Master of Science in Computer Science-December 1990
Advisor: Timothy Shimeall-Department of Computer Science

Two issues gaining interest in the computer community are the development of software testing tools and the increase of graphical user interfaces in all types of software. VIEWER is a program that provides support to a set of tools that work in an integrated fashion to analyze Pascal programs to determine the failure regions associated with identified faults in the program. It is a graphical user interface that facilitates the process of analyzing the program. It provides automated coordination between the tools and as such maintains a certain level of abstraction for the analyst. It allows for rapid and customized improvement in the automation of the analysis process. The thesis discusses the background involved in testing tools, user interfaces, and the combination of the two into a useful tool. An implemented prototype is discussed and an example of failure region analysis performed with the graphical user interface is included.

NPSME-AN INTERACTIVE TOOL FOR MATERIAL CHARACTERISTICS SPECIFICATION

Wilhelm F. Anderson-Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1977
Master of Science in Computer Science-December 1990
Advisor: Michael J. Zyda-Department of Computer Science

A general tool capable of interactively creating, displaying, modifying, and managing lists of material specifications is required for the display of 3D icons on the Silicon Graphics Inc. IRIS 4D workstation. The Naval Postgraduate School Material Editor (NPSME) fulfills these requirements using an interactive interface and provides direct support for the Naval Postgraduate School's Command and Control workstation of the Future project.

DESIGN AND IMPLEMENTATION OF A MULTIMEDIA DBMS: COMPLEX QUERY PROCESSING

Huseyin Aygun-Lieutenant Junior Grade, Turkish Navy
B.S., Turkish Naval Academy, 1985
Master of Science in Computer Science-September 1991
Advisor: Vincent Y. Lum-Department of Computer Science

Traditional Database Management systems are capable of managing only alphanumeric data. The Multimedia Database Management System (MDBMS) prototype started at the Computer Science Department of Naval Postgraduate School in 1988, made it possible to capture, store, manage, retrieve and present different media information such as image and sound by using the current, modern computer technology. In the existing MDBMS, if a query references only formatted data, it is passed to INGRES directly, but if a query includes media data, then the query is decomposed into multiple subqueries each of which must be individually processed, and the intermediate results of which must be recomposed to form the final result to be given to the user. This thesis will concentrate on complex queries involving nesting conditions and multiple selections which are not supported by the existing MDBMS prototype.

THE DESIGN AND IMPLEMENTATIOON OF AN EXPANDER AND CONSISTENCY CHECKER FOR THE HIERARCHICAL REAL-TIME CONSTRAINTS OF COMPUTER AIDED PROTOTYPING SYSTEMS (CAPS)

Suleyman Bayramoglu-Lieutenant Junior Grade, Turkish Navy
B.S., Turkish Naval Academy, 1984
Master of Science in Computer Science-September 1991
Advisor: Valdis Berzins-Department of Computer Science

As part of developing the Execution Support System of Computer-Aided Prototyping System (CAPS), there is a need to translate and schedule prototypes of hard real-time systems whose specifications are defined in a hierarchical structure by using the Prototyping System Description Language (PSDL). We present a design and implementation of a PSDL expander in this thesis. The expander translates a PSDL prototype with an arbitrarily deep hierarchical structure into an equivalent two-level form that can be processed by the current implementations of the other CAPS tools. The design of the expander also provides for inheritance of timing constraints and static consistency checking. To establish a convenient representation of PSDL specifications, we define an Abstract Data Type (ADT) that provides an Ada representation of PSDL specification. The main idea behind the PSDL ADT is forming an abstract representation of PSDL to support software tools for analyzing, constructing, and translating PSDL programs. The PSDL ADT is built by using other common abstract data types, i.e., maps, sets, sequences, graphs, and stacks. The construction process of ADT itself is done by an LALR(1) parser, generated in Ada using the tools *ayacc* and *aflex*, a parser generator and a lexical analyzer.

UNDERWATER MULTI-DIMENSIONAL PATH PLANNING FOR THE NAVAL POSTGRADUATE SCHOOL AUTONOMOUS UNDERWATER VEHICLE II

Joseph Bonsignore, Jr.-Captain, United States Marine Corps
B.S., The Virginia Military Institute, 1979
Master of Science in Computer Science-September 1991
Advisor: Yuh-jeng Lee-Department of Computer Science

Traditionally path planning software has been developed in LISP or C. with the recent government mandate for the use of Ada, this thesis seeks to demonstrate the feasibility of using Ada for both path preplanning and real-time path replanning. Land vehicle path planning can be accomplished with two horizontal components. However, for autonomous underwater vehicles, the two horizontal components and a vertical component are required. Memory and computational speed restrictions dictate that special processing of the search space be conducted to optimize the time-space trade-off. In this research, a four dimensional array of nodes (two horizontal components, one vertical component and one orientation component) is used to represent the search space. By use of an orientation component, the number of nodes that can be legally moved to is limited, in effect pruning the search space. Three search methods were investigated: the Tendril search, the Direction search and the Real-time A* search. The Tendril search is a wavefront, breadth-first search. The Direction search uses a vector field for path planning. The Real-time A* search uses the Tendril search to a specified search depth then applies a heuristic to determine the best path to expand upon.

AN EMPIRICAL STUDY OF FAULT DETECTION BY STATIC UNITS-CONSISTENCY ANALYSIS

Judy A. Browning-Captain, United States Army
B.S., University of Southern Mississippi
Master of Science in Computer Science-September 1991
Advisor: Timothy Shimeall-Department of Computer Science

With the increasing costs involved in software development, testing has become a more critical aspect of the software engineering process. Automatic methods, such as various static analysis techniques, may offer economic fault detection. This thesis analyzes a static analysis technique that allows users to associate units with variables in computer programs and to check that data transformations manipulate units in a consistent manner. A tool is designed and applied for this analysis. Its performance is measured by comparing the results with a previous study of other testing techniques in detecting faults. The results reveal that this technique consistently detected a narrow class of faults including some faults not found by other testing techniques. The results also show that application of this technique during the requirements and design phases of software development can identify faults associated with units-inconsistency early and reduce costs involved in developing a piece of software.

COMPUTER FEAR AND ANXIETY IN THE UNITED STATES ARMY

Michael S. Buchner-Captain, United States Army
B.S., University of Arizona, 1979
Master of Science in Computer Science-March 1991
Advisor: Thomas Mitchell-Department of Operations Research

The fear of technology, particularly computers, appears to be widespread. This thesis defines computer fear and anxiety, its consequences, and provides recommendations to reduce its impact. Further, it attempts to quantify the extent of computer fear and anxiety in the U.S. Army. *Finding 1: As some soldiers increase their interaction* with computers through training and experience their level of comp uter fear, anxiety, and apprehension also increases, at least for the short term. Finding 2: The extent of computer anxiety in the U.S. Army is as high as 11% for computer specialists and as high as 18% for "end-users." The extent of *severe* computer anxiety is approximately 4.5% for both computer specialists and "end-users." Finding 3: There is not a set of characteristics that can be used to draw a profile of a computer anxious individual. Observation/hypothesis: Computer anxiety may be understood as a cycle, termed the *Computer Anxious Cycle*. The cycle involves four stages: ignorance is bliss, computer shock, rising anxiety, and relief. This hypothesis requires additional research.

NPSNET-MES: SEMI-AUTOMATED FORCES INTEGRATION

Carl Patrick Cecil-Major, United States Army
B.S., United States Military Academy, 1979
Master of Science in Computer Science-September 1991
Advisors: Michael J. Zyda & David R. Pratt-Department of Computer Science

NPSNET-MES provides realistic semi-automated forces (SAF) for interactive play in the three dimensional visual simulator, NPSNET. NPSNET-MES consists of two components. The first component is a path generation module that determines the SAF route and mission based upon the SAF controller input. This module generates multiple segment paths based on obstacle avoidance. The second component is a vehicle controller module that uses the programmable network harness, NPSNET-NET, to multicast data packets via the Ethernet to control the SAF vehicles during the simulation. NPSNET-NET integrates SAF into an already existing network simulator such that no changes are necessary to the existing system, NPSNET. NPSNET-MES fulfills a real need in networking simulation to populate the battlefield simulation with semi-automated forces.

SEARCHING FOR SHORTEST AND SAFEST PATHS ALONG OBSTACLE COMMON TANGENTS

Jerry Allen Crane-Major, United States Army
B.S., United States Military Academy, 1979
Master of Science in Computer Science-September 1991
Advisor: Yutaka Kanayama-Department of Computer Science

This thesis describes a method for computing globally shortest paths for a point robot in a two-dimensional, orthogonal world composed of convex and concave polygons through the construction of obstacle common tangent visibility graphs. Visibility and intersection testing are based on the orientation of three of more points in the plane, and complex obstacle tangent visibility graphs are constructed using only these orientation relationships. Obstacle common tangents for convex and concave polygonal obstacles are implemented as a computational representation of locally shortest paths. A series of tangent sequences form global paths which equate to global path equivalence classes, effectively reducing the path finding problem to that of finding the shortest path in the path equivalence class. A simple and logical approach for processing concave polygons using convex subpolygons is implemented, allowing common tangent construction and path searching algorithms to process complex geometrical shapes in an efficient and symbolically unique fashion.. Dijkstra's algorithm is implemented using heuristic control for optimal path searching. The framework for utilizing constant clearance strips for safe path planning along obstacle common tangents is presented but not fully implemented.

DFQL: A GRAPHICAL DATAFLOW QUERY LANGUAGE

Gard J. Clark-Lieutenant, United States Navy
B.S., United States Naval Academy, 1985
Master of Science in Computer Science-September 1991
Advisor: Thomas Wu-Department of Computer Science

In nearly all large organizations, the Navy and Department of Defense being no exceptions, the use of database management systems (DBMS's) has become widespread. The prevailing data model for modern DBMS's is the relational model developed by Codd in the early 1970s. The relational model's superiority is due to its well thought out design and founding in mathematical logic. The de facto standard query language for relational DBMS's IBM's Structured Query language (SQL). Although SQL is the most widely used query language today, it has many problems, specially in the ease-of-use area. The purpose of this thesis is to design, implement, and test a new query language, *DFQL*, which will mitigate SQL's ease-of-use problems. DFQL provides a graphical query interface based on the dataflow paradigm in order to allow a user to easily and incrementally construct queries for a relational database. DFQL is relationally complete, maintains relational operational closure, and is designed to be easily extensible by the end user. DFQL has been implemented on an Apple Macintosh using an ORACLE relational DBMS. A simple human factors experiment was performed in which DFQL's ease of query writing compared favorably to that of SQL.

THE DEVELOPMENT OF USER INTERFACE TOOLS FOR THE COMPUTER AIDED PROTOTYPING SYSTEM

Mary Ann Cummings-Civilian, Naval Surface Warfare Center
B.S., James Madison University, 1984
Advisors: Lucia Luqi & Patrick D. Barnes-Department of Computer Science

The computer Aided Prototyping System (CAPS) was created to rapidly prototype real-time systems in order to determine if the system requirements can be met early in the development cycle. CAPS consists of several software tools that automatically generate an executable Ada model of the proposed system from a given specification. This thesis describes the development of a user interface for CAPS. The user interface supports the design, modification and execution of the software prototype throughout the entire prototyping life cycle. It makes use of X Windows and advanced windowing techniques and allows the user to run the tools concurrently. The user interface incorporates a separate tool interface which controls the interaction between the CAPS tools and the user interface. The graphic editor uses advanced graphics capabilities to give the user more flexibility in editing a graphical representation of the prototype. It automatically produces a formal representation of the prototype to be used by the other tools in CAPS.

SOFTWARE TESTING FOR EVOLUTIONARY ITERATIVE RAPID PROTOTYPING

Edward Vernon Davis, Jr.-Major, United States Marine Corps
B.S., United States Naval Academy, 1978
Master of Science in Computer Science-December 1990
Advisor: Timothy J. Shimeall-Department of Computer Science

Rapid prototyping is emerging as a promising software development paradigm. It provides a systematic and automatable means of developing a software system under circumstances where initial requirements are not well known or where requirements change frequently during development. To provide high software quality assurance requires sufficient software testing. The unique nature of evolutionary iterative prototyping is not well-suited for classical testing methodologies, therefore the need exists for a testing methodology tailored for this prototyping paradigm. This thesis surveys current prototyping and testing practices to provide a foundation for developing a software testing methodology for prototyping. The thesis then describes a testing methodology for rapid prototoyping, Spiral Testing, and the Test Goal Tracking System (TGTS), a requirements-based testing tool developed for use with the Computer Aided Prototyping System (CAPS). TGTS provides the first in an anticipated family of testing tools to supoprt the CAPS environment. This thesis shows key prototyping characteristics impinging on testing, the value of Spiral Testing and the feasibility and qualities of complementary testing tools to support evolutionary iterative rapid prototyping.

INTERNETWORKING WITH INTERNET PROTOCOL (IP) AND TRANSMISSION CONTROL PROTOCOL (TCP) WITHIN THE MILITARY

Bruce Eikenberg-Captain, United States Marine Corps
B.S., United States Naval Academy
Master of Science in Computer Science-December 1990
Advisor: G.M. Lundy-Department of Computer Science

The backbone of the internetworking technology widely used by the military, as well as many civilian installations, is commonly referred to as TCP/IP. Transmission Control Protocol (TCP) and Internet Protocol (IP) are the two standard communication protocols from which TCP/IP receives its name. By utilizing TCP/IP, the majority of technical issues of interconnecting various computer technologies have become transparent to the user. This thesis conducts an in depth study of many aspects of the TCP/IP technology. Based upon descriptions provided, flowcharts detailing the series of procedures of numerous functions of both TCP and IP are created. Additionally, inefficient TCP/IP functions are discussed and possible solutions to the inefficiencies are provided.

A FORMAL MODEL OF THE MAC LAYER OF AN IMPROVED FDDI PROTOCOL

Jose Luiz Timbo Elmiro-Lieutenant, Brazilian Navy
B.S., Brazilian Naval Academy, 1979
Master of Science in Computer Science-September, 1991
Advisor: G.M. Lundy-Department of Computer Science

This research examines an improved FDDI protocol which ideally raises the network throughput form 100 to a maximum of 300 Megabits per second. It develops the details of the protocol structure at the MAC layer and provides a formal specification using a formal model for protocol specification called Systems of Communicating Machines. The study investigates the MAC FDDI standard and conforms the improved protocol to the specifications of that document. The MAC protocol employs a Timed-Token Controlled Concurrent Access with simultaneous transmission on the FDDI dual ring. Key characteristics of FDDI are maintained in the improved protocol. The formal specification enhances protocol interpretation and verification. It reduces protocol ambiguities and allows proofs for protocol verification and correctness. A formal specification of a real-world network protocol contributes to multivendor interoperability achievement.

DESIGN AND IMPLEMENTATION OF A COLLISION AVOIDANCE SYSTEM FOR THE NPS AUTONOMOUS UNDERWATER VEHICLE (AUV II) UTILIZING ULTRASONIC SENSORS

Charles Alan Floyd-Commander, United States Navy
B.S.E.E., United States Naval Academy, 1975
Master of Science in Computer Science-September 1991
Advisor: Yutaka Kanayama-Department of Computer Science

The recognition of underwater objects and obstacles by sonar has been explored in many forms, particularly through the use of high-resolution imaging sonar systems. This work explores a method of providing real-time obstacle avoidance and navigational position updating for an Autonomous Underwater Vehicle (AUV) by applying regression analysis and geometric interpretation to sonar range data obtained from a low-cost, low-resolution, fixed-beam sonar. The algorithm utilized by this method first develops a least-squares fit for sonar range data in a 2-D manner. The parameters developed by this method are then compared to an environmental model for position identification. If no match is achieved, then by applying the known geometry of the acoustic signal, an estimate for a 3-D surface is derived. This derived 3-D surface is then added to the environmental model to enable accurate path planning and post-mission analysis information. This method is currently implemented on an operational AUV operating in a well-defined orthogonal environment at NPS. The paper also discusses the simulation of the sonar systems using a ray tracing technique in a real-time dynamic graphical simulation implemented on a Silicon Graphics IRIS workstation.

AN OBJECT-ORIENTED APPROACH TO COMPUTER ARCHITECTURE SIMULATION

Kevin Anthony Fontes-Lieutenant, United States Navy
B.S., California Polytechnic State University, 1984
Master of Science in Computer Science-September 1991
Advisor: Michael L. Nelson-Department of Computer Science

An object-oriented approach to modeling and simulating computer architectures is presented. This approach yields a 'generic' class hierarchy that supports the simulation of basic computer microarchitecture components found in most computers. This is accomplished by concentrating on the more generic concepts of processors, memories, registers, etc., rather than concentrating on a specific system. The 'generic' class hierarchy is tested by developing microarchitecture simulators for two different microarchitecture designs.

SAFETY ANALYSIS OF HETEROGENEOUS-MULTIPROCESSOR CONTROL SYSTEM SOFTWARE

Janet A. Gill-Civilian, Naval Air Test Center, Patuxent River, Maryland
B.S., University of West Florida, 1985
Master of Science in Computer Science-December 1990
Advisor: Timothy J. Shimeall-Department of Computer Science

Fault trees and Petri nets are two widely accepted graphical tools used in the safety analysis of software. Because some software is life and property critical, thorough analysis techniques are essential. Independently, Petri nets and fault trees serve limited evaluation purposes. This thesis presents a technique that converts and links Petri nets to fault trees and fault trees to Petri nets. It enjoys the combinational benefits of both analysis tools. Software Fault Tree Analysis and timed Petri nets facilitate software safety analysis in heterogeneous-multiprocessor control systems. Analysts use a Petri net to graphically organize the selected software. A fault tree supports a hazardous condition with subsequent leaf node paths that lead to the hazard. Through the combination of Petri nets and fault trees, an analyst can determine a software fault if he can reach an undesired Petri net state, comparable with the fault tree root fault, from an initial marking. All transitions leading to the undesired state from the initial marking must be enabled and the states must be marked that represent the leaf nodes of the fault tree path. It is not the intention of this thesis to suggest that an analyst be replaced by an automated tool. There must be analyst interaction focusing the analyst's insight and experience on the hazards of a system. This method is proposed only as a tool for evaluation during the overall safety analysis.

AN EMPIRICAL APPROACH TO ANALYSIS OF SIMILARITIES BETWEEN SOFTWARE FAILURE REGIONS

Lelon Levoy Ginn-Lieutenant, United States Navy
B.S., Lubbock Christian College, 1981
Master of Science in Computer Science-September 1991
Advisor: Timothy J. Shimeall-Department of Computer Science

Previous authors have postulated that faults are related to each other and testers have tried to exploit the effect. However, the evidence and applications have been largely anecdotal. This thesis uses an analytical derivation of software failure regions to develop a quantitative metric of the relationship of one fault to another. This metric is then applied in an empirical study of a population of failure regions derived from faults used in a previous experiment. The failure regions were analyzed for clustering behavior using graph theory techniques. The goal of this study is to be able to use information about known faults in a program as a means of finding other faults in the same program. This study provides strong evidence that failure regions have a tendency to form clusters. Further, two specific characteristics of failure regions that lead to cluster formation are identified: shared bounding conditions (the Identical dimension) and shared variables that appear in different contexts (the Coincidental dimension). The nature of the clusters formed by these two dimensions are markedly different. The Identical dimension clusters are small, isolated, and strongly connected. The Coincidental dimension clusters are larger and more loosely connected. Software testing implications of failure region clustering behavior are discussed.

DESIGN AND IMPLEMENTATION OF THE MAINTENANCE DATA SYSTEM MODULE FOR THE ARGOS PAPERLESS SHIP SYSTEM

James Daniel Hendricks-Lieutenant, United States Navy
B.S., United States Naval Academy, 1983
Master of Science in Computer Science-December 1990
and
Jeffrey Alan Kulp-Lieutenant, United States Navy
B.S., The Pennsylvania State University
Master of Science in Computer Science-December 1990
Advisor: C. Thomas Wu-Department of Computer Science

The paperless ship concept proposed by VADM Metcalf has been advocated at the highest levels in the Navy. ARGOS is a prototype multi-media database system under development at the Naval Postgraduate School in support of this superior concept. This thesis has implemented the maintenance functional area of ARGOS in a manner that easily interfaces with the existing Maintenance Data System. Additionally, it demonstrates the advanced capabilities attainable in a system implemented with economical, off-the-shelf technology.

A STOCHASTIC APPROACH TO SOLVING THE 2 1/2 DIMENSIONAL WEIGHTED REGION PROBLEM

Cary Allen Hilton-Captain, United States Army
B.S., University of Southern Mississippi, 1980
Master of Science in Computer Science-June 1991
Advisor: Man-Tak Shing-Department of Computer Science

This thesis describes a method of computing a feasible path solution for the anisotropic weighted region problem. Heuristics are used to locate an initial starting solution. This starting solution is iteratively improved using a golden ratio search to produce a solution within a specified tolerance. The path solution is then randomly perturbed or detoured through different region frontiers, and the golden ratio search is again applied. These random detours are controlled by a process known as simulated annealing, which determines the number of detours made and decides whether to accept or reject each path solution. Better solutions are always accepted and worse solutions are accepted based on a probability distribution. Accepting worse solutions allows an opportunity to escape from a local minimum condition and continue the search for the optimal path. Since an exhaustive search is not performed, the globally optimal path may not be found, but a feasible path can be found with this method.

THE INTEGRATION SYSTEM FOR THE LOW COST COMBAT DIRECTION SYSTEM

Richard Thomas Irwin-Lieutenant, United States Navy
B.S., University of Michigan-Flint, 1983
Master of Science in Computer Science-September 1991
and
Willie Kelly Bolick-Lieutenant, United States Navy
B.S., University of Arkansas, 1977
M.S., Arkansas State University, 1980
Master of Science in Computer Science-December 1991
Advisor: Valdis Berzins-Department of Computer Science

In a world where changes in technology occur each minute, the demand for a hard Real-Time embedded computer system deployed on board naval ships not equipped with Naval Tactical Data System increases. As the demand increases, an important fact looms, a new approach to software development and system design is essential. The approach used in our research started with the requirement specifying use of Ada as the design language with UNIX as the operating system, and selection of the commercial workstation rugged enough to withstand shipboard requirements. The system requires standard power with no special interface equipment for adaptation to shipboard application. Specific benefits include ease of maintenance and expansion of ongoing processes and applications, allowing the system to grow as the need grows. This study provides a detailed set of requirements, functional specifications, designs, and a prototype implementation of the Integrated System for such a system. The approach taken is to implement the basic features of a Combat Direction System (CDS) on a commercially available microprocessor workstation. This Integration System for the Low Cost Combat Direction System meets all the requirements specified by the Naval Sea Systems Command. The code provides the basic elements and is designed for integration of a database, a user interface, and the ships sensors necessary to provide essential data to operate the system.

A REAL TIME AUTONOMOUS UNDEWATER VEHICLE DYNAMIC SIMULATOR

Thomas A. Jurewicz-Commander, United States Navy
B.S., United States Naval Academy, 1975
Master of Science in Computer Science-December 1990
Advisor: Michael J. Zyda-Department of Computer Science

The NPS Autonomous Underwater Vehicle Simulator is a joint project between the Naval Postgraduate School's Mechanical Engineering and Computer Science Departments. In order to test mission planning and execution software, an accurate vehicle dynamic model is required. Using dynamics based upon the Navy's Swimmer Delivery Vehicle (SDV), there is a need to continually update the hydrodynamic coefficients based upon actual vehicle-in-water testing. The NPS AUV Dynamic Simulator contains a full set of submarine equations of motion and hydrodynamic coefficients. The coefficients are modifiable on-line, and a replay capability exists for further performance review. Using Monterey Bay as an underwater testing environment, there is the need to be able to display expansive terrain data while maintaining the real time simulation. The Variable Terrain Resolution Algorithm incorporated into the NPS AUV Dynamic Simulator enables the entire Monterey Bay data base to be displayed in real time Resolution adjustments are automatically based upon the vehicle's depth level and system performance.

INTERFACE-DRIVEN SOFTWARE DEVELOPMENT TOOL

Heung-Taek Kim-Captain, Republic of Korean Army
B.S., Electrical Engineering, Korea Military Academy, 1985
Master of Science in Computer Science-December 1990
Advisor: C. Thomas Wu-Department of Computer Science

We live in an age where the volume of paper-based information is steadily expanding. Personal computers have a great potential as tools for managing information Effectiveness of using personal computers is determined by how easy it is to use them, since majority of the end-users are not computer experts. Compared with the advances in software design, the important issue of computer interface has begun to be addressed recently. There has been a research joining the database with the graphical interface to give users an easy-to-use method for accessing the database. With this, users navigate through the database by following the links from one piece of information to the next. There are several classes of softwares (languages) to build visual user interfaces: traditional, object-oriented, and interface-driven languages. In this thesis, we used an interface-driven software named Guide to build a prototype visual user interface to analyze the effectiveness of interface-driven software.

RAPID PRODUCTION OF GRAPHICAL USER INTERFACES

David Maurice King-Lieutenant, United States Navy
B.S., North Dakota State University, 1984
Master of Science in Computer Science-December 1990
and
Richard Montgomery Prevatt, III-Lieutenant Commander, United States Navy
B.S.E., Duke University, 1977
Master of Science in Computer Science-December 1990
Advisor: Michael J. Zyda-Department of Computer Science

There is a growing demand within the military for effective, flexible and configurable command and control workstations suiting the diversity of experience and working style that commanders bring to the decision making process. This need motivates development of real-time three-dimensional simulators at the Naval Postgraduate School. Our work concentrates on the graphical user interface and presents a study of information display, interface human factors, and underlying implementation efficiency considerations so as to enhance real-time simulation systems with minimal degradation in performance. High quality interface software is costly in time and money, and it is essential for effective system performance. Our research culminated in the implementation of the NPS Panel Designer and ToolBox (NPSPD), an automated development environment that enables design, implementation, modification, and testing of customized graphical user interfaces. NPSPD includes automatic generation of compilable source code which can stand alone or be integrated quickly into a developer's application. NPSPD was developed using Silicon Graphic Inc. IRIS 4D/70GT and 4D/GTX workstations, relatively low-cost systems which are commercially available. Methodology used and techniques developed provide a foundation applicable to any hardware capable of a windowing environment and graphics display.

DESIGN AND IMPLEMENTATION OF THE MAINTENANCE DATA SYSTEM MODULE *FOR THE ARGOS PAPERLESS SHIP SYSTEM*

Jeffrey Alan Kulp-Lieutenant, United States Navy
B.S., The Pennsylvania State University
Master of Science in Computer Science-December 1990
and
James Daniel Hendricks-Lieutenant, United States Navy
B.S., United States Naval Academy, 1983
Master of Science in Computer Science-December 1990
Advisor: C.Thomas Wu-Department of Computer Science

The paperless ship concept proposed by VADM Metcalf has been advocated at the highest levels in the Navy. ARGOS is a prototype multi-media database system under development at the Naval Postgraduate School in support of this superior concept. This thesis has implemented the maintenance functional area of ARGOS in a manner that easily interfaces with the existing Maintenance Data System. Additionally, it demonstrates the advanced capabilities attainable in a system implemented with economical, off-the-shelf technology.

APPLICATION OF HIGH SPEED NETWORKS

Olav Kvaslerud-Major, Norwegian Air Force
B.S., University of Oslo, 1982
Master of Science in Computer Science-September 1991
Advisor: G.M. Lundy-Department of Computer Science

This thesis discusses the utility and application of high speed networks in the evolving technological environment of communications. In the early sections of this work the primary thesis explicitly presents the properties of fiber optics, existing and developing high speed networks, and applications of these high speed networks. The analysis and validation of this thesis leads to two major postulations. The first investigates the possibility of replacing the current communication network for the Aegis real-time combat system aboard Naval ships with a dual optical fiber ring. This network would consolidate all sensors, weapons, electronic equipment, and computers into a single communication network, possessing a simple topology, higher data transfer capability, and enhanced security. The network has also been designed to accommodate the projected requirements of the next generation of surface combatant. The future system is expected to build upon the current Aegis combat system architecture, becoming more complex but remaining a well integrated and easily operable combat system. A high speed network based on FDDI (Fiber Distributed Data Network) can satisfy the demand for more bandwidth, integrating both real-time and other communication services aboard a ship. This paper supports the view that FDDI can not only successfully replace the current communications in a ship's combat system, but also provide an enhanced level of operation. There are also several other advantages which are quite significant. These include a significant reduction in weight and volume, and reduced susceptibility to electromagnetic interference. The second major construction is the configuration of a hospital health care system utilizing a high speed network. The intern-hospital network would connect the medical hardware, electronic equipment, and computers into a single network. It is projected that the intern-hospital network will interface with an external network employing emerging telephone transmission capabilities. The high speed networks based on Distributed Queue Dual Bus (DQDB) and Synchronous Optic NETwork (SONET)/Asynchronous Transfer Mode (ATM) can satisfy the demand for more bandwidth, integrating services such as voice, video, image, and text.

NEURAL NETWORK DECISION SUPPORT SYSTEMS FOR THE DEPARTMENT OF DEFENSE: AN EXPLORATION

Matthew Ludwig Laskowski-Lieutenant Commander, United States Navy
B.A., Johns Hopkins University, 1977
Master of Science in Computer Systems Management-September 1991
Advisor: Tung X. Bui-Department of Administrative Sciences

Neural networks have demonstrated the potential to deal with problems related to human cognition that to date have stymied researchers: problems that traditional rule and logic based artificial intelligence techniques have been unable to solve. The range of possible neural network applications is not yet fully understood. To date, research and development has tended to concentrate on a most impressive array of real-time embedded systems such as speech processors, target recognition and robotics control systems. The Department of Defense is a strong proponent of this technology. There is another side to the development and practical use of neural network applications. Inexpensive software is presently available that allows virtually any personal computer to function as a simulated neurocomputer. This thesis -- presented in a personal computer based hypertext environment (a diskette is available) -- reports the results of an exhaustive literature search and extensive hands-on experience with these tools and techniques.

DESIGN AND IMPLEMENTATION OF CONTROL COMMAND CHECK SYSTEM (CCCS) A MULTIMEDIA DBMS FOR SECURITY APPLICATIONS

Ioannis M. Leontakianakos-Lieutenant, Hellenic Navy
B.S., Naval Academy of Hellas, 1981
Master of Science in Computer Science-September 1991
Advisor: Thomas Wu-Department of Computer Science

In many applications, in addition to formatted data which can be managed by the current traditional database management systems, media data such as image and sound are also needed. One such application is a database system for maintaining person's entrance and exit from the buildings for security reasons. Best solution for such application requires the use of a multimedia DBMS to manipulate data such as formatted data, image, graphics, bar codes, and voice input. Although most organizations today own general purpose microcomputers (IBM, compatibles), the implementation of true multimedia DBMS that can run on microcomputers is not feasible. This creates a problem of not utilizing the existing microcomputers and software. In this thesis, we will design and implement a system for handling multimedia data by using software tools for the microcomputers. Our prototype system runs on general purpose microcomputers.

AN EFFICIENT HEURISTIC SCHEDULER FOR HARD REAL-TIME SYSTEMS

John Glenn Levine-Captain, United States Army
B.S., United States Military Academy, 1983
Master of Science in Computer Science-September 1991
Advisor: Man-Tak Shing-Department of Computer Science

The requirement for efficient scheduling algorithms for the development of hard real-time systems resulted in much effort directed toward the development of high performance scheduling algorithms. The algorithms developed up to this point for the Computer Aided Prototyping System (CAPS) do not satisfy the requirements for an efficient static scheduling algorithm. The existing static scheduler neither performs efficiently nor produces correct results for all input cases. This thesis represents the research conducted to develop a fast heuristic static scheduling algorithm based on the principles of simulated annealing. In addition, this thesis describes the development of new data structures that simplify the static scheduler and maximize system resources. Several of the existing scheduling algorithms were reimplemented to make use of the new data structures and provide correct results. Any feasible schedule produced by these scheduling algorithms guarantees that both timing and precedence constraints are met. The primary goal of this thesis was to produce an efficient and effective scheduler to support the CAPS system.

THE DEVELOPMENT OF A DESIGN DATABASE FOR THE COMPUTER AIDED PROTOTYPING SYSTEM

Garry Wayne Lewis-Major, United States Marine Corps
B.A., University of Virginia, 1974
M.B.A., Golden Gate University, 1985
Master of Science in Computer Science-September 1991
and
Andrew P. Dwyer-Captain, United States Marine Corps
B.S., Juniata College, 1980
M.B.A., Webster University, 1983
Master of Science in Computer Science-March 1992
Advisor: Lucia Luqi-Department of Computer Science

The Computer Aided Prototyping System (CAPS) was created to rapidly prototype real-time systems to determine early in the development cycle whether system requirements can be met. The CAPS consists of several software tools that automatically generate an executable Ada model of the proposed system. This thesis describes the development of a design database (DDB) for the CAPS. The DDB is an engineering database that contains all information related to a prototype software design. The DDB enhances the CAPS environment and the prototyping paradigm by providing to the designer the functions of storage, retrieval, viewing, and versioning of prototype components. Garry Lewis is the primary author of Chapters I an II and Drew Dwyer the primary author of Chapters III and IV. In the joint implementation, Lewis focused on the design database schema and C++/ONTOS issues. Dwyer was responsible for building the command line interface, the hierarchical k-ary data structures and the C++ classes/methods for traversing this structure. Items not covered in the above description were mutually developed.

AN INTELLIGENT TRAINING SYSTEM FOR HELICOPTER RECOGNITION

Ming-Tien Ling-Captain, Taiwan R.O.C. Army
B.S., Chung-Cheng Institute of Technology, 1985
Master of Science in Computer Science-September 1991
Advisor: Yuh-jeng Lee-Department of Computer Science

This thesis investigates the design and implementation of an intelligent computer-assisted instruction system for visual helicopter recognition training. We developed the Helicopter Recognition Tutor according to the four-component model of a generalized intelligent computer-assisted instruction system. The tutor system provides an interactive tutoring environment that teaches, reviews, and tests visual helicopter recognition skills at a level relevant to the student. It instructs the student at three different levels: the novice level, the intermediate level, and the expert level, based on the student's understanding of the Wing, Engine, Tail, Fuselage, Undercarriage, and Rotor (WETFUR) features of a particular helicopter.

NPSNET: HIERARCHICAL DATA STRUCTURES FOR REAL-TIME THREE-DIMENSIONAL VISUAL SIMULATION

Randall Lee Mackey-Captain, United States Army
B.S., United States Military Academy, 1981
Master of Science in Computer Science-September 1991
Advisor: Michael J. Zyda & David R. Pratt-Department of Computer Science

NPSNET is a low-cost visual simulation system designed and constructed at the Naval Postgraduate School. NPSNET uses digital terrain data and renders scenes involving vehicles, aircraft, cultural features, and natural features in real-time. The implementation of a terrain paging algorithm in NPSNET is discussed. Terrain paging expands the terrain area available for simulation and overcomes the limits of main memory size. Hierarchical data structures commonly used in visual simulation systems are surveyed. The generation of a multi-resolution terrain dataset and the implementation of hierarchical data structure are explained. The multi-resolution dataset is created by generating lower resolution descriptions of polygons from the original data. The hierarchical data structure used in NPSNET, based on quadtrees, provides a means to attenuate the resolution of terrain over distance and cull those portions of terrain outside of the user's field of view.

THREE DIMENSIONAL GUIDANCE FOR THE NPS AUTONOMOUS UNDERWATER VEHICLE

Christopher Magrino-Lieutenant, United States Navy
B.A., Miami University, 1985
Master of Science in Computer Science-September 1991
Advisor: Yutaka Kanayama-Department of Computer Science

The Naval Postgraduate School is currently conducting research in the area of autonomous underwater vehicles. In support of this research, the school has developed a testbed vehicle and graphic simulation. One of the major thrusts of the project is the development of a control system. This work explores the implementation and testing of a guidance scheme proposed by Kanayama called spatial tracking. The method is evaluated with and without consideration for AUV dynamics. Spatial tracking is also compared with an earlier guidance scheme attributed to Kanayama known as cross track guidance. The NPS AUV testbed vehicle and simulator are also described within this work.

DEVELOPMENT OF A GRAPHICAL INTERFACE FOR A MAINTENANCE MANAGEMENT DATABASE SYSTEM

Jeffrey James Mahoney-Lieutenant, United States Navy
B.A., University of Kansas, 1985
Master of Science in Computer Science-September 1991
Advisor: Thomas Wu-Department of Computer Science

Winomms is a prototype graphical interface designed to support the Navy's goal of paperwork reduction. Designed to replace the existing interface of the Navy's Maintenance Data System program, "MicroOmms", Winomms provides an intuitive easy to learn and use graphical environment that greatly enhances productivity for shipboard maintenance requirements.

A REUSABLE COMPONENT RETRIEVAL SYSTEM FOR PROTOTYPING

John Kelly McDowell-Lieutenant, United States Navy
B.S., University of New Mexico, 1984
Master of Science in Computer Science-September 1991
Advisor: Lucia Luqi-Department of Computer Science

Prototyping is an important software development method to rapidly construct software, validate and refine requirements, and check the consistency of proposed software designs. This thesis describes the design and implementation of a CASE tool to be used in conjunction with the Computer Aided Prototyping System (CAPS) which retrieves and prepares reusable components for use in PSDL (Prototype System Description Language) prototypes. Reusable components and their PSDL specifications are stored in a software base. Components can be retrieved from the software base via its Object-Oriented Data Base Management System (OODBMS) using PSDL to formulate queries. All of the PSDL specifications for the reusable components are normalized and stored in the software base to support efficient search based on a given query PSDL specification for a software component. The search process is based on both syntactic and semantic matches between the query and stored components. Our software base has been designed to be easily configured to support storage and retrieval of reusable components in any programming language with the initial configuration for Ada components. A window based user interface was also implemented to allow easy access to the software base via the CAPS user interface as well as stand alone use.

A HYPERMEDIA APPROACH TO THE DESIGN OF AN INTELLIGENT TUTORING SYSTEM

Elizabeth Marie McGinn-Lieutenant, United States Navy
B.S., United States Naval Academy, 1985
Ed.M., Boston University, 1989
Master of Science in Computer Science-September, 1991
Advisor: Yuh-jeng Lee-Department of Computer Science

A hypermedia approach to designing intelligent tutoring systems (ITS) is presented. Animated "page-turners" limited to one knowledge domain represent the majority of ITSs that have been developed in the past several years. They have failed to improve the value or effectiveness of training delivery systems. A need exists to expand present microworld, "page-turner" computer-based instruction applications into complete curricula capable of providing an array of teaching strategies and learning activities for students -- in short, a comprehensive instructional environment. A tutorial module designed with hypermedia capabilities, supported by multimedia devices, could generate a more comprehensive set of knowledge-based explanations for students as well as provide a richer learning environment for them to explore. In addition to providing an interactive learning environment for students, a hypermedia-based tutorial module can be an aid to instructors in curricula design. The applicability of hypermedia concepts was reviewed and applied with a prototype Linguist Workstation being developed by the Basic Military Language Course (BMLC) Project at the Defense Language Institute (DLI), Presidio of Monterey, California.

NPSNET: PHYSICALLY BASED MODELING ENHANCEMENTS TO AN OBJECT FILE FORMAT

James Gregory Monahan-Lieutenant, United States Navy
B.A., Cornell University, 1983
Master of Science in Computer Science-September 1991
Advisor: Michael J. Zyda-Department of Computer Science

The Naval Postgraduate School (NPS) has actively explored the design and implementation of real-time three-dimensional simulators on low-cost, readily accessible graphics workstations. Many of the simulator platforms have had tremendous success due to the fact that a common object format was used. Prototyping time is dramatically reduced when the tedious and often repetitious task of object design is replaced with the simpler task of modifying an existing object description file. The current level of support that the NPS Object File Format (OFF) provides is descriptions for lights, lighting, material characteristics, the expected graphics drawing primitives (lines, polygons, surfaces,...), and provisions for texturing and special lighting effects (spotlights, decaling,...). The objectives of this research are the enhancement of the basic OFF structure with information necessary for accurate physically-based rendering in real-time; to construct a library of functions specifying an object's physical properties and the internal/external forces controlling the object and to develop a tool to rapidly design and test an object's dynamic characteristics.

VIEWER-A USER INTERFACE FOR FAILURE REGION ANALYSIS

Medio Monti-Captain, United States Marine Corps
B.S., Allegheny College, 1979
Master of Science in Computer Science-December 1990
and
Vicki Sue Abel-Lieutenant Commander, United States Navy
B.A., University of Dallas, 1979
Master of Science in Computer Science-December 1990
Advisor: Timothy Shimeall-Department of Computer Science

Two issues gaining interest in the computer community are the development of software testing tools and the increase of graphical user interfaces in all types of software. VIEWER is a program that provides support to a set of tools that work in an integrated fashion to analyze Pascal programs to determine the failure regions associated with identified faults in the program. It is a graphical user interface that facilitates the process of analyzing the program. It provides automated coordination between the tools and as such maintains a certain level of abstraction for the analyst. It allows for rapid and customized improvement in the automation of the analysis process. The thesis discusses the background involved in testing tools, user interfaces, and the combination of the two into a useful tool. An implemented prototype is discussed and an example of failure region analysis performed with the graphical user interface is included.

NPSNET: AN ACCURATE LOW-COST TECHNIQUE FOR REAL-TIME DISPLAY OF TRANSIENT EVENTS: VEHICLE COLLISIONS, EXPLOSIONS AND TERRAIN MODIFICATIONS

William Dale Osborne-Captain, United States Army
B.S., United States Military Academy, 1981
Master of Science in Computer Science-September 1991
Advisors: Michael J. Zyda & David R. Pratt-Department of Computer Science

This work concentrates on a method for real-time collision detection and how to resolve that collision when it has occurred. The results of this effort are only a small part of the overall system, NPSNET. The collision detection mechanism is integrated into the overall system to create realism involving collisions. The original NPSNET did not contain a collision detection and response module. The collisions to be detected include explosions such as missile contact with a vehicle, one vehicle running into another such as a jeep and a tank, and terrain modifications such as an artillery round hitting the ground and creating a crater. The overall system complements the DoD large-scale networking system, SIMNET. The NPSNET system is portable and able to run on any graphics workstation that has the GL libraries.

THE IMPLEMENTATION OF FORM-BASED INTERFACE FOR RELATIONAL DATABASE

Partoyo-Major, Indonesian Army
Master of Science in Computer Science-December 1990
Advisor: Thomas Wu-Department of Computer Science

Currently the problem with the relational DBMS's is a lack of user-friendly interfaces. Relational query languages such as SQL and QUEL are not ideal languages for end-users. The forms approach is considered the most natural interface between end-user and database. Several systems based on the forms concept have been designed and implemented. This thesis studies the effectiveness of a form-based visual interface. To evaluate the development process of the form-based applications, this thesis includes the simple implementation of form-based interface using the Form Designer of Superbase-4.

DESIGN OF A GRAPHICAL USER INTERFACE FOR A MULTIMEDIA DBMS: QUERY MANAGEMENT FACILITY

Charles Brown Peabody-Captain, United States Marine Corps
B.S., University of New Hampshire, 1981
Master of Science in Computer Science-September 1991
Advisor: Vincent Y. Lum-Department of Computer Science

This thesis presents criteria and necessary features by which to evaluate and design a good graphical user interface (GUI) for a Multimedia Database Management System (MD-BMS). This material is also applicable to a traditional DBMS. Included in the thesis is the specification for a Query Management Facility (QMF) for a MDBMS user interface. The nature and benefits of the GUI environment, requires that we consider GUI concepts early in the user interface conceptualization and design. In today's DBMS user interfaces, these GUI concepts are for the most part applied as an after-thought. This is a critical mistake. Early incorporation of GUI capabilities along with established user interface principles results in a superior user interface. The QMF presented herein is one such interface. It combines the ideas of simple operations and data flow to allow the user to specify his query. Additional concepts used include: picture of the database schema, picture of the developing query, selectable objects, direct manipulation, piecemeal query specification, display of intermediate results and pre-defined joins. The resulting QMF is simple to use and enables the flexible expression of the simple as well as the complex database query.

USING SOLID MODELING TECHNIQUES TO CONSTRUCT THREE-DIMENSIONAL ICONS FOR A VISUAL SIMULATOR

Jane Stolarski Polcrack-Captain, United States Army
B.B.A., St. Bonaventure University, 1983
Master of Science in Computer Science-September 1991
Advisor: Michael J. Zyda-Department of Computer Science

Realistic three dimensional (3D) models are an essential part of any battle simulator. They contribute greatly to the quality of the scenarios and the decision making training the system can provide. Commercial programs are available to build and modify these models, also known as icons, but they tend to be very expensive and complicated. They also tend to be very specific as to the file format used to store icons. The developers of the Naval Postgraduate School's battle simulator, NPSNET, need a simple, easy to use, and inexpensive system which allows them to quickly build and modify icons stored in Object File Format (OFF). We present the program NPSICON to meet this need and also discuss some of the issues involved in building 3D icons. NPSICON runs on commercially available Silicon Graphics, Inc. IRIS workstations.

RAPID PRODUCTION OF GRAPHICAL USER INTERFACES

Richard Montgomery Prevatt, III-Lieutenant Commander, United States Navy
B.S.E., Duke University, 1977
Master of Science in Computer Science-December 1990
and
David Maurice King-Lieutenant, United States Navy
B.S., North Dakota State University, 1984
Master of Science in Computer Science-December 1990
Advisor: Michael J. Zyda-Department of Computer Science

There is a growing demand within the military for effective, flexible and configurable command and control workstations suiting the diversity of experience and working style that commanders bring to the decision making process. This need motivates development of real-time three-dimensional simulators at the Naval Postgraduate School. Our work concentrates on the graphical user interface and presents a study of information display, interface human factors, and underlying implementation efficiency considerations so as to enhance real-time simulation systems with minimal degradation in performance. High quality interface software is costly in time and money, and it is essential for effective system performance. Our research culminated in the implementation of the NPS Panel Designer and ToolBox (NPSPD), an automated development environment that enables design, implementation, modification, and testing of customized graphical user interfaces. NPSPD includes automatic generation of compilable source code which can stand alone or be integrated quickly into a developer's application. NPSPD was developed using Silicon Graphic Inc. IRIS 4D/70GT and 4D/GTX workstations, relatively low-cost systems which are commercially available. Methodology used and techniques developed provide a foundation applicable to any hardware capable of a windowing environment and graphics display.

DESIGN AND IMPLEMENTATION OF A CONCRETE INTERFACE GENERATION SYSTEM

Randy James Rachal-Lieutenant, United States Navy
B.S., Northwestern State University, 1982
Master of Science in Computer Science-December 1990
Advisor: Valdis Berzins-Department of Computer Science

The purpose of this thesis is to design and implement a concrete interface generation system. The concrete interface generator is a software system which takes a formal specification as input and generates the specification part of an Ada implementation as output. Attribute grammars and fourth-generation language tools have been used in the implementation of this system. Spec, a formal language for writing black-box specifications for large software systems, was used as the input for the concrete interface generation system. Ada was chosen to be the computer language generated by the system. This thesis implements a subset of the Spec language, discusses the design methodology used in its implementation, and presents guidelines for the mapping of Spec to Ada. Included is a listing of the Spec grammar, the concrete interface generator systems source listing, a sample of input used to test the system, and resulting output.

DESIGN OF AN INTELLIGENT TUTORING SYSTEM SHELL

Robert Edward Scurlock, Jr.-Captain, United States Army
B.S., United States Military Academy, 1982
Master of Science in Computer Science-September, 1991
Advisor: Yuh-jeng Lee-Department of Computer Science

Computer technology has brought about numerous changes in the availability of educational media, especially the Intelligent Tutoring System (ITS). Since the development of an ITS is such an interdisciplinary task, the instructor needs assistance in developing these educational aides. An ITS shell, or authoring system, is the tool that will enable ITSs to make the transition from research arena and into the educational environment. The conceptual model of the ITS shell proposed in this thesis uses a layered approach to accessing the different modules of the ITS. The components, or subcomponents, of each module consist of either existing programs, or are selectable options developed by area experts. These options should allow the instructor to develop an ITS concentrating on the material being presented and on the method of interaction the student has with that material. The emphasis on the construction of these components is portability, modularity, and flexibility. The C Language Integrated Production System (CLIPS) is used as the inferencing and control mechanism. The design methodology proposed is the Object Oriented Programming approach. The emphasis of this thesis is on interface tools and presentation systems that allow for linking and integration into the ITS shell proposed.

A MOBILE ROBOT SONAR SYSTEM

Solomon Rand Sherfey, III-Lieutenant, United States Navy
B.S., Chapman College, 1982
Master of Science in Computer Science-September 1991
Advisor: Yutaka Kanayama-Department of Computer Science

In order to function autonomously in the real world a mobile robot must first be able to sense the boundaries of its operating space. Once the enclosing features and/or obstacles have been sensed they must be interpreted and represented in some way meaningful to the robot's controlling algorithms. The objective of this work is the development of a system of ultrasonic sensors, or sonars, for the mobile robot YAMABICO-11 at the Naval Postgraduate School, and the implementation of a user friendly set of sonar language functions for the robot's control language MML. The sonar hardware includes twelve transducer pairs, their drivers and a bus mounted control card. The sonar control system operates autonomously under direction of the robot's central processor. Extraction of linear features is accomplished by the use of a least-square-fit algorithm of cartesian coordinate pairs to a parametric representation of the including line segment.

BOILERMODEL: A QUALITATIVE MODEL-BASED SYSTEM IMPLEMENTED IN ADA

James F. Stascavage-Lieutenant, United States Navy
B.A., University of Dallas, 1982
Master of Science in Computer Science-September 1991
Advisor: Yuh-jeng Lee-Department of Computer Science

Effective, inexpensive, and realistic on-going training is required to keep all Naval personnel proficient in their fields. Nowhere is this more true than in steam propulsion engineering plants. The complex systems of valves, piping, and components require continual refresher for watchstanders to perform their jobs safely. BoilerModel is a qualitative expert system designed using model-based reasoning principles and implemented in Ada. It accurately models a 1200 psi D-type boiler and its associated peripherals. The use of fundamental intra-component relationships ("first principles") and constraint propagation result in compact code because there is no need for the extensive rule base found in conventional expert systems. Implementation in Ada permits the use of concurrent tasking to simulate simultaneous valve propagation found in real-world boiler systems. Additionally, Ada's portability allows BoilerModel to be compiled and run on virtually any machine, thereby making it an affordable and attractive complement to shipboard engineering training.

DESIGN AND IMPLEMENTATION OF A MULTIMEDIA DBMS: MODIFICATION AND DELETION

Rosemary Ellen Stewart-Captain, United States Army
B.S., United States Military Academy, 1982
Master of Science in Computer Science-September 1991
Advisor: Vincent Y. Lum-Department of Computer Science

In the computer science department at the Naval Postgraduate School students are currently working on a multimedia database management (MDBMS) project. This prototype designed in 1988, has the ability to capture, store, manage, retrieve and present both standard data, like alphanumerics and numerics, and media data. Media data in this thesis refers to graphics, signals, sound and image and is stored using the abstract data type (ADT) concept. The MDBMS is built upon a conventional INGRES DBMS using the concept of abstract data type (ADT). The multimedia database management system (MDBMS) can integrate audio, image (video) and formatted data so that these forms of data can process in the following ways: create tables, insert, delete, and retrieve. To be a complete database management system, working delete and modification operations are needed for updating data already stored in a DBMS or removing information no longer requiring storage. Formatted data is passed directly to INGRES for all area of processing. However, the inclusion of image and sound media data types in the MDBMS requires additional data structures and applications for modifying data that the INGRES catalog management cannot process directly. The special handling, SQL relational operations required to process data in the MDBMS are discussed. This thesis concentrates on the design and implementation operations for deletion and modification of formatted and unformatted data in the MDBMS.

DESIGN AND IMPLEMENTATION OF VISUAL INTERFACE TO DATABASE

Suprapto-Captain, Indonesian Air Force
B.A., Surabaya Institute of Teachers and Educational Sciences, 1978
Ph.D., Surabaya Institute of Teachers and Educational Sciences, 1981
Master of Science in Computer Science-September 1991
Advisor: Thomas Wu-Department of Computer Science

Traditional approaches to database system design and implementation involve text-oriented data access with their inherent lack of modularity, extensibility and modifiability. An alternative to this traditional approach is using visual interface for the design and implementation of databases. This alternative approach involves using software development tools (toolkits) to ensure modularity, extensibility and modifiability. To study the effectiveness of using visual interfaces, we have designed and implemented a sample application using KnowledgePro (Windows), a tool for rapid applications under Windows.

AN ADA OBJECT ORIENTED MISSILE FLIGHT SIMULATION

John V. Waite
B.S., Wayne State University, 1983
Master of Science in Computer Science-September 1991
Advisor: Yung-jeng Lee-Department of Computer Science

This thesis uses the Ada programming language in the design and development of an air-to-air missile flight simulation with object oriented techniques and sound software engineering principles. The simulation is designed to be more understandable, modifiable, efficient and reliable than earlier FORTRAN simulations. The principles of abstraction, information hiding, modularity, high cohesion and low coupling are used to achieve these goals. The resulting simulation is an accurate mapping of the problem space into software. The simulation is a three Degree-of-Freedom (3-DOF) model of RF/IR guided air-to-air missile. Two targets are also modeled. The simulation is primarily intended to study missile kinematics.

NPSNET: OBJECT ANIMATION SCRIPT INTERPRETATION SYSTEM

Phillip Donald West-Lieutenant, United States Navy
B.S., Penn State University, 1984
Master of Science in Computer Science-September 1991
Advisor: Michael J. Zyda-Department of Computer Science

The goal of this work is to develop a text-based script interpretation system for easy and efficient 3D visual simulations without extensive programming. Scripts are sequences of events representing task-level behaviors in virtual worlds systems. The Object Animation Script Interpretation System for NPSNET (NPSNET-OASIS), provides animators at the Naval Postgraduate School a mechanism for interacting with 3D visual simulations via scripted autonomous players. Libraries of scripts are collected for rapid generation of 3D visual simulations. NPSNET-OASIS makes use of object-oriented design methodologies for reusability and extensibility. Included in NPSNET-OASIS are the object tools for script processing, writing, and sorting.

MISSION EXECUTOR FOR AN AUTONOMOUS UNDERWATER VEHICLE

Wilfrid Paul Wilkinson-Lieutenant, United States Navy
B.S., United States Naval Academy, 1983
Master of Science in Computer Science-September 1991
Advisor: Yuh-jeng Lee-Department of Computer Science

The Naval Postgraduate School has been conducting research into the design and testing of an Autonomous Underwater Vehicle (AUV). One facet of this research is to incrementally design a software architecture and implement it in an advanced testbed, the AUV II. As part of the high level architecture, a Mission Executor is being constructed using NASA's CLIPS version 5.0. The Mission Executor is an expert system designed to oversee progress from the AUV launch point to a goal area and back to the origin. It is expected that the Executor will make informed decisions about the mission, taking into account the navigational path, the vehicle subsystems health, and the sea environment, as well as the specific mission profile which is downloaded from an offboard mission planner. Heuristics for maneuvering, avoidance of uncharted obstacles, waypoint navigation, and reaction to emergencies (essentially the expert knowledge of a submarine captain) are required. The Mission Executor prototype, SKIPPER, attempts to do this through the use of a three-tiered reasoning system which monitors overall mission status, functional area status, and individual equipment status simultaneously.

SECURING APPLICATIONS IN PERSONAL COMPUTERS: THE RELAY RACE APPROACH

James M. Wright-Lieutenant Commander, United States Navy
B.S., University of Florida, 1980
Master of Science in Computer Systems Management-September 1991
Advisor: Moshe Zviran-Department of Administrative Sciences

This thesis reviews the increasing need for security in a personal computer (PC) environment and proposes a new approach for securing PC applications at the application layer. The Relay Race Approach extends two standard approaches: data encryption and password access control at the main program level, to the subprogram level by the use of a special parameter, the "Baton". The applicability of this approach is demonstrated in an original Basic application and an existing Dbase IV application, representing both third generation language (3GL) and fourth generation language (4GL) environments. The Approach can add to overall network security in the PC LAN environment as well. The Approach is successful and proposed enhancements can strengthen the Approach.

OPTIMAL CONFIGURATION OF DIGITAL COMMUNICATION NETWORK

Goo Hwang Yong-Major, Republic of Korean Army
B.S., Computer Science, University of Dong-Kook, 1987
Master of Science in Computer Science-December 1990
Advisor: Myung W. Suh-Department of Administrative Sciences

As the costs for maintaining computer communication networks are rapidly rising, it is particularly important to design the network efficiently. The objective of this thesis is to model the minimum cost design of digital communication networks and propose a heuristical solution approach to the formulated model. The minimum cost design has been modeled as a zero-one integer programming problem. The Lagrangian relaxation method and subgradient optimization procedure have been used to find reasonably good feasible solutions. Although the reliability requirement for computer communication networks is as important as the cost factor, only the cost factor is considered in the context of this thesis.

MASTER OF SCIENCE
IN
ELECTRICAL ENGINEERING

AUTOMATIC DIGITAL HARDWARE SYNTHESIS USING VHDL

John W. Ailes-Lieutenant, United States Navy
B.S., Oregon State University, 1985
Master of Science in Electrical Engineering-September 1991
Advisor: Chin-Hwa Lee-Department of Electrical and Computer Engineering

The automatic synthesis of a hardware description language (HDL) representation of a digital device has been the subject of significant research in the past five years. This thesis explores this topic as it applies to finite state machines and combinational logic expressed in a subset of the IEEE standard language VHDL (VHSIC Hardware Description Language). It describes the subset chosen, and the development of VHDL2PDS, a program which automates the process of translating VHDL to PALASM, a hardware synthesis language. The PALASM description is then directly implemented into a field programmable gate array (FPGA) using the Xilinx Logic Cell Array (LCA) development system. Complete examples are provided which illustrate top-down design and testing using VHDL, and the use of software to produce a FPGA. This thesis demonstrates that selected constructs in VHDL can be automatically synthesized with a resulting savings in engineering development time due to the simplicity of this approach and the ease of verifying the correctness of the design.

PERFORMANCE ANALYSIS OF IMAGE MOTION ANALYSIS ALGORITHMS

Ibrahim Aksu-Lieutenant Junior Grade, Turkish Navy
B.S., Turkish Navy Academy, 1985
Master of Science in Electrical Engineering-June 1991
Advisor: Jeffrey B. Burl-Department of Electrical & Computer Engineering

Computer simulation studies of image motion analysis algorithms are presented. The algorithms are the extended Kalman filter algorithm, linear feature-based algorithms (perspective and orthogonal), and the accumulative differencing algorithm. The simulation studies both using computer generated and real images are conducted to determine the performance of the algorithms on low signal to noise ratio images. Using the results of simulation studies, a comparison of the performance of image motion analysis algorithms is performed.

COMMUNICATION NETWORK SURVIVABILITY

Soliman Al-Amro, Major-Saudi Arabian Army
B.S.E.E., University of Wisconsin, 1981
Master of Science in Electrical Engineering-March 1991
Advisor: Chyan Yang-Department of Electrical & Computer Engineering

A communication network is composed of communication links and processing nodes. The effective design of a survivable communication network requires a means of determining the structural connectivity of the network both as a whole and with respect in individual resources: links and nodes. In this thesis we represent the connectivity evaluation from two perspectives. The first pertains to considerations applicable to the design schema of the network, and the second deals with an improvement of connectivity in an existing network. We then present and analyze a practical synthetic approach to a communications network's survivability profile by using the example of SACS (the Saudi Arabian Communication System). Finally, we evaluate the difference between the theoretical and practical approaches to survivability.

ENHANCEMENT OF IMAGE PROCESSING CAPABILITIES FOR DIFFERENT ENVIRONMENTS

Erkan Aykac-Lieutenant Junior Grade, Turkish Navy
B.S., Turkish Naval Academy, 1985
Master of Science in Electrical Engineering-June 1991
Advisor: Charles W. Therrien-Department of Electrical & Computer Engineering

This thesis provides a set of tools for the enhancement of digital image processing capabilities on MS-DOS, UNIX, and VM operating systems with computer programming languages APL, C, FORTRAN, and MATLAB. The tools consist of input/output functions for images, programs for displaying images of SUN SPARC-stations and IBM-PC compatibles and finally a "toolkit" for MATLAB to implement the basic digital image processing functions.

AN ANALYSIS OF ALIASING IN BUILT-IN SELF TEST PROCEDURE

Jasa Barus-Captain, Indonesian Air Force
B.S., Padjadjaran University, Indonesia, 1977
Master of Science in Electrical Engineering-June 1991
Advisor: Chyan Yang-Department of Electrical Engineering

This thesis investigates aliasing probability in Built-in Self Test (BIST) procedures, in which a Linear Feedback Shift Register (LFSR) is used as a pseudo-random pattern generator, with a full-adder as a circuit-under-test (CUT). The Signature Analyzer implements a Multiple Input Signature Register (MISR) as a test response compressor.

REAL-TIME IMAGING AND INFRARED BACKGROUND SCENE ANALYSIS USING THE NAVAL POSTGRADUATE SCHOOL INFRARED SEARCH AND TARGET DESIGNATION (NPS-IRSTD) SYSTEM

Jean Daniel Bernier-Major, Canadian Forces
B.Eng., Royal Military College of Canada, 1984
Master of Science in Electrical Engineering-September, 1991
Advisor: Alfred W. Cooper-Department of Physics

The imaging in real-time of infrared background scenes with the Naval Postgraduate School Infrared Search and Target Designation (NPS-IRSTD) System was achieved through extensive software developments in protected mode assembly language on an Intel 80386 33 Mhz computer. The new software processes the 512 by 480 pixel images directly in the extended memory area of the computer where the DTL-2861 frame grabber memory buffers are mapped. Direct interfacing, through a JDR-PR10 prototype card, between the frame grabber and the host computer AT bus enables each load of the frame grabber memory buffers to be effected under software control. The protected mode assembly language program can refresh the display of a six degree pseudo-color sector in the scanner rotation with the two second period of the scanner. A study of the imaging properties of the NPS-IRSTD is presented with preliminary work on image analysis and contrast enhancement of infrared background scenes.

PERFORMANCE ENHANCEMENT OF THE NPS TRANSIENT ELECTROMAGNETIC SCATTERING LABORATORY

Aldo E. Bresani-Lieutenant, Peruvian Navy
Peruvian Naval Academy, 1983
Master of Science in Electrical Engineering-September 1991
Master of Science in System Engineering-September 1991
Advisor: Michael Morgan-Department of Electrical and Computer Engineering

This thesis describes the performance enhancement of the NPS Transient Electromagnetic Scattering Laboratory (TESL) accomplished by replacing the old HP 8349A microwave preamplifier of the dual amplifier configuration with a new Avantek 13533 5-13 GHz amplifier and optimizing the delay line length for the 1-6 GHz amplifier. New Matlab software was developed to process the signals scattered from canonical and complex targets. This software includes a program to calculate the correct delay line length for either amplifier in future modifications. The updated TESL is shown to provide measurements yielding excellent agreement with theoretically predicted responses of canonical targets demonstrating a significant improvement of the signal to noise ratio as compared with the previous configuration. A target library was created to support research in radar target identification based on natural resonances.

EFFECTS OF VIDEO BANDWIDTH ON THE PERFORMANCE OF A SQUARE LAW DETECTOR WITH GAUSSIAN IF AND VIDEO FILTERS

Long Wee Chang-Major, Republic of Singapore Air Force
B.E.E., National University of Singapore, 1983
Master of Science in Electrical Engineering-September 1991
Advisor: Donald V.Z. Wadsworth-Department of Electrical and Computer Engineering

The effects of Gaussian-shaped IF and video filters on the performance of a square-law detector employing post-detection integration are analyzed. The number of additional noise-only samples that are integrated due to a finite video bandwidth is determined. Emerson's method is used to obtain an expression for the cumulants of the output probability density function. These cumulants are used in Edgeworth's asymptotic series expansion of the density functions. By integrating these density functions, the receiver operating characteristics are determined for various ratios of IF bandwidth to video bandwidth. A collapsing ratio which takes into account the Gaussian shape of the filters is formulated and compared against Barton's approximate formula for collapsing ratio. For typical video bandwidths, Barton's approximate formula is found to overestimate the collapsing loss by an amount less than 0.5 dB.

PROFILE SAMPLING DEPENDENCE OF THE MLAYER PROGRAM

Ting-Hsun Chang,-Lieutenant, Taiwan Navy
B.S., Chinese Naval Academy, 1984
Master of Science in Electrical Engineering-March 1991
Advisor: Hung-Mou Lee-Department of Electrical & Computer Engineering

The dependence of the predictions of the MLAYER program on the set of heights at which the refractive index value are sampled from a fixed reference profile are analyzed. A refractivity profile with a four-meter evaporation duct is adopted as a reference. Two variable piecewise linear profiles of four and five segments, respectively, are used to approximate the reference profile for MLAYER computations. The sensitivities of the waveguide mode location, the range attenuation rate, and the height-gain function to the changes of the piecewise linear profiles are investigated at the frequencies 3, 6, 10, and 16 GHz. The frequency dependence of the dominant mode for one profile is also studied to investigate the fact that the sensitivity to changes in sampling point location is lower at 6 GHz than at other frequencies. A general rule-of-thumb for the change in range attenuation rate due to a slight change in refractivity is suggested.

ARRIVAL TIME TRACKING OF PARTIALLY RESOLVED ACOUSTIC RAYS WITH APPLICATION TO OCEAN ACOUSTIC TOMOGRAPHY

Edwin K. Chaulk-Lieutenant(N), Canadian Armed Forces
B.S., Memorial University of Newfoundland, 1979
Master of Science in Electrical Engineering-March 1991
Advisors: James H. Miller & Ralph Hippenstiel-Department of Electrical & Computer Engineering

Accurate estimation of arrival times along an ocean acoustic ray path is an important component of ocean acoustic tomography. A straightforward method of arrival time estimation, based on locating the maximum value of an interpolated arrival, was used with limited success for analysis of data from the December 1988 Monterey Bay Tomography Experiment. Close examination of the data revealed multiple closely spaced arrivals of similar amplitude, only partially resolved in many returns. A modification to the original tracking algorithm succeeded in improving the estimates and lead to the development of a tracker based on a least mean squares (LMS) linear predictive filter. A second algorithm, based on a modified recursive least squares (MRLS) solution, allows the estimation of dynamic spectral processes at surface and internal wave frequencies in the tomography arrivals.

SECOND AND THIRD ORDER MINIMUM TIME CONTROLLERS AND MISSILE ADJOINTS

Colin Roy Cooper
B.S., University of California, San Diego, 1987
Master of Science in Electrical Engineering-June 1991
Advisor: Harold A. Titus-Department of Electrical & Computer Engineering

The optimal minimum time control (i.e. bang-bang controller) is applied to the fast reaction missile defense problem. From Pontryagin, the optimal control was determined to be a function of the adjoint in the minimization of the Hamiltonian. The control may also be posed either as a function of time or as a function of the states. The state space can be partitioned into regions, surfaces and curves where the optimal control action is either its maximum plus or minus N. In missile simulation problems, the method of adjoints is often used in parametric studies of errors and miss distance. This technique is developed both graphically and mathematically, and is used here to help one visualize the solution trajectory and families of optimal trajectories for all possible initial conditions.

SOUND PROPAGATION IN THE INHOMOGENEOUS OCEAN

Daniel L. Devany-Lieutenant, United States Navy
B.S.E.M., West Virginia University, 1981
Master of Science in Electrical Engineering-June 1991
Advisor: Lawrence J. Ziomek-Department of Electrical & Computer Engineering

By using a linear systems theory approach, an ocean medium transfer function based on the WKB approximation can be developed. The phase computations for the transfer function are made by evaluating the WKB phase integral. Two applications of ray acoustics theory are investigated as accurate, efficient alternatives to direct numerical integration of the WKB phase integral. Both applications base phase computations on signal travel time. The difference is their treatment of the sound-speed versus depth data pairs. One forms a sound-speed profile by using the piecewise linear approximation method while the other uses an Akima cubic spline fit to the data. Each method can identify source-to-receiver eigenrays and provide ray trace plots.

AN ANTENNA DESIGN FOR PANSAT USING NEC

Daniel A. Ellrick-Captain, United States Marine Corps
B.S.E.E., Purdue University, 1984
Master of Science in Electrical Engineering-June 1991
Advisor: Richard W. Adler-Department of Electrical & Computer Engineering

In this thesis the Numerical Electromagnetics Code (NEC) is used to design an omnidirectional antenna for the Petite Amateur Navy Satellite (PANSAT). The completed antenna design uses a tangential turnstile antenna to achieve a circularly polarized radiation pattern with predicted worst nulls of approximately -3.0 dBi. The use of NEC-3, recently ported to 80386 personal computers, demonstrates the potential of personal computers for performing this type of design work. A simple antenna feed system was also designed. Performance predictions for the completed antenna system were made through the application of simple statistical functions to the NEC output.

ITERATIVE METHODS FOR ESTIMATION OF 2-D AR PARAMETERS USING A DATA-ADAPTIVE TOEPLITZ APPROXIMATION ALGORITHM

John C. Eremic-Lieutenant, United States Navy
B.S., University of the State of New York, 1983
Master of Science in Electrical Engineering-September 1991
Advisor: Murali Tummala-Department of Electrical and Computer Engineering

A new two-dimensional data-adaptive algorithm utilizing the iterative Toeplitz approximation method is presented. This algorithm provides a robust and efficient means for accurate estimation of 2-D autoregressive parameters representing spatially variant data arrays. Its convergence performance is comparable to that of the 2-D Recursive Least Squares (RLS) algorithm but is computationally more efficient. The savings in computation is realized by reducing the size of the matrix to be inverted when solving the AR model normal equations. The ability of the algorithm to accurately estimate the model parameters using very small data sets and various windowing schemes are evaluated. Spectral estimates are compared for quarter-plane (QP), nonsymmetric half-plane (NSHP) and combined quadrant (CQ) regions of support. Additionally, the algorithm is tested in noise cancellation and line enhancement applications using image arrays. This algorithm may be implemented for data-adaptive image processing or coding and for applications requiring 2-D spectral estimation.

INVESTIGATION INTO EFFICIENT CONVERSION METHODS BETWEEN RESIDUE AND BINARY SYSTEMS

David E. Gilbert-Lieutenant, United States Navy
B.S.E.E., University of South Carolina, 1985
Master of Science in Electrical Engineering-September, 1991
Advisor: Chyan Yang-Department of Electrical and Computer Engineering

Residue number systems (RNS) can efficiently perform addition, subtraction, and multiplication in a parallel and fault tolerant manner. Because of this, they hold significant promise for use in digital signal processing, where high speed arithmetic operators are needed. However, the difficulties in using RNS, such as magnitude comparison between two RNS values, division, and determining overflow or underflow out of system range, have prevented more widespread use of these systems. This thesis investigates traditional methods to perform comparisons and to propose some new ones. Proposals include residue number system with quotient (RNS-Q), residue number system quotient-on-demand (RNS-QD), and pipelined conversions from traditional RNS to a mixed radix representation. These proposals will be compared with traditional methods with respect to silicon area needed for implementation, speed with which they can be developed, and VLSI techniques utilized to carry out the design.

THE DEVELOPMENT OF A THERMAL ANALYSIS MODEL BUILDER FOR A PRINTED CIRCUIT BOARD

Stephen J. Glaser-Lieutenant, United States Navy
M.S., Purdue University, 1984
Master of Science in Electrical Engineering-September 1991
Advisor: Allan D. Kraus-Department of Electrical and Computer Engineering

The Naval Postgraduate School possesses software designed to perform thermal analysis of electronic components. At the core of this package is a model builder whose purpose is to generate a thermal model for use in steady state and transient thermal analyzers. The current version of the model builder requires excessive amounts of time for data input and model verification. This thesis describes the development of a model builder specifically designed to reduce the time required to model a printed circuit board containing up to four copper layers.

VIDEO-TEXT PROCESSING BY USING MOTOROLA 68020 CPU AND ITS ENVIRONMENT

M. Kadri Hekimoglu-Captain, Turkish Air Force
Gazi University, Ankara/Turkey, 1976
Master of Science in Electrical Engineering-March 1991
Advisor: Chyan Yang-Department of Electrical & Computer Engineering

The objective of this thesis is to design a small, stand-alone microcomputer using the MC68020 CPU and its environment. It is dedicated to one of the most common jobs of microcomputers: "Video-Text Generation." Therefore, it is named "VTG (Video-Text Generator)." VTC consists of a CPU (MC68020), CRT Controller (MC6845), and DUART (MC68681). The CRT Controller processes and generates the NTSC standard video-synchronization and video-text signals. The DUART accomplishes asynchronous serial communication with the Keyboard unit and allows for the parallel communication via its parallel port, with peripherals. The VTG has four 32 KB of RAM for main memory and one 16 KB of RAM for the CRT Controller Refresh Memory. The system software and the initialization routine is saved in 32 KB of ROM. Memory management and the generation of chip control signals are accomplished by two PALs (Programmable Logic Arrays) and two EPLDs (Erasable Programmable Logic Device). The CPU, PALs, EPLDs, and Memory chips in the VTG work at a speed of 8 MHz, while the CRT Controller works at 2 Mhz. In addition, the system has a "Video Synchronization and Multiplexing Unit" which make it possible to synchronize the VTG's video-text signal with an external video signal. Accomplishing this, the system can place its text information into any NTSC standard video picture. To perform these jobs, the system does not need another microcomputer or aid. It can work as a stand-alone system. In this thesis, the whole VTG system has been designed and implemented. Each PAL and EPLD was tested with a Logic Analyzer. Proper simulations were performed and observed to work properly, as they were programmed.

ESTIMATION OF MOTION PARAMETERS FROM IMAGE SEQUENCES

Fatih Ildiz-Lieutenant Junior Grade, Turkish Navy
B.S., Turkish Navy Academy, 1985
Master of Science in Electrical Engineering-June 1991
Advisor: Jeffrey B. Burl-Department of Electrical & Computer Engineering

The image motion analysis algorithms that generate the two dimensional velocity of objects in a sequence of images are developed. The algorithms considered consist of: the extended Kalman filter method; the spatiotemporal gradient methods; the spatiotemporal frequency methods; and the one-dimensional FFT methods. These algorithms are designed to perform on low signal to noise ratio images. Each of these algorithms is applied to a sequence of computer generated images with varying signal to noise ratios. Simulations are used to evaluate the performance of each algorithm.

ELECTROMAGNETIC SCATTERING FROM ROUGH SURFACE USING THE ON-SURFACE RADIATION BOUNDARY CONDITION (OSRC) METHOD

Spyridon G. Konidaris-Lieutenant J.G., Hellenic Navy
B.S., Hellenic Naval Academy, 1982
Master of Science in Electrical Engineering-December 1990
Advisor: Ramakrishna Janaswamy-Department of Electrical & Computer Engineering

Electromagnetic scattering from rough surfaces is of prime importance in the engineering field since it affects communication, radar, remote sensing, acoustics, etc. The actual problem of scattering from rough surfaces is complicated and involves three dimensional scattering from either lossy or dielectric, electrically large surfaces. Integral equations are widely utilized to solve this kind of problem but this solution to the problem is generally computationally intensive. In the On-Surface Radiation Boundary Condition (OSRC) method, a higher order radiation condition is imposed directly on the surface of the scatterer. This reduces the integral equation for the scattered field to a line integral which can be easily evaluated numerically. In this thesis, the OSRC method is used to formulate the problem of scattering from periodic rough, two-dimensional surfaces illuminated by a transverse magnetic, plane electromagnetic wave. Three geometric surfaces are considered. A comparison is made between the present formulation the exact solution, and the physical optics approximation.

AN APPROACH TO INTEGRATION OF REAL-TIME SOFTWARE FOR AN AUTONOMOUS UNDERWATER VEHICLE

Brent Lee Leatherman-Lieutenant, United States Navy
B.S., University of Florida, 1985
Master of Science in Electrical Engineering-June 1991
Advisor: Shridhar Shukla-Department of Electrical Engineering

The Naval Postgraduate School (NPS) is currently involved in a long term project to investigate and develop real-time software for command and control of Autonomous Underwater Vehicles (AUV). In support of this goal, NPS is currently designing and fabricating a testbed AUV. This thesis describes the design, development and testing of a real-time scheduling software package to act as the top layer of control software for the AUV. Also discussed are the various real-time scheduling policies available along with the features of the assigned operating system that allows implementation of the scheduler.

PARTICLE-SIZING SYSTEM FOR SCANNING ELECTRON MICROSCOPE IMAGES OF SOLID-PROPELLANT COMBUSTION EXHAUST

Yeaw-Lip Lee-Civilian, Singapore Ministry of Defense
Master of Science in Electrical Engineering-March 1991
B. Eng. (Elect), National University of Singapore, 1985
Advisor: John P. Powers-Department of Electrical & Computer Engineering

Accurate measurement of particle size distribution of rocket motor exhausts is essential for predicting the combustion efficiency and infrared plume signature. This thesis presents an automated method for extracting particle size distribution from scanning electron microscope (SEM) images. The SEM images were taken off a filter paper placed at the end of a collection probe inserted into the exhaust plume. The automated SEM extraction system consists of an IBM AT-based computer system fitted with a 512 x 480 pixel frame grabber. Photographic images taken off the SEM are acquired via a vidicon camera. A C language program was written to control the hardware and automate the extraction process. A threshold is first applied to the digitized image and the resulting binary image is subjected to object segmentation. Each object is then sized and the distribution for one or more images can be plotted. The main bulk of this thesis is to document the software specially written to undertake this set of tasks. Results obtained were compared with that from a Malvern MasterSizer particle sizer and found to be favorable. Particles as small as 1/8 μm have been successfully sized.

INVESTIGATION OF AN EQUIVALENT CIRCUIT FOR AN INDUCTIVE STRIP IN FINLINE WITH DIELECTRIC

Michael R. Linzey-Lieutenant, United States Coast Guard
B.S., United States Coast Guard Academy, 1976
Master of Science in Electrical Engineering-June 1991
Advisor: Jeffery B. Knorr-Department of Electrical & Computer Engineering

This thesis describes a circuit model for the inductive strip in inhomogeneous finline with the following geometry: fine and strip centered in the shield, dielectric material with $\epsilon_r = 2.22$, b/a/ = 4/9, $0.5 \leq W/b \leq 1.0$, $T/a \geq 0.01$ and $0.0 \leq d/a \leq 0.1$. The model is shown to produce results that agree with data computed using the spectral domain method. The model has been generated using WR (90) waveguide operating in the TE_{10} mode.

A DESIGN OF FLOATING POINT FFT USING GENESIL SILICON COMPILER

Chung-Kuei Lu-Lieutenant Commander, Republic of China Navy
B.S., Chinese Naval Academy, 1981
Master of Science in Electrical Engineering-June 1991
Advisor: Chyan Yang-Department of Electrical & Computer Engineering

The hardware of floating-point MULTIPLY, ADD, and SUBTRACT units are designed to support the multiplication, addition, and subtraction operation necessary in the Fast Fourier Transform (FFT). In this thesis, the IEEE floating-point standard is adopted and scaled down to 16 bits, but the exponent is an excess-8 number represented using radix-2. A 16 bit reduced word size floating-point arithmetic unit for high speed signal analysis was implemented. The layout verification, functional simulation, and timing analysis of these units have been performed on the Genesil Silicon Compiler (GSC) system that was developed to overcome the shortcomings of the time consuming custom layout methods. The design of this thesis work can be used for further investigation of the high speed, pipelined floating-point arithmetic units.

USING EXPERT SYSTEMS IN MINE WARFARE

Han-Chung Lu-Lieutenant Commander, Republic of China Navy
B.S., Chinese Naval Academy, 1981
Master of Science in Electrical Engineering-June 1991
Advisor: Chyan Yang-Department of Electrical & Computer Engineering

Historically, sea mines warfare have played an important role in warfare, which a naval officer cannot afford to neglect. During the recent mine campaign in the Middle East involving Iran and Iraq, commanders delayed decisions on whether or not to deploy mine countermeasure (MCM) forces. As a result, damage occurred to ships in a minefield that could have been prevented by the speedy application of MCM. Before an operational mission is commenced, there are several uncertain questions in the mind of the commander: Do the mine-fields exist? Which country laid the mines? What type of delivery platform laid the mines? Where are the mines? What kind of mines are they? Do we need to deploy the MCM forces? Previously, these kinds of fuzzy questions were very difficult to answer by a tactical principle. In this thesis, the probabilistic inference network in an expert system environment is used to answer the above questions. The probabilistic inference network method is supported by the certainty factors. Calculations involving quantitative probabilities for answers to the above questions could enable the MCM experts to offer suggestions to the commander for reducing the ship's vulnerability at sea during wartime.

NATURAL RESONANCES OF SLOTTED CYLINDER CONFIGURATIONS

Keith O. Lyles-Lieutenant, United States Navy
B.S., Southern University, 1978
Master of Science in Electrical Engineering-March 1991
Advisor: Hung-Mou Lee-Department of Electrical & Computer Engineering

Electromagnetic sensitivity of systems from intentional apertures such as radar antennas and optical sensors are generally well studied and understood. Characteristics of electromagnetic energy that leaks into an enclosed volume through unintentional apertures such as seam at bolted, riveted, or screwed joints are not understood analytically or from a practical standpoint. Measurement of the electromagnetic field of axially slotted cylinders of varying slots widths provides a simple method for the analysis of internal coupled fields. Experimental results of resonance measurements and theoretical computations conducted on slotted cylinder configurations are presented. These measurements provide practical information on the resonance characteristics of different slotted cylinder configurations. Analysis of the data will provide insight into the phenomena of E-field coupling and natural resonances of slotted cylinders.

POLE-ZERO MODELING OF TRANSIENT WAVEFORMS: A COMPARISON OF METHODS WITH APPLICATION TO ACOUSTIC SIGNALS

Gary L. May-Lieutenant, United States Navy
B.S., Harvey Mudd College, 1982
Master of Science in Electrical Engineering-March 1991
Advisor: Charles W. Therrien-Department of Electrical & Computer Engineering

The modeling of damped signals as the impulse response of a pole-zero system is considered for a broad range of pole-zero modeling algorithms. The goal is to obtain the best possible fit between the model impulse response and the modeled signal. Prony's method, the least squares modified Yle-Walker equations (LSMYWE), iterative prefiltering, and the Akakie maximun likelihood estimator are compared on known test sequences for a variety of model degrading situations (e.g., additive noise) to develop an understanding of which methods are most suitable for modeling real world signals. A correlation domain version of interative prefiltering is also introduced. The most robust algorithms are determined to be LSMYWE using singular value decomposition and iterative prefiltering (including the correlation domain version). Modeling several laboratory generated short duration acoustic signals confirmed the robustness of LSMYWE and iterative prefiltering. It is shown that correlation domain iterative prefiltering outperforms standard iterative perfiltering when large model orders are required for accurate modeling. Shank's method was determined to be the most effective method of determining the zeros of a pole-zero model when a time domain match is required.

DESIGN IMPLEMENTATION INTO FIELD PROGRAMMABLE GATE ARRAYS

Norman C. Messa-Lieutenant, United States Navy
B.S., Chapman College, 1982
Master of Science in Electrical Engineering-March 1991
Advisor: Chin-Hwa Lee-Department of Electrical & Computer Engineering

In the past three years a new type of programmable logic device has emerged. The programmable gate array is a new approach to an old problem of trying to implement logic designs in an efficient manner. This thesis explores the implementation of design using the Field Programmable Gate Array (FPGA). In particular, this thesis utilizes the XILINX development system tools to implement design into the XILINX Logic Cell Array (LCA). This thesis begins by defining the characteristics of the LCA and then defines the characteristics of the Small Computer Systems Interface (SCSI) which is used as a design implementation example. The XILINX implementation method is then explored and a complete design implementation study is conducted on the design example. Both Mentor Graphics and Futurenet schematic capture tools are sued for design entry. Following design implementation, backannotated design simulation is performed to study the effect of the LCA technology on design performamce. The results of this thesis showed that designs implemented using this technology peformed comparably to other implementation technologies. Additionally, this implementation method allows design to be completed in a significantly shorter time frame than previously possible.

FAST CORRELATION APPLIED TO PASSIVE RANGING
Frank Jude Mika-Civilian, United States Air Force
B.S.E.E., *University of Miami*, 1985
Master of Science in Electrical Engineering-September 1991
Advisor: Ralph D. Hippenstiel-Department of Electrical and Computer Engineering

Application of classic triangulation methods will allow the location of a radar to be determined by passive sensors. Through the use of modern digital signal processing techniques this estimate can be made in a simpler fashion using a conventional receiver. In this thesis a technique is developed for time difference of arrival (TDOA) estimation using a frequency domain based correlation detector driven by an envelope detector. Time lag boundaries are defined on the output of the correlator. A fixed detection threshold is calculated to permit constant false alarm rate (CFAR) detection. The performance of the correlation detector is plotted as a receiver operating characteristic (ROC) curve as a function of signal to noise ratio (SNR). An interactive MATLAB software program is proved to perform either spectral domain or time domain based correlation. Spectral domain based correlation uses the Fast Fourier Transform (FFT). Implicit with the use of the FFT are finite arithmetic internal processing errors which are modeled as independent uncorrelated noise sources. A method is presented to account for SNR degradation at the output of the FFT.

PASSIVE SONAR TARGET RECOGNITION
USING A BACK-PROPAGATING NEURAL NETWORK
David Franklin Moore-Lieutenant, United States Navy
B.S., University of California, 1982
B.S., California State University, 1986
Master of Science in Electrical Engineering-June 1991
Advisor: Murali Tummala-Department of Electrical Engineering

The prompt and accurate processing of sonar data is essential in undersea warfare. The ability to quickly detect and classify sonar targets is crucial to the performance and survivability of all navy surface ships and submarines. With the advent of neural network technology, new opportunities have arisen which could greatly enhance current sonar target recognition capabilities. The main objective of this research is to demonstrate the practical usage of neural networks in recognizing the acoustic signatures of passive sonar targets using simulated-at-sea conditions. We will review the theory behind neural networks, the problems associated with recognizing acoustic signals in an underwater environment, and we will make a detailed case study of a neural network's performance using test data generated from simulated sonar targets.

EXPERIMENTAL RESULTS FOR INDUCTIVE STRIPS IN INHOMOGENEOUS FINLINE
John P. Muir-Captain, Canadian Forces
B.Eng., Royal Military College of Canada, 1982
Master of Science in Electrical Engineering-September 1991
Advisor: Jeffrey B. Knorr-Department of Electrical and Computer Engineering

This thesis discusses some experimental results involving inductive strips in inhomogeneous finline. One resonator bandpass filters were constructed in inhomogeneous finline for $w/b = 1.0$, 0.5, 0.2 and 0.1 in X-Band waveguide. The frequency response of these filters was plotted using a scalar analyzer and the resonant frequency and crossover bandwidth were measured. The results were compared to those obtained using spectral-domain programs and CAD models developed at the Naval Postgraduate School.

IMAGE PROCESSING TECHNIQUES FOR ACOUSTIC IMAGES

Brian P. Murphy-Lieutenant, United States Navy
B.S., United States Naval Academy, 1984
Master of Science in Electrical Engineering-June 1991
Advisor: Roberto Cristi-Department of Electrical & Computer Engineering

The primary goal of this thesis research is to test the effectiveness of various image processing techniques applied to acoustic images generated in MATLAB. The simulated acoustic images have the same characteristics as those generated by a computer model of a high resolution imaging sonar. Edge Detection and Segmentation are the two image processing techniques discussed in this study. The two methods tested are a modified version of Kalman filtering and median filtering.

THE MINIMIZATION OF MULTIPLE VALUED LOGIC EXPRESSIONS USING PARALLEL PROCESSORS

Sabri Onur Oral-Lieutenant Junior Grade, Turkish Navy
B.S. Turkish Naval Academy, 1985
Master of Science in Electrical Engineering-September 1991
Master of Science in Systems Engineering-September 1991
Advisor Chyan Yang-Department of Electrical and Computer Engineering

The process of finding an exact minimization for a multiple-valued logic (MVL) expression requires an extensive search and enormous computation time. One of the heuristics to reduce this computation time is the Neighborhood Decoupling (ND) Algorithm by Yang and Wang. This algorithm finds near-optimal solutions for the given MVL expressions. The ND algorithm is an extension of HAMLET (Heuristic Analyzer for Multiple-valued Logic Expressions). The primary goal of this thesis is to reduce the computation time of the ND algorithm by using parallel processors. We developed a parallel version of the ND algorithm and tested it on an iPSC/2 (Intel Parallel Supercomputer). The parallel version of the ND algorithm actually executes in parallel a portion of the ND algorithm known as the clustering factor calculation. The number of nodes needed to run the programs is twice the number of input variables of the expression. The results indicate that the parallel version of ND algorithm halves the computation time compared to the sequential version. A secondary goal of this thesis is to initiate the parallelization of the HAMLET and the study of parallel computers, i.e., iPSC/2. The experiences we obtained with iPSC/2 suggest an alternative algorithm. The ND algorithm searches the first branch of the search tree assuming that the optimum solution will be on that branch. We developed a Multi-branch Concurrent ND (MCND) algorithm which concurrently searches multiple branches, hence increasing the probability of reaching the optimum.

COMPUTER SIMULATED MISSILE-TARGET ENGAGEMENT WITH A LUENBERGER OBSERVER AND A GROUND OBSERVER

Gerald L. Painter-Lieutenant, United States Navy
B.S., Temple University, 1983
Master of Science in Electrical Engineering-June 1991
Advisor: Hal Titus-Department of Electrical & Computer Engineering

The technique of proportional navigation is applied to a three dimensional missile-target engagement model. A Luenberger Observer is developed to reduce the effects of noise or jamming to the missile's seeker head. A ground observer which computes the deviations in target position and velocity and uplinks the deviations to the missile, is also evaluated using the Kalman Filter theory to determine the benefits of the additional information provided to the missile.

ANALYSIS OF RADIATION DAMAGED AND ANNEALED GALLIUM ARSENIDE AND INDIUM PHOSPHIDE SOLAR CELLS USING DEEP LEVEL TRANSIENT SPECTROSCOPY TECHNIQUES

Dimas Pinzon, Jr.-Major, United States Marine Corps
B.S., Polytechnic Institute of Brooklyn, 1975
M.S., University of Southern California, 1985
Master of Science in Electrical Engineering-March 1991
Advisor: Sherif Michael-Department of Electrical and Computer Engineering

Degradation of solar cell performance from radiation damage was found to be reversed through annealing processes. The mechanisms behind the degradation and recovery is based on deep-level traps, or defects, in the lattice structure of the solar cell. Through a process known as Deep Level Transient Spectroscopy (DLTS), a correlation can be made between damage/recovery and trap energy level/concentration of the cell. Gallium Arsenide (GsAs) and Indium Phosphide (InP) solar cells were subjected to 1 MeV electron irradiation by a Dynamitron linear acceleration at two fluence levels of 1E14 and 1E15 electrons/cm^2. The process of annealing included thermal annealing at 90°C with forward bias current and thermal annealing alone (for GaAs). After each cycle, DLTS measurements were taken to determine the energy level of the traps and their concentration. Multiple cycles of irradiation, annealing and DLTS were performed to observe the correlation between degradation and recovery to trap energy level and concentration. The results show that the lower energy level traps are associated with the recovery of the cells while the higher level traps are associated with the overall permanent degradation of the cells. Applying this information to future research could allow for significant increases in satellite mission life and potentially increase mission payload.

PARASITIC FREE SWITCHED CAPACITOR COMPOSITE OPERATIONAL AMPLIFIERS

Ralph Calvin Raisor-Lieutenant, United States Navy
B.S., Brigham Young University, 1982
Master of Science in Electrical Engineering-June 1991
Advisor: Sherif Michael-Department of Electrical & Computer Engineering

In this research, analog active circuits are analyzed and designed using periodic sampling techniques. Switched capacitor networks are the basis of these techniques. A parasitic free switched capacitor network is combined with composite operational amplifiers to facilitate implementation of low sensitivity, wide bandwidth, analog integrated circuits. The resulting designed network is implemented into a finite gain circuit and into a band pass filter network. The results of these applications are compared with the results obtained from continuous circuits of the same design.

PERFORMANCE OF A FAST FREQUENCY-HOPPED NONCOHERENT MFSK RECEIVER WITH RATIO-STATISTIC COMBINING OVER RICIAN FADING CHANNELS WITH PARTIAL-BAND INTERFERENCE

John Francis Riley-Lieutenant, United States Navy
B.S., In E.E., The Citadel, 1985
Master of Science in Electrical Engineering-June 1991
Advisors: R. Clark Robertson & Tri T. Ha-Department of Electrical Engineering

An error probability analysis is performed for a fast frequency-hopped, frequency-shift keyed noncoherent receiver with ratio-statistic combining for a Rician channel with partial-band interference. Results are obtained for binary and M-ary FSK receivers where M is 4, 8, or 16. Both the envelope and square-law detectors were analyzed. The probability of bit error is examined for different levels of diversity, thermal noise, severity of fading, fractions of bandwidth jammed, and varying jamming power. Comparisons for the different parameters are done to determine when diversity should be used. For the special case when there is no diversity, an analytic expression for receiver performance is obtained, and the performance of a receiver using envelope detection is found to be identical to that of a receiver using square-law detection for this special case. The results show that, for diversities of three and four, the envelope detector performs better than the square-law detector. It is shown that, for low signal-to-jammer ratios, diversity is generally a disadvantage, and for high signal-to-jammer ratios, diversity is generally an advantage. The transition is dependent on thermal noise and the value of M.

THE DEVELOPMENT OF A MODEL BUILDER FOR A MICROCIRCUIT SUBSTRATE

Patric Karl Roesch-Lieutenant, United States Navy
B.S., University of Florida, 1982
Master of Science in Electrical Engineering-June 1991
Advisor: Allan D. Kraus-Department of Electrical & Computer Engineering

The Naval Postgraduate School is currently in possession of software designed to perform a thermal analysis of electronic components. This software package incorporates a model builder whose primary function is to generate a thermal model. In its present configuration, the model builder requires an inordinate amount of time for data input and model verification. This thesis describes the development of a model builder designed specifically to reduce the time required to model the substrate, epoxy, and carrier layers of a microcircuit assembly.

COMMERCIAL FILTERS IN THE TOPOLOGICAL APPROACH TO POWER LINE NOISE ISOLATION

Brian M. Schmanske-Captain, United States Marine Corps
B.S.E.E., The Pennsylvania State University, 1986
Master of Science in Electrical Engineering-September 1991
Advisor: Stephen Jauregui-Department of Electrical and Computer Engineering

Signal Intelligence (SIGINT) receiver sites must maintain low electronic noise levels to ensure an adequate probability of intercept. Recently installed equipment in SIGINT sites, such as Uninterruptible Power Supplies (UPS), have been counter-productive to this end by injecting noise into the receiver systems via power conductors, cable shields, and grounds. This thesis examines the topological approach to isolating power line noise using commercial filters in a Barrier, Filter and Ground architecture. UPS generated noise is specifically examined, illustrating both the problem and possible solution.

DEVELOPMENT OF NOISE JAMMING TECHNIQUES FOR THE ULQ-21S ECM SYSTEM

Philip F. Spratt-Civilian, Pacific Missile Test Center, Point Mugu, CA.
B.S., San Francisco State University, 1985
Master of Science in Electrical Engineering-September 1991
Advisor: Frederic H. Levien-Department of Electrical and Computer Engineering

This report discusses the design, implementation, and testing of the waveforms and modulations required to generate the necessary noise jamming techniques to be incorporated into the ULQ-21S electronic countermeasure system. It begins by covering the type of waveforms and modulations required to generate the noise jamming techniques. It then discusses how these waveforms and modulations are implemented in hardware and software. Finally, it addresses the testing procedure and results of testing the waveforms and modulations.

A RING MODEL FOR LOCAL/MOBILE COMMUNICATIONS WITH CORRECT PACKET CAPTURE

Kim J. Tran-Civilian, United States Department of Navy
B.S., California State University, Long Beach, 1988
Master of Science in Electrical Engineering-March 1991
Advisor: Tri T. Ha-Department of Electrical & Computer Engineering

Researchers and scientists have been studying Aloha networks for many years hoping to improve the channel throughput and overcome the inherent instability. In this study, we are going to describe some of the Aloha network features. An application of the slotted Aloha network is considered for local/mobile radio communications. The near/far effect, Rayleigh, fading, and shadow fading arise in local/mobile radio communications due to differences in distances and topography between each of the users and the base station. These various effects cause a packet capture effect which improves overall channel throughput but leads to *different packet delay times* for the various users. An analysis of a ring model for local/mobile radio communications with correct packet capture is considered in this paper. The correct packet capture effect of one-ring and three-ring networks are studied. A Markov model is developed for a slotted Aloha network with capture. It is shown that the throughput in such a network is markedly greater than the standard 1/e. Perhaps even more important is the result that such networks are more stable under overload.

MODELING FOR IMPROVED MINIMUM RESOLVABLE TEMPERATURE DIFFERENCE MEASUREMENTS

Alejandro Ruben Ugarte-Lieutenant, Argentine Navy
Escuela Naval Militar, Argentina, 1980
Master of Science in Electrical Engineering-September 1991
Master of Science in Systems Engineering-September 1991
Advisor: Ron J. Pieper-Department of Electrical and Computer Engineering

The minimum resolvable temperature difference (MRTD) is widely accepted as the parameter that best describes the field performance of a thermal imaging system (TIS). Mathematical modeling that accurately predicts the MRTD has been of major interest to the infrared community over the last 30 years. This work reviews the currently accepted models for predicting the MRTD. Simplifying assumptions used by these models which deal with target spectrum are discussed and tested using specifications taken from a standard forward looking infrared (FLIR) system. In addition new models are proposed and tested. Two of these models are a direct extension of the recently proposed Vortman-Bar-Lev adaptive matched filter. A third model is based on the novel concept that the MRTD curve is predictable from a threshold condition on the visibility, rather than the signal-to-noise ratio, of the system-degraded bar pattern.

FREQUENCY, AMPLITUDE, AND PHASE TRACKING OF NONSINUSOIDAL SIGNAL IN NOISE WITH EXTENDED KALMAN FILTER

Muhittin Uner-Lieutenant Junior Grade, Turkish Navy
B.S., Turkish Naval Academy, 1984
Master of Science in Electrical Engineering-June 1991
Advisor: Harold A. Titus-Department of Electrical & Computer Engineering

This thesis applies extended Kalman filtering to the problem of estimating frequency, amplitude, and phase of a nonsinusoidal periodic signal contaminated by additive white, Gaussian noise. Parameters will be estimated up to the *m*th significant harmonic component. It also gives an approach for the case of less than *m*th significant harmonic components. The estimator will track the signal's fundamental frequency, amplitudes, and phases while these parameters are changing slowly over time. The amplitudes are estimated as if the fundamental frequency estimate is correct; the frequency and the phases of the signal are estimated as if the amplitude estimation is correct. This thesis also contains tracking and the capture behavior of the filter.

NONCOHERENT DETECTION OF COHERENT OPTICAL HETERODYNE SIGNALS CORRUPTED BY LASER PHASE NOISE

Kent C.M. Varnum-Lieutenant, United States Navy
B.S., United States Naval Academy, 1982
Master of Science in Electrical Engineering-March 1991
Advisor: R. Clark Robertson-Department of Electrical & Computer Engineering

An error probability analysis is performed for noncoherent detection of optical heterodyne signals corrupted by laser phase noise and additive white Gaussian noise. Two types of laser modulation are investigated, on-off keying (OOK) and frequency shift keying (FSK). Single user OOK system performance for different linewidth-to-bit rations is analyzed over a range of both signal-to-noise ratios (SNR) and normalized decision thresholds. The decision threshold analysis illustrates which noise source dominates system performance. An analytical expression representing the effect of laser phase noise on system performace is derived based on a high user bit rate assumption. The system performance obtained with the high bit rate expression is compared with the system performance obtained with currently used expressions to determine its range of validity. An error probability analysis is then performed for noncoherent detection of FSK signals corrupted by laser phase noise and additive white Gaussian receiver noise. The performance of the FSK system is compared with the performance of the OOK system. It is shown that optical FSK systems perform better than optical OOK systems. As a demonstration of future system capability, the performance of a multiuser FSK code-division multiple access (FSK-CDMA) system is analyzed. The results obtained indicate that the application of FSK-CDMA techniques to current wavelength division multiplexed (WDM) systems can increase user capacity up to one thousand fold.

EFFECTS OF NON-UNIFORM WINDOWING ON THE PERFORMANCE OF A FAST FREQUENCY-HOPPED NONCOHERENT MFSK RECEIVER OVER RICIAN FADING CHANNELS WITH PARTIAL-BAND INTERFERENCE AND DOPPLER SHIFT

Thomas W. Vece-Lieutenant, United States Navy
B.S., Loyola University of Chicago, 1984
Master of Science in Electrical Engineering-June 1991
Advisors: R. Clark Robertson & Tri T. Ha-Department of Electrical & Computer Engineering

An error probability analysis is done for a DFT based, M-ary frequency-shift keying (MFSK) communications system employing fast frequency-hopped spread spectrum signals. A linear combination procedure referred to as noise-normalization is employed at the receiver to minimize the effects of partial-band interference, which is modeled as additive Gaussian noise. The performance of the receiver is studied as a function of signal Doppler shift and type of windowing function used in the DFT. The use of fast frequency-hopped spread spectrum is found to improve the performance of the DFT based receiver in all but the most severe cases of Doppler shift. The use of a non-uniform window (i.e., a Hamming window) to improve receiver performance is effective only in the presence of large Doppler shifts. The amount of Doppler shift necessary to warrant the use of a non-uniform window depends on the amount of jamming noise power at the receiver, but is relatively insensitive to the frequency-hop rate used. In general, in the absence of any information concerning the nature of the received signal, a non-uniform window should be used because the performance degradation experience at small Doppler shifts is insignificant compared to the performance enhancement gained at large Doppler shifts.

COMPUTER AIDED THERMAL ANALYSIS OF A MICROCIRCUIT STRUCTURE

Joseph Arthur Willhelm, Jr.-Lieutenant Commander, United States Navy
B.S., Texas A&M University, 1974
Master of Science in Electrical Engineering-December 1990
Advisor: A.D. Kraus-Department of Electrical and Computer Engineering

The Naval Postgraduate School has obtained software which can be used for the thermal analysis of a electronic component. This software includes two versions, one for steady state analysis and the other for transient analysis. Each version consists of two programs, a model builder and a thermal analyzer. This thesis describes a user friendly, menu driven specific model builder which may be used to rapidly generate a thermal model, containing up to 750 nodes, for a microcircuit die. This model builder is an improvement over the existing model builder in that the only pertinent input will be the physical dimensions and heat transfer data. The main feature of this model builder is the accommodation of the marked variation of silicon thermal conductivity with temperature.

A COMPARISON OF HIGH-LATITUDE IONOSPHERE PROPAGATION PREDICTIONS FROM AMBCOM WITH MEASURED DATA

David J. Wilson-Major, United States Marine Corps
B.S., Oregon State University, 1975
Master of Science in Electrical Engineering-March 1991
Advisor: Richard W. Adler-Department of Electrical Engineering

This thesis examines the performance of SRI's Ambient Communications (AMBCOM) model for high-latitude propagation prediction. It is one in a series of studies, conducted at the Naval Postgraduate School, to establish the relative merits of several computer-based propagation prediction models using a standard set of measured data. AMBCOM modeled the propagation path between a transmitter located in the polar cap region and several midlatitude receiver sites. Model predictions were matched to measured data obtained during two high-latitude communication experiments (campaigns). The absolute difference between model signal-to-noise ratio (SNR) and measured SNR was considered as error. Error statistics were accumulated to show the distribution of the error by campaign and frequency. The percentage, by frequency, of match AMBCOM predictions in reference to total predictions for a given frequency was considered a measure of AMBCOM performance. AMBCOM exhibited small absolute values of average error, i.e., 7-11 dB, and high percentages of matched records. The average error was typically distributed between -20 and +20 db. Unfortunately, there are only relative measures of model performance. The site antenna and environmental data used to model high latitude campaigns were estimated not measured, and some variation in AMBCOM results may be attributable to poor estimates. The measured data were not designed specifically for model validation, and further comparisons are needed with new measured data.

IMPLEMENTATION OF MULTI-FREQUENCY MODULATION WITH TRELLIS ENCODING AND VITERBI DECODING USING A DIGITAL SIGNAL PROCESSING BOARD

John William Wisniewski-Lieutenant, United States Navy
B.S., Virginia Military Institute, 1984
Master of Science in Electrical Engineering-June 1991
Advisor: Paul H. Moose-Department of Electrical & Computer Engineering

Multi-Frequency Modulation has been the topic of several papers at NPS. In past systems the majority of time required for the generation of the MFM signal was due to the software routine used to implement the FFT. In this report a Digital Signal Processor was used to reduce the time needed to generate the FFT. The use of Trellis coding and Viterbi decoding on a Digital Signal Processor was also investigated. Assembly language programs for three encoder/decoder systems were developed. The first uses a 16 QAM signal, the second uses a 2/3 rate convolutional encoder and Viterbi decoder and the third uses the V.32 convolutional encoder and a Viterbi decoder.

THE ERROR PERFORMANCE ANALYSIS OVER CYCLIC REDUNDANCY CHECK CODES

Hee Byung Yoon-Lieutenant, Korean Navy
B.S., Naval Academy Korea, 1983
Master of Science in Electrical Engineering-June 1991
Advisor: Chyan Yang-Department of Electrical & Computer Engineering

The burst error is generated in digital communication networks by various unpredictable conditions, which occur at high error rates, for short durations, and can impact services. To completely describe a burst error one has to know the bit pattern. This is impossible in practice on working systems. Therefore, under the memoryless binary symmetric channel (MBSC) assumptions, the performance evaluation or estimation schemes for digital signal 1 (DS1) transmission systems carrying live traffic is an interesting and important problem. This study will present some analytical methods, leading to efficient detecting algorithms of burst error using cyclic redundancy check (CRC) code. The definition of burst error is introduced using three different models. Among the three burst error models, the mathematical model is used in this study. The probability density function f(b) of burst error of length b is proposed. The performance of CRC-n codes is evaluated and analyzed using f(b) through the use of a computer simulation model within CRC block burst error. The simulation result shows that the mean block burst error tends to approach the pattern of the burst error which random bit errors generate.

MASTER OF SCIENCE
IN
ENGINEERING ACOUSTICS

MULTIFREQUENCY ACOUSTIC RESONATORS WITH VARIABLE NONUNIFORMITY

Steven Lee Alkov-Lieutenant, United States Navy
B.S., Texas A&M University, 1984
Master of Science in Engineering Acoustics-June 1991
Advisor: Bruce C. Denardo-Department of Physics

A new type of acoustic resonator utilizes alterations of the nonuniformity to achieve different resonance frequencies. Each resonator is designed to yield different frequencies that correspond to musical notes. The apparatus are remarkably simple, employing pi ewise uniform cross sectional areas that can easily and quickly be changed. The resonators are thus useful as educational demonstrations. The phenomenon can be understood physically and quantified perturbatively by the energy method of Rayleigh, or equivalently by the method of adiabatic invariance. Improved accuracy is obtained by matching one-dimensional solutions of the wave equation in the uniform regions. The agreement between this theory and the experimental data is less than one percent.

INVESTIGATION OF A HEAT DRIVEN THERMOACOUSTIC PRIME MOVER ABOVE ONSET OF SELF-OSCILLATION

Earl Clayton Bowers-Lieutenant, United States Navy
B.S., United States Naval Academy, 1985
Master of Science in Engineering Acoustics-September 1991
Master of Science in Applied Science-September 1991
Advisor: Anthony A. Atchley-Department of Physics

The goal of this thesis is to investigate the work output of a heat driven thermoacoustic prime mover above onset of self-oscillation. The exponentially growing sound wave, generated when a prime mover is initially "turned on", was digitally sampled for a helium filled prime mover at pressures ranging from 238 kPa to 500 kPa and at temperature differences ranging from onset to 400 K. This data was then digitally filtered by a 100 Hz band pass filter centered on the prime mover's fundamental frequency. A least mean squares fit was applied to the envelope of the filter's output in order to determine the temporal absorption coefficient ß. From ß, the quality factor was computed. These quality factors were then compared to thermoacoustic theory. The agreement between the theoretical predictions and the measured results is extremely good at high mean gas pressures. As the mean gas pressure decreases, however, the agreement between the theoretical value of onset and the predicted slope of the data, increasingly deviate.

EXPERIMENTAL INVESTIGATION OF ENERGY DISSIPATION IN FINITE-AMPLITUDE STANDING WAVES

Chih-Lyeu Chen-Lieutenant Commander, Republic of China Navy
B.S., Taiwan Provincial College of Marine and Oceanic Technology, 1976
Master of Science in Engineering Acoustics-June 1991
Advisor: Anthony A. Atchley-Department of Physics

Thermoacoustic engines are designed to perform optimally at one frequency. However, the thermoacoustic prime movers have been shown to generate highly nonlinear waveforms, in which a significant amount of the acoustic energy appears in higher harmonics. This condition reduces the overall efficiency of the engine. The harmonics can be suppressed. But does the suppression mean that more energy remains in the fundamental frequency? This question is the topic of this thesis. Finite-amplitude standing waves were generated in a standing wave tube. The steady state input acoustic power was compared to the steady state dissipated acoustic power for two configurations - an empty tube and an obstructed tube - over a wide range of input powers. The waveforms in the empty tube were rich in harmonics, whereas the obstruction suppressed the harmonics significantly. The results of the measurements indicate that suppression of the harmonics also suppresses the transfer of energy from the fundamental.

NUMERICAL STUDIES OF LOCALIZED VIBRATING STRUCTURES IN NONLINEAR LATTICES

Brian Russell Galvin-Lieutenant, United States Navy
A.B., Harvard University, 1981
Master of Science in Engineering Acoustics-March 1991
Advisors: Bruce Denardo & Andres Larraza-Department of Physics

A simple numerical model using a modified Euler's method was developed to model nonlinear lattices. This model was used to study the properties of four breather and kink type solitons in the cutoff modes of a lattice of linearly coupled oscillators with a cubic nonlinearity. These cutoff mode solitons were shown to correspond very well to the theoretical predictions of Larraza and Putterman [1984] and the experimental work of Denardo [1990]. In addition, a fifth solition was discovered in the upper cutoff mode, which was not anticipated by the theory. A preliminary analytical attempt to describe this soliton and to describe solitons in the intermediate modes, due to Larraza, Putterman, and the author, is presented. Additional numerical work on intermediate mode solitons and domain walls was performed. These studies showed that kink solitons are ubiquitous, and that they appear to be intimately linked to domain wall structures. In order to demonstrate the flexibility of the computer program developed, the model was extended to include two dimensional lattices and one dimensional lattices with nonuniform characteristics. Two dimensional breather and kink solitons are described. Finally, a Toda lattice was modeled and some preliminary results obtained in preparation for future work.

UNDERWATER SOUND RADIATION FROM LARGE RAINDROPS

Peter W. Jacobus-Lieutenant, United States Navy
B.S., University of Southern California, 1985
Master of Science in Engineering Acoustics-September 1991
Advisors: Herman Medwin & Jeffrey A. Nystuen-Department of Physics

The principal underwater sound energy radiated by terminal velocity raindrops at sea is due to micro-bubble entrainment and oscillations which occur for drops of the two diameter ranges 0.8 to 1.1 mm (Type I) and 2.2 to 4.6 mm (Type II). In the absence of bubbles, particularly between 1.1 and 2.2 mm, the impact sound radiation is significant. The Type I bubbles radiate at frequencies close to 15 kHz, whereas Type II bubbles radiate between 2 and 10 kHz, depending on the drop diameter. Therefore Type II bubbles, which are common in moderate to heavy rainfall, offer the opportunity to determine rainfall drop distribution and total rainfall rate by remote underwater listening. Type II bubbles radiate more energy when the drop and surface temperatures differ, e.g., almost twice as much energy when the drop and surface temperatures differ by 10°C. Type II bubbles radiate less energy in saline water e.g., 45% as much energy at a salinity of 35 ppt as for fresh water. The distinctive sound spectral shape for a particular diameter raindrop does not change appreciably with extreme differences of temperature (0 to 22°C) or salinity (0 to 35 ppt). It is possible, therefore, to condense the data acquired from hundreds of drops in our laboratory into a single relation which gives the average energy radiated by a Type II raindrop as a function of drop volume, temperature and salinity. Using this relation, we find good agreement between measurements at sea and the predicted sound spectrum for an assumed reasonable drop size distribution. Also, the total rainfall rate and drop size distribution has been calculated from sound spectra measured at sea (the inverse problem). These early successes lay the groundwork for real time measurements of total rainfall rate and drop size distributions in moderate to heavy rainfalls inferred by remote underwater listening.

RECURSIVE RAY ACOUSTICS FOR THREE-DIMENSIONAL SOUND-SPEED PROFILES

F. Wynn Polnicky-Lieutenant, Canadian Navy
B.Math., University of Waterloo, Canada, 1976
Master of Science in Engineering Acoustics-September 1991
Master of Science in Applied Science-September 1991
Advisor: Lawrence J. Ziomek-Department of Electrical and Computer Engineering

A comparison of a simple recursive ray acoustics algorithm versus a ray acoustics algorithm based on solving a system of first-order ordinary differential equations was conducted. The recursive ray acoustics (RRA) algorithm was found to be accurate and relatively fast. The RRA algorithm is capable of handling sound speed as a function of all three spatial coordinates, and this capability was demonstrated. Two separate methods of representing a sound-speed profile (SSP) based on data points were examined: Akima cubic spline and spatial Fourier series (SFS). The SFS representation encountered difficulties in accurately modeling SSPs. Various techniques were applied to improve the SFS sound-speed representation. While accurate sound-speed fits were eventually achieved, difficulties remained in the SFS modeling of first and second-order derivatives of the sound-speed data. The RRA algorithm was tested using the SFS sound-speed representation and found to be significantly inaccurate. A demonstration was conducted of the ability of the SFS sound-speed representation to incorporate randomness in the SSP.

OCEAN BOTTOM SIMULATION USING FRACTAL GEOMETRY

Candace Joanne Robertson
B.S.E.E., University of Missouri
Master of Science in Engineering Acoustics-September 1991
Advisor: David Canright-Department of Mathematics

Fractal geometry can simulate natural topography, creating data that can be used in sonar models as realistic ocean bottom features. An algorithm using recursive subdivision, or midpoint replacement, is used to create the fractals. The appearance, statistics, and dimension of the fractal can be controlled through the use of variables. The variables control the initial corner values and the amount that each subdivision can vary from the average of its two initial points. The choice of a random number distribution also affects the final fractal. The statistics, fractal dimension, and appearance of data generated by the fractal algorithm are comparable to real data.

MASTER OF SCIENCE
IN
ENGINEERING SCIENCE

A FREQUENCY DOMAIN BASED APPROACH TO ON LINE SYSTEM IDENTIFICATION

Chi-Shun Chao-Lieutenant, Taiwan R.O.C. Navy
B.S., Chung Cheng Institute of Technology, 1985
Master of Science in Engineering Science-June 1991
Advisor: Roberto Cristi-Department of Electrical and Computer Engineering

This thesis addresses the problem of the identification of the dynamics of a linear system if the frequency domain. An algorithm operating on the Fast Fourier Transform (FFT) of blocks of signals is developed and its performance evaluated through computer simulation. Several properties are tested, in particular, its convergence and its capabilities of identifying the frequency response of the unknown system.

COMPLEMENTARY METAL OXIDE SILICON CYCLIC REDUNDANCY CHECK GENERATOR

Miao Chin-Commander, Republic of China Navy
B.S., Chinese Naval Academy, 1978
Master of Science in Engineering Science-June 1991
Advisor: Chyan Yang-Department of Electrical and Computer Engineering

This thesis introduces an economical way of implementing the test pattern generation for built-in test. A layout generator as well as a netlist generator are written and validated. In addition, we use the netlist generator to investigate the properties of nonprimitive polynomials.

THE NAVIGATION DATA-LOGGER FOR A SUITCASE NAVIGATION SYSTEM

Yu-Chi Chin-Commander, R.O.C., (Taiwan) Navy
B.S., Chinese Naval Academy, 1977
Master of Science in Engineering Science-June 1991
Advisor: Uno Kodres-Department of Computer Science

This thesis presents the design, implementation and description of a Data-Logger for the Suitcase Navigation System. All the programs and examples presented in this thesis were implemented in the Ada programming language, which has successfully incorporated the low-level I/O ports communication with high-level abstraction. The software is portable as desired and can be reused by LCCDS when needed.

VLSI IMPLEMENTATION OF FUZZY LOGIC OPERATOR UNIT

Ismail bin Dewa-Lieutenant Commander, Royal Malaysian Navy
B.S., Teesside Polytechnic, 1984
Master of Science in Engineering Science-June 1991
Advisor: Chyan Yang-Department of Electrical and Computer Engineering

Fuzzy logic is widely used in many applications that deal with uncertainty and approximate reasoning in decision making. Decisions can be made based on fuzzy inferences. Because of the ease with which Very Large Scale Integration (VLSI) circuits can be made, hardware implementation of fuzzy logic is thus seen to be an appropriate step to be taken to fully realize its potential. Fuzzy operations are based on three basic operators, the maximum, minimum and inverse functions. This thesis investigates its implementation in VLSI circuits, specifically for digital systems. Design structures such as bit-cascade, bit-slice, block-cascade and block-slice were implemented. Comparisons between these designs are provided.

SYSTEM EVALUATION OF A FREQUENCY HOPPING COMBAT NET RADIO

Syed Agha Hussain-Major, Pakistan Army
B.E., UE&T, Lahore, 1983
Master of Science in Engineering Science-September 1991
Advisor: Dan C. Boger-Department of Administrative Sciences

The importance of survivable radio communications in contemporary EW threat environments cannot be overemphasized. At the tactical level, in fast and fluid conditions, radio will remain the primary means of communication for command and control. Thus, it will be subjected to hostile EW efforts, e.g., jamming, direction finding, interception, etc. Therefore, the aim of this thesis is to carry out a comparative evaluation of several state-of-the-art frequency hopping combat net radios in order to select the best available choice for fielding into the Pakistan Army. The methodology of evaluation is primarily based on the system specifications provided by respective vendors. Greater emphasis is laid on the anti-jamming performance and upgradability of the systems in the process of evaluation.

NONCOHERENT DETECTION OF BFSK SIGNALS WITH LINEAR AND NONLINEAR DIVERSITY COMBINING OVER RICIAN FADING CHANNELS WITH PARTIAL BAND INTERFERENCE

Ahmet C. Karaagac-Lieutenant Junior Grade, Turkish Navy
B.S., Turkish Naval Academy, 1985
Master of Science in Engineering Science-March 1991
Advisor: Clark Robertson-Department of Electrical and Computer Engineering

A performance analysis of Binary Orthogonal Frequency Shift Keying (BFSK) Fast Frequency Hopped (FFH) receivers implemented with both square-law and envelope detectors is performed. Bit error probabilities of the two types of receivers for linear combining, noise-normalization combining, self normalization combining under worst case partial-band interference with nonselective Rician fading and thermal noise are compared. The analysis is repeated for the case of no interference to point out the effect of fading. A study of nonlinear diversity combining receivers (self-normalization and noise-normalization) is also performed for a system model that is free from thermal noise. Envelope and square-law detectors for particular types of nonlinear combining investigated do not differ in performance, but this is not true for linear combining detectors. The visible superiority of envelope detectors for linear combining is noted. Nonlinear combining receivers achieve a diversity and performance improvement compared to linear combining receivers.

RESONANT ACOUSTIC DETERMINATION OF COMPLEX ELASTIC MODULI

Beng Hock Tan-Civilian, Singapore Ministry of Defence
B. Eng.(Mech)., National University of Singapore, 1981
Master of Science in Engineering Science-March 1991
Advisors: Steven L. Garrett & David A. Brown-Department of Physics

An acoustic resonance based technique using a free-free bar has been extended to investigate the complex (storage and loss) moduli of non-magnetic materials having circular cross section. Using this technique, the bar can be selectively excited in three independent vibrational modes, i.e., torsional, flexural, and longitudinal modes. The torsional mode yields the shear modulus. Either the flexural or longitudinal mode can be used to obtain Young's modulus. These resonant modes can be tracked continuously by means of a phase-locked-loop (PLL) as the temperature (and resonant frequency) of the rod is changed. The in-phase amplitude of the receiver output of the electrodynamic transducer is proportional to the quality factor, Q, of the material. It can be used to continuously track the loss tangent ($=1/Q$) of the material as a function of temperature and frequency. Results for complex shear modulus and Young's modulus were obtained for a castable epoxy type PR1592 and complex shear modulus for polymethyl methacrylate (PMMA) and Uralite 3130. Over the temperature and requency range that was accessible, a clear viscoelastic transition was observed in both the storage modulus and loss tangent curves of PR1592.

MASTER OF SCIENCE
IN
HYDROGRAPHIC SCIENCE

EVALUATION OF ABSOLUTE POSITIONING USING THE DEFENSE MAPPING AGENCY'S GASP PROGRAM

Dennis Bredthauer-Civilian, Defense Mapping Agency
B.S., Worcester State College, 1982
Master of Science in Hydrographic Science-September 1991
Advisor: James R. Clynch-Department of Oceanography

The Geodetic Absolute Sequential Positioning (GASP) program, as utilized by the Defense Mapping Agency (DMA), processes static GPS measurements collected with the TI 4100 GPS receiver to estimate geodetic point (absolute) positions. In this thesis, the GASP program is modified to accept data from different receiver types, the estimated point positions are compared to positions produced by the Transit Doppler positioning system, the between-receiver estimates are compared, the difference between estimates using the broadcast and the precise are examined, and the effects of Selective Availability assessed. During the Monterey Bay Precision Positioning Experiment (MBPPE), conducted in the Winter of 1990-91, a large set of static GPS positioning data was collected with four types of GPS receiver; the TI 4100, the Trimble 4000ST, the Ashtech LD XII, and the Magnavox MX4200. Additional static GPS measurements were obtained with the TI 4100 receiver at a reference site established to support the experiment. A third data set was collected after activation of Selective Availability. Measurements collected with the TI 4100, Trimble, and Ashtech receivers were subsequently processed with GASP using broadcast and precise ephemerides to produce point position estimates. In order for GASP to accept the data from the Ashtech and Trimble receivers, the program had to be modified. The positioning results obtained are analyzed for accuracy and precision. The accuracy of the GASP GPS estimates is determined by comparison to independent estimates obtained by the Transit Doppler positioning system. Precision or repeatability (i.e., consistency of the estimated positions) is also examined. Analysis of the accuracy and repeatability reveals little difference between the positions computed for the three receivers using the precise ephemeris and that all three provide good agreement to the Transit Doppler positions. All three receivers are capable of providing geodetic-quality point positions. It is also clearly demonstrated that the precise ephemeris does produce a more accurate, higher precision solution than the broadcast ephemeris. The activation of Selective Availability has substantially degraded position solutions available from the broadcast ephemeris.

ACCURACY OF SHIPBORNE KINEMATIC GPS SURVEYING

Barry Grinker-Lieutenant Commander, Israeli Navy
B.S., Hebrew University - Jerusalem, 1979
Master of Science in Hydrographic Science-September 1991
Advisor: James R. Clynch-Department of Oceanography

In December 1990 an experiment was conducted at the Naval Postgraduate School in Monterey, California in which four different receivers, mounted on the mast of a ship, collected data simultaneously for several hours at a time. Ashtech LD-XII, Trimble 4000 ST, TI 4100 and Magnavox MX 4200 receivers were used. The reference system consisted of a Krupp Atlas Polarfix laser system set up on the shore at a pre-surveyed site. A two-axis vertical gyro system and a heading gyro gave the ship's 3-dimensional orientation at any instant in time, providing a connection between the laser reflector and the GPS antennas on the ship's mast. This enabled the reduction of the laser reflector's trajectory to the Ashtech and Trimble antennas for subsequent comparison to the kinematic GPS trajectories of these receivers determined by the postprocessing of the data collected. Each data set was processed once with the software provided by the manufacturer and once with an independent software package, OMNI, developed by the National Geodetic Survey. In addition to the software, six factors were examined to determine their effects on kinematic GPS surveys. They included: tropospheric corrections, initialization, satellite geometry, ephemeris type, data interval and multipath. In general the software available is versatile; however each package has some limitations which call for further development. The results indicate that the effects mentioned are small, generally less than the noise in the reference system. An important factor is the initialization of the kinematic process. Bad initialization can cause a reasonable solution for a period of time, but a sudden deterioration when the satellite configuration changes. Accuracy levels of a few decimeters were easily achieved with the systems and procedures used. Both Ashtech and Trimble produced trajectories which were accurate to within the noise level of the laser trajectories. In both cases the solution produced by OMNI differed from the solution produced by the manufacturer's software, only by a few centimeters.

PRECISION OF THE LONG BASELINE ACOUSTIC NAVIGATION SYSTEM USED BY PEGASUS

Margaret F. Haskell-Civilian, U.S. Naval Oceanographic Office
B.A., University of Maine, 1956
Master of Science in Hydrographic Science-June 1991
Advisors: John Hannah & Kurt J. Schnebele-Department of Oceanography

A least squares algorithm is developed to solve for the trajectory and transponder array coordinates of the current velocity profiler, Pegasus. Measurement residuals and parameter precision are computed for data quality analysis. Travel times from a maximum of four seafloor transponders, pressure sensor depths, and transponder positions are input with their respective accuracy estimates. The algorithm is used to analyze a 2250m profile from the Monterey Canyon with four transponders, one of which had not been positioned. This transponder's unknown position is found and problems in the other array coordinates identified. Transponder coordinate precision improves by factors of ten in the horizontal and five in depth, to about 13m (Drms) and 2m (1σ) respectively. Trajectory precision is about 7m (Drms) horizontal, with high correlation between points. Thus, the precision of horizontal velocity components, determined by time differencing points, is better than 11 cm/s (1σ). Depth precision is better than 3m (1σ), except in the deeper portions where anomalous pressure residuals near the depth of the transponder array suggest systematic pressure errors needing further study.

A HEURISTIC SEARCH METHOD OF SELECTING RANGE-RANGE SITES FOR HYDROGRAPHIC SURVEYS

Arnold Fulton Steed-Physical Scientist, Naval Oceanographic Office
B.S., University of Texas, 1987
Master of Science in Hydrographic Science-September 1991
Advisors: Neil C. Rowe-Department of Computer Science &
Everett Carter-Department of Oceanography

One of the costliest aspects of many hydrographic surveys is establishing and occupying the navigation control stations. As budget cuts force agencies to conduct their surveys more efficiently, minimizing the cost of these control networks will be of primary importance. Because it has the ability to process numerical information faster than a human, a computer could be used to assist the survey planner in selecting optimal shore sites, yet little work has actually been done in this area. This thesis examines the possibility of using Artificial Intelligence (AI) to assist the survey planner in selecting navigation control sites. A search program is presented which uses a number of heuristics to select sites and guide the search for an optimal solution. The program was tested in several actual and idealized survey situations, and the results of these tests indicate that the heuristic search approach has the potential of surpassing a human expert in the selection of an optimal set of sites.

MASTER OF SCIENCE
IN
INFORMATION SYSTEMS

HIGHLIGHTS OF TOTAL QUALITY MANAGEMENT IN THE DEPARTMENT OF DEFENSE: LESSONS LEARNED, QUALITY MEASUREMENTS AND INNOVATIVE PRACTICES

Carolyn L.Applegate-Lieutenant, *United States Navy*
B.S., University of Pennsylvania, 1985
M.B.A., Golden Gate University, 1989
Master of Science in Information Systems-September 1991
Advisors: Susan Page Hocevar & Kenneth W. Thomas
Department of Administrative Sciences

This thesis aids in understanding the implementation of Total Quality Management (TQM) through both quantitative and qualitative analyses. Interviews were conducted with top executives from ten exemplar organizations within the Department of Defense (DoD). Survey questionnaires on perceptions of quality practices were administered to a sample of 102 representing members of the executive steering committees at the same organizations. Research identifies lessons learned by top executives during TQM implementation, discusses measures of organization-wide quality management, specifies evaluation mechanisms to discern strategic issues vital to a quality focus, and describes the TQM implementation plan. Research also identifies innovative practices such as self-managing work teams, learning centers and productivity gain sharing, which may benefit the top executive during his/her own TQM implementation. Conclusions and recommendations concern maturity of TQM implementations in the DoD, performance appraisal systems and quality assessment tools.

BREAKDOWN OF SOFTWARE EXPENDITURES IN THE DEPARTMENT OF DEFENSE, UNITED STATES AND IN THE WORLD

Kathy A. Bannick-Captain, United States Marine Corps
B.B.A., National University, 1985
Master of Science in Information Systems-September 1991
Advisor: *Dani Zweig-Department of Administrative Sciences*

This study was conducted to identify credible sources for estimating expenditures in software development, maintenance, and acquisition. This research encompasses the United States, the Department of Defense, and the world. This study attempts to reconcile various sources which report expenditures in different ways. These figures are often estimates and frequently combined with other software related costs or revenues. Software expenditures in 1990 were over $185 billion worldwide with approximately $90 billion being spent in the United States. The Department of Defense accounted for approximately $27 billion.

A PERFORMANCE ANALYSIS OF VIEW MATERIALIZATION STRATEGIES FOR GENERAL EXPRESSIONS

Curtis Gus Barefield, Jr.-Lieutenant, United States Navy
B.S., Wayland Baptist University, 1981
Master of Science in Information Systems-September 1991
Advisor: Magdi N. Kamel-Department of Administrative Sciences

Efficient processing of views is critical to many real world applications, particularly real time applications such as surveillance systems which support military applications. This thesis compares the performance of three view materialization strategies: semi-materialization, full materialization and query modification. This thesis first develops a program that generates databases according to user specification. Second the generated databases are used to conduct an empirical study on the three view materialization strategies using select-project-join and general expression views. The results of the study indicate that for select-project-join view definitions, semi-materialization performed best for high values *P*, lower values of *l*, *fv* and all values of *fq* with the database stored on hard disk. Full materialization performed best for lower values of *P*, *l*, and all values of *fv* with the database stored in RAM. The results also indicate that the semi-materialization strategy is the best view processing method for general expressions.

INTEGRATION OF THE PERUVIAN AIR FORCE INFORMATION SYSTEMS THROUGH AN INTEGRATED LAN/WAN

Ricardo A. Bartra-Second Lieutenant, Peru Air Force
B.S., Peruvian Air Force Academy, 1988
Master of Science in Information Systems-March 1991
Advisor: Myung Suh-Department of Administrative Sciences

This thesis studies and analyzes the current Peruvian Air Force information systems with the view to implement an integrated network design for the existing computer based systems. The focus of this is on examining the issues and factors that need to be taken into consideration for the integration design. The objective is to provide a feasible alternative for integration under the constraints of available resources and the limitations inherent to its environment. We believe that the implementation of the recommendations of this thesis will have a substantial impact on the information systems of the Peruvian Air Force, allowing new applications to be developed including a Decision Support System on the up-to-date data. It will also permit the resolution of many problems related to data redundancy, inconsistency, and non-current data.

QUANTITATIVE MEASUREMENT OF AUTOMATION: AN ASSESSMENT OF APADE

Basil Belden Bates, Jr.-Lieutenant Commander, Supply Corps, United States Navy
B.S., United States Naval Academy, 1980
Master of Science in Information Systems-March 1991
and
Nicholas K.K. Mato-Lieutenant, Supply Corps, United States Navy
B.S., Michigan Technological University, 1979
M.B.A. University of Detroit, 1982
Master of Science in Information Systems-March 1991
Advisor: Willaim J. Haga-Department of Administrative Sciences

This study examined the productivity of the Automation of Procurement and Accounting Data Entry (APADE) system, in a before/after quasi-experimental design that measured outputs (workload, productivity), inputs (staff size, staff grade structure, usage of overtime), and by-product social effects (annual leave, sick leave, and leave without pay) using archival data. While workload decreased, the procurement action lead time (PALT) decreased by 55% after APADE implementation. This result was obtained as the size of the staff decreased and overtime usage declined sharply. The implementation of APADE streamlined the document process significantly at the test site.

BENEFIT ANALYSIS OF PROPOSED INFORMATION SYSTEMS

Mark H. Besore-Captain, United States Army
B.B.A., University of Wisconsin-Whitewater
Master of Science in Information Systems-March 1991
Advisor: William J. Haga-Department of Administrative Sciences

This thesis reviewed two different approaches to benefit analysis, benefit comparison and user satisfaction, that could be applied to the evaluation of proposed information systems which are under consideration for acquisition by the federal government. Currently the General Services Administration only recommends that present value analysis methods be used in the analysis of alternatives even though the GSA specifies that non-cost factors should be evaluated in such an analysis. Different benefit comparison and user satisfaction methods are reviewed for their particular advantages and disadvantages. A discussion is given on how selected methods of each approach may be used within the federal government for the evaluation of alternatives. Suggestions are made for ways of conducting a more complete analysis of alternatives through incorporating present value analysis, benefit comparison of non-cost factors, and analysis of user satisfaction, into one comprehensive analysis.

THE PROBLEM OF UNIQUE NAMES VIOLATIONS IN DATABASE INTEGRATION

Renae M. Beyer-Major, United States Army
B.S., Kearney State College, 1979
Master of Science in Information Systems-March 1991
Advisor: Hemant K. Bhargava-Department of Administrative Sciences

When multiple database schemes are integrated, there are often conflicts in the naming of attributes within the schemes. These conflicts must be detected and resolved prior to successful integration of the schemes. This thesis describes a method for automatically detecting such naming conflicts, which adapts and enhances a method for detecting similar conflicts in (mathematical) model integration. The method relies on the representation of semantic information, not found in data dictionaries, about the data elements or attributes present in the various schemes. This information about data elements is then used by mechanical inference procedures to automatically determine whether two distinctly named elements in fact represent the same object (the synonym problem), or if data elements with the same name in different schemas actually represent different objects (the homonym problem). The expected accuracy and error of these procedures, and results obtained from a set of experiments on the use of this method, are also presented.

EVALUATION OF USER INFORMATION SATISFACTION OF THE AUTOMATED QUALITY OF CARE EVALUATION SUPPORT SYSTEM

James Runyan Booth-Lieutenant Commander, United States Navy
B.S., Alabama State University, 1974
Master of Science in Information Systems-September 1991
and
John Linwood Bryant, Jr.-Lieutenant, United States Navy
B.S., Rutgers University, 1982
Master of Science in Information Systems-September 1991
Advisor: Moshe Zviran-Department of Administrative Sciences

This thesis investigates the level of User Information Satisfaction of the Automated quality of Care Evaluation Support System (AQCESS) and the Composite Health Care System (CHCS). A User Information Satisfaction questionnaire was administered to AQCESS users at Silas B. Hays (Army) Hospital, Fort Ord, California and the Naval Hospital, Pensacola, Florida. The findings from the AQCESS system are compared to those obtained from the CHCS system at Naval Hospital, Charleston, South Carolina. Significant differences in satisfaction between work groups were found. Overall, physicians were least satisfied and administrative personnel were the most satisfied of the groups.

SPEEDS: AN APPROACH TO SUPPORT PROGRAMMING ENVIRONMENTS USING EXPERT DATABASE SYSTEMS

Ronald A. Boxall-Lieutenant, United States Navy
B.S., The Pennsylvania State University
Master of Science in Information Systems-September 1991
Advisor: Magdi N. Kamel-Department of Administrative Sciences

Programming decisions, such as scheduling, planning and coordinating, are made in every type of organization. In situations where these decisions are made by an expert who uses information contained in large databases, it could be advantageous for the organization to employ an expert system coupled with a database to assist in the decision process. This thesis proposes an approach for building expert database systems to support programming environments. To test this approach, a prototype expert database system is developed for a typical programming environment at a classical music radio station that employs experts to select music. The process of acquiring and representing the expert knowledge and the development, testing and implementation of the prototype are discussed in the context of this case study. The lessons learned in the development of this expert database system are also presented.

IMPROVED CLASSIFIED MATERIAL CONTROL THROUGH THE APPLICATION OF A DATABASE MANAGEMENT SYSTEM

Terrance Clifford Brady-Major, United States Marine Corps
B.B.A., National University, 1984
Master of Science in Information Systems-September 1991
Advisor: Myung W. Suh-Department of Administrative Sciences

Most military organizations maintain classified material but systems of accountability vary from one command to another. This thesis presents the design and implementation of a prototype database system, called COMMANDOC, that provides an automated method of tracking these documents including subcustody to a secondary control point, check ut to an individual user, transfer to a new command, and destruction. All required reports are generated by the system. In addition to the information on the actual documents, the database contains information on the personnel authorized to use both the documents and to operate the system, thereby ensuring that only personnel with the necessary access are allowed to check ut documents. A password system ensures only authorized personnel utilize the system, and a weekly audit report of system users is provided to the supervisor. The system provides a simple menu interface that leads the user through each step of a transaction and a user's manual is provided.

IMPLEMENTATION OF A CONFIGURATION MANAGEMENT SYSTEM FOR A LOCAL AREA NETWORK

Mack L. Brewer-Captain, United States Marine Corps
B.S., Texas A&M University, 1980
Master of Science in Information Systems-September 1991
Advisor: Norman F. Schneidewind-Department of Administrative Sciences

A major concern of system managers in Local Area Network (LAN) environments is to keep track of each of the components and location of network nodes as well as the maintenance history of LAN nodes and accessories. The complexity of the technology and the variety of products used interchangeably make this task particularly hard. This thesis designs and implements a database application to facilitate this effort. It allows the LAN maintenance staff to manage the assets more efficiently and effectively. This system can also be adapted and applied to LAN systems throughout the DoD as required.

CONCEPTUAL DATA MODEL FOR ADMINISTRATIVE FUNCTIONS OF A TYPICAL NAVAL SHIP, TO INCLUDE: PERSONNEL, TRAINING, SHIP SECRETARY, WELFARE AND RECREATION, COMMAND CAREER COUNSELOR, PUBLIC AFFAIRS OFFICER, EDUCATIONAL SERVICES OFFICER, MASTER AT ARMS, AND LEGAL

Teresa Nell Briede-Lieutenant, United States Navy
B.S., Purdue University, 1986
Master of Science in Information Systems-September 1991
Advisor: Magdi N. Kamel-Department of Administrative Sciences

The need for data management standardization has been clearly identified by the Office of the Secretary of Defense as a means to realize savings in the $9 billion spent annually on information technology in DoD and to further interoperability and sharing of information among systems. Most efforts thus far have been directed at standardizing data elements, the lowest level in the hierarchy of data, as a foundation for standardizing Management Information Systems with DoD. In this thesis, we propose extending the standardization effort to the schema level of an organizational unit. We accomplish this by examining the administrative functions carried out onboard a generic Navy ship and developing a data model (view) for each function. The functions addressed in this thesis are Personnel, Training, Ship Secretary, Welfare and Recreation, Command Career Counselor, Public Affairs Officer, Educational Services Officer, Master at Arms, and Legal. The separate views are then integrated to form a global, high level, conceptual data model. This complex view is then simplified by creating higher levels of abstraction using an entity clustering technique.

SPEECH RECOGNITION AND THE TELECOMMUNICATIONS EMERGENCY DECISION SUPPORT SYSTEM

Nancy C. Browne-Captain, United States Army
B.A., Northeastern University
M.S.B., Troy State University
Master of Science in Information Systems-March 1991
Advisor: Daniel R. Dolk-Department of Administrative Sciences

The purpose of this thesis is to provide a feasibility study for incorporating speech recognition into the Telecommunications Emergency Decision Support System (TEDSS) developed by the National Communications System (NCS) and contained on a Compaq 386. The three types of speech recognition systems that were used are: the DragonDictate, a software driven system, the Verbex Series 5000, a system contained in a peripheral device, and the KeyTronic Speech Recognition System, a system contained in a keyboard in addition to using speech software. A prototype was developed in addition to using speech software. A prototype was developed using the speech systems to determine whether or not TEDSS could be combined successfully with speech recognition. The results indicate that the incorporation of speech recognition into TEDSS is possible with some modifications to TEDSS software and to the Compaq 386.

EVALUATION OF USER INFORMATION SATISFACTION OF THE AUTOMATED QUALITY OF CARE EVALUATION SUPPORT SYSTEM

John Linwood Bryant, Jr.-Lieutenant, United States Navy
B.S., Rutgers University, 1982
Master of Science in Information Systems-September 1991
and
James Runyan Booth-Lieutenant Commander, United States Navy
B.S., Alabama State University, 1974
Master of Science in Information Systems-September 1991
Advisor: Moshe Zviran-Department of Administrative Sciences

This thesis investigates the level of User Information Satisfaction of the Automated quality of Care Evaluation Support System (AQCESS) and the Composite Health Care System (CHCS). A User Information Satisfaction questionnaire was administered to AQCESS users at Silas B. Hays (Army) Hospital, Fort Ord, California and the Naval Hospital, Pensacola, Florida. The findings from the AQCESS system are compared to those obtained from the CHCS system at Naval Hospital, Charleston, South Carolina. Significant differences in satisfaction between work groups were found. Overall, physicians were least satisfied and administrative personnel were the most satisfied of the groups.

AN ANALYSIS OF MISSION CRITICAL COMPUTER SOFTWARE IN NAVAL AVIATION

Robert L. Buckley-Lieutenant Commander, United States Navy
B.S., Texas A&M University, 1979
Master of Science in Information Systems-March 1991
Advisor: Martin J. McCaffrey-Department of Administrative Sciences

For over 25 years, the United States Navy has been designing, developing and maintaining software for embedded computer systems. Throughout this generation of Naval aviation software development, no collective analysis of the successes and failures in software development had been accomplished. To accomplish this task, this thesis evaluated aircraft software data from the Department of the Navy against two metrics: 1) did the original software development schedule have to be changed, and 2) did the software released to the fleet contain any major defects? This research has revealed that only about half of the original software development schedules were sustained without a milestone change being made. Also, software that was released to the fleet had no major deficiencies three out of four times. To further specify this information, it has been refined into categories of software language, size of program and type of software program. The results of this study will be beneficial to aviation program managers, software developers and software maintenance technicians.

DEVELOPMENT OF THE DAMAGE CONTROL SYSTEMS ASSIST TOOL

William Thomas Carney-Lieutenant, United States Navy
B.S., Jacksonville University, 1984
Master of Science in Information Systems-September 1991
Advisor: Thomas Wu-Department of Computer Science

The paperless ship concept first proposed by VADM Metcalf has been advocated at the highest levels in the Navy. ARGOS is a prototype multi-media database interface system under development at the Naval Postgraduate School in support of this advanced concept. This thesis has implemented a shipboard systems evaluation and assistance tool called Systems Assist Module (SAM). SAM automates many of the evaluation and information retrieval processes that a Damage Control Assistant is required to perform during normal and emergency conditions. It demonstrates the superior capabilities attainable in a system implemented with economical, off-the-shelf technology.

THE TELECOMMUNICATIONS EMERGENCY DECISION SUPPORT SYSTEM AS A CRISIS MANAGEMENT DECISION SUPPORT SYSTEM

Mitchel Carthon-Major, United States Marine Corps
B.S., Savannah State College, 1974
M.A. Pepperdine University, 1981
Master of Science in Information Systems-September 1991
Advisor: Daniel R. Dolk-Department of Administrative Sciences

The Telecommunications Emergency Decision Support System (TEDSS) is an automated management tool to aid the government in the management of the nation's telecommunications resources during a national emergency. The current version of TEDSS uses conventional database technology which is rapidly becoming inadequate to entice the "computer naive" manager to use the system under pressure. The National Communication's System which oversees TEDSS is interested in opportunities to incorporate emerging technologies into its program. The purpose of this thesis is to consider TEDSS in the context of Crisis Management Decision Support Systems (CMDSS) in order to determine generic requirements for a CMDSS, survey the technology current implementations, and assess the potential for applying this technology to a revision of TEDSS. A further objective is to survey emerging technologies not found in CMDSS which can be transferred to TEDSS. The result of the research indicates that technology found in CMDSS is not much more advanced than TEDSS. Emerging technologies which would enhance crisis decision making support for TEDSS include geographical information systems, graphical user interfaces, optical storage and voice recognition.

PLAIN ENGLISH TECHNIQUES FOR WRITING MANUALS AND A PROPOSED DSS FOR BASIC INSTRUCTION MANUAL WRITING PROCEDURES

Theresa J. Childs-Captain, United States Marine Corps
B.S., Penn State, University Park, 1981
M.B.A., United States International University, 1986
Master of Science in Information Systems-March 1991
Advisor: James E. Suchan-Department of Administrative Sciences

This thesis proposes a design for a DSS that will be used by the designers of instruction manuals for enlisted service members in the grades of E-1-E-5 in the Department of Defense (DoD). The purpose of this proposed DSS is to help authors create manuals that will be easily comprehended by service members so they can quickly and effortlessly accomplish a task. Current research from the document design field and Plain English movement are reviewed to determine the best way to structure a written document whose sole purpose is adult instruction. The rules for creating the DSS are developed from this literature review.

ALTERNATIVES FOR DEVELOPING USER DOCUMENTATION FOR APPLICATIONS SOFTWARE

Nancy K. Clark-Lieutenant Commander, United States Navy
B.S., Southern Methodist University, 1975
Master of Science in Information Systems-September 1991
Advisor: Norman F. Schneidewind-Department of Administrative Sciences

The preparation of software documentation is an iterative process that involves research, analysis, design, and testing. The writer must have a solid understanding of the technical aspects of the document being prepared, good writing skills, and, most important, an understanding of the needs of the audience for whom the document is written. This thesis describes the theory and steps taken in developing software user documentation for applications software. The final products are two prototypes of user's guides for applications software programs, specifically WordPerfect 5.1 and dBase IV 1.1, installed on the networks in the Administrative Science/Information Systems Computer Laboratories at the Naval Postgraduate School.

CONSIDERATIONS FOR CONVERSION OF MICROFICHE TO OPTICAL STORAGE

Robert W. Clipper, Jr.-Lieutenant, Medical Service Corps, United States Navy
M.A., University of West Florida, 1983
Master of Science in Information Systems-March 1991
and
John D. Fowler-Commander, United States Navy
B.S., Duke University
Master of Science in Information Systems-March 1991
Advisor: Barry A. Frew-Department of Administrative Sciences

Information maintained in a digital format which enables full-text search and retrieval capabilities provides significant advantages over hard-copy or microfiche based information. Recent advances in optical storage technology and full-text retrieval software have made it possible to maintain and access large information bases quickly and inexpensively. Conversion from existing microfiche format to an optical format is possible, but still quite expensive. A case study concerning conversion of microfiche from the Naval Postgraduate School Knox Library Research Reports Division is presented to demonstrate the costs and benefits of having information in a full-text format. Alternatives to full backfile conversion are presented with policy recommendations for organizations considering implementing optical storage systems.

USER AUTHENTICATION: A STATE-OF-THE-ART REVIEW

John A. Coley-Lieutenant Commander, United States Navy
B.S., Mississippi State University, 1977
Masters of Science in Information Systems-September 1991
Advisor: Moshe Zviran-Department of Administrative Sciences

Access control of computing systems is considered a key issue among Information Systems managers. There are different methods available to computing systems to ensure a proper authentication of a user. Authentication mechanisms can use simple user-generated passwords to complicated combinations of passwords and physical characteristics of the user (i.e., voice recognition devices, retina scanner, signature recognition devices, etc.). This thesis looks at the various authentication mechanisms available to a security manager. It describes how different authentication mechanisms operate and the advantages and disadvantages associated with each mechanism. It also reports on several commercially available software products that support the user authentication process. Finally, a discussion of password use in the military environment and the unique requirements of the Department of Defense.

ESKAPE/CF: A KNOWLEDGE ACQUISITION TOOL FOR EXPERT SYSTEMS USING COGNITIVE FEEDBACK

James W. Connor, Jr.-Lieutenant Commander, United States Naval Reserve
B.S., University of Illinois, 1979
Master of Science in Information Systems-March 1991
Advisor: Kishore Sengupta-Department of Administrative Sciences

The major bottleneck in the construction of expert systems is the time-consuming process of acquiring knowledge from experts. Automated knowledge acquisition tools have demonstrated the ability to reduce the time required to construct expert system knowledge bases and are supported by both knowledge engineers and experts. However, due to limitations in their underlying psychological paradigms, existing tools may not be well-suited to extracting semantic or procedural knowledge from an expert. This thesis designs and implements an Expert System Knowledge Acquisition and Policy Evaluation tool using Cognitive Feedback (ESKAPE/CF), based on Lens model techniques which have demonstrated effectiveness in capturing policy knowledge. The system is designed to be used interactively by an expert to reduce the historically lengthy interactions with a knowledge engineer. Additionally, the use of cognitive feedback techniques should enable the system to capture expertise that has heretofore been unobtainable by existing knowledge acquisition tools.

U.S. COAST GUARD FLEET MIX PLANNING: A DECISION SUPPORT SYSTEM PROTOTYPE

Louis A. Cortez-Lieutenant, United States Navy
B.S., Florida A&M University, 1985
and
Thomas J. Kaiser-Lieutenant Commander, United States Navy
B.S., Michigan Technological University, 1977
Master of Science in Information Systems-March 1991
Advisor: Hemant K. Bhargava-Department of Administrative Sciences

The objective of this thesis is to analyze the fleet mix planning problem, develop an approach to evaluate alternative fleet mixes, and implement the approach in a decision support system (DSS). In particular, this research is conducted in the context of the acquisition of a mix of patrol boats to replace the aging Point Class patrol boats within the U.S. Coast Guard. The analysis of an alternative fleet mix involves, among other things, the evaluation of cost, activity and performance measures for that fleet mix. Several analytic and forecasting models are used to determine costs and activity measures for various fleet mixes, and simulation games are played to assess expected mission performance for each mix under a set of mission scenarios. A rule-based deductive model is employed to determine and score the response of a given fleet mix to events occurring during the simulation. These models are implemented and integrated in a decision support system which combines the mathematical models with a database system, an expert system, and user interface tools. It is hoped that repeated use of the system, analysis of the alternative fleet mixes using a large number of data sets, and post-evaluation analysis and explanations, will help provide the decision-maker insight in to the problem, and will facilitate a judicious decision.

DE-CERTS: A DECISION SUPPORT SYSTEM FOR A COMPARATIVE EVALUATION METHOD FOR RISK MANAGEMENT METHODOLOGIES AND TOOLS

Leonard A. Crump, Jr.-Major, United States Army
B.S., Fitchburg State College, 1979
Master of Science in Information Systems-September 1991
and
James G. Pound-Lieutenant, Supply Corps, United States Navy
B.A., Aurora College, 1975
Master of Science in Information Systems-September 1991
Advisor: Magdi N. Kamel-Department of Administrative Sciences

A new approach was recently proposed to effectively and objectively evaluate risk management methodologies and tools for their suitability to a given organizational situation. The proposed approach, known as CERTS, is based on defining suitability in terms of criteria which in turn are described in terms of attributes and metrics. Using the Analytic Hierarchy Process, this thesis develops the CERTS approach into a Decision Support System, that could be used easily and effectively by organizations for selecting a risk management methodology or tool. The thesis also applies the developed DSS to three case studies to gain insights on the applicability of the DSS.

MEASURING THE EFFECTIVENESS OF INFORMATION SYSTEMS

Angela W. Cyrus-Lieutenant, United States Navy
B.A., Mississippi State University, 1983
Master of Science in Information Systems-June 1991
Advisor: William Haga-Department of Administrative Sciences

Measuring the effectiveness of information systems (IS) is an issue that has generated debate and research among academics and practitioners. This thesis consolidates the numerous and various approaches to measuring IS effectiveness into six general schools of thought: user satisfaction, system usage, performance/usefulness, productivity, value analysis and cost-benefit analysis. It then presents a model for examining the various linkages that exist among the IS effectiveness measures. These linkages include: user satisfaction and system usage, system usage and performance, performance and productivity, and productivity and cost justification. This research provides a user a summary of the IS effectiveness literature of the past two decades and a consolidated reference for measuring the effectiveness of information systems.

A MICRO COMPUTER BASED PROCUREMENT SYSTEMS:
AN APPLICATION OF REVERSE ENGINEERING TECHNIQUES

Daniel E. Delaney-Lieutenant, United States Navy
B.S., New Hampshire College, 1980
Master of Science in Information Systems-March 1991
and
George T. Skrtich-Lieutenant, United States Navy
B.S. West Liberty State, 1976
Master of Science in Management-March 1991
Advisor: Magdi N. Kamel-Department of Administrative Sciences

The Department of the Navy has developed a system called the Automation of Procurement and Accounting Data Entry (APADE), which automates the procurement of nonstandard materials. Small Navy Field contracting locations, however, cannot afford to utilize this service and the Navy currently has no standard micro computer software for such procurement. This thesis analyzes and reviews the Navy's APADE procurement system using a reverse engineering approach. It establishes an entity relationship model from the existing APADE flat files. This entity relationship model is then used to design and implement a prototype of the APADE system small procurement module on micro computers. The prototype micro computer version emulates the small procurement functions of the mainframe system.

UPGRADE AND ENHANCEMENT OF THE A.S. DEPARTMENT
FINANCIAL MANAGEMENT INFORMATION SYSTEM:
DEVELOPMENT OF THE FMIS PROPERTY MANAGEMENT MODULE

Thomas Allan Ditri-Lieutenant, United States Navy
B.S., Oregon State University, 1984
Master of Science in Information Systems-September 1991
Advisors: Tung Bui & Shu Liao-Department of Administrative Sciences

The Administrative Sciences (AS) Department of the Naval Postgraduate School (NPS) maintains a large amount of plant and minor property to support its vast and varied operations. This property requires accurate record keeping to assure accountability of each item throughout its lifetime, from initial acquisition through disposal. The AS Department implemented a Financial Management Information System (FMIS), through the work of prior NPS students, at the commencement of FY 91. This thesis develops and integrates the Property Management Module into the FMIS to support the management and accountability of the AS Department property. The new expanded version is named FMIS 2.0. An outline covering software maintenance analysis, the Property Management system requirements analysis, and system design methodology is provided. The system was written using dBase IV, version 1.1 and will transition to operational status from the current FMIS at the beginning of FY 92.

REDUCING THE EFFECTS OF IRRELEVANT INFORMATION WITH COGNITIVE FEEDBACK

William Andre Durbin-Lieutenant, United States Navy
B.A., University of Mississippi, 1986
Master of Science in Information Systems-March 1991
Advisor: Kishore Sengupta-Department of Administrative Sciences

This thesis was a study which deals with two basic concepts in human decision making. The first is the role of information relevance, specifically the adverse effects of irrelevant information on decision quality. The second key concept was cognitive feedback and its value for supporting decision making. The thesis was designed to research the effectiveness of cognitive feedback in reducing the adverse effect of irrelevant information. The experiment test the Lens Model indices: achievement, consistency, and matching in task conditions of high and low predictability. Subjects were divided into block which differed in the availability of cognitive feedback and predictability. The results of the experiment showed that the subjects performed better in all Lens Model indices in the cognitive feedback condition. Subjects also had superior performance in the high predictability condition. This thesis was intended to contribute to the research in the subject of human decision making. The results were of importance in support of future design of decision support systems.

DIMENSIONAL ANALYSIS OF STRUCTURAL STEEL BEAM DESIGN

Michael A. Elizondo-Lieutenant, United States Naval Reserve
B.Arch., University of Texas at Austin, 1978
Master of Science in Information Systems-March 1991
Advisor: Hemant K. Bhargava-Department of Administrative Sciences

This thesis examines the representation of dimensional units as prime numbers to perform dimensional analysis within a computer-based model management system. A computer program applies this concept to simple span structural steel beam design, an engineering stress and strain problem. Most common applications of computers manipulate only the numeric value of the measure of physical objects. The user manually ensures that data is processed according to the meaning of its units. Prime-encoding of dimensional units in this application provides a numeric method of validating dimensional consistency in mathematical expressions for use on a computer. This study is implemented in TEFA, a computer-based modeling system with an embedded Prolog programming language. The beam design application demonstrates that model representation using prime-encoding of dimensional units simplifies the overhead required in data manipulation, and helps maintain meaningful results in the numerical processing of data.

PARTICIPATION AND ERROR RATES OF THE INTERNAL REVENUE SERVICE ELECTRONIC FILING SYSTEM: EMPIRICAL EVIDENCE AND IMPLEMENTATION LESSONS

Carol P. Elliott-Lieutenant, United States Navy
B.A., Goucher College, 1971
Master of Science in Information Systems-March 1991
Advisor: Tung X. Bui-Department of Administrative Sciences

The process of collecting revenue has become increasingly costly for the Internal Revenue Service (IRS) in terms of requirements for storage space and the complexity and time involved in converting paper returns into machine readable form. To alleviate these problems, the IRS proposed and developed the Electronic Filing System (EFS) which provides taxpayers the option of filing tax returns electronically. This study consists of a two year field study of the EFS in the San Jose District with respect to the reasons for success or failure of the implementation of computer systems, with particular emphasis on the participation rate and the error rate. The study includes a statistical analysis of responses to two surveys distributed by the San Jose District EFS Office to determine whether there is significant evidence to indicate reasons why some users have higher error rates than others. A case study approach is used, in conjunction with available literature, to determine factors which influence the effective implementation of an information system and encourage use of the system.

LOCAL AREA NETWORK COMPATIBILITY ISSUES

Rita Villapando Espiritu-Lieutenant Commander, United States Navy
B.S., University of the Philippines, 1973
Master of Science in Information Systems-September 1991
Advisor: Norman F. Schneidewind-Department of Administrative Sciences

This thesis presents a research study of local area network compatibility issues. Today's high performance and successful LANs must use hardware and software that is compatible with the network technology used. Compatibility, for the purposes of this research paper, means the ability to interface without special adapters or other devices and directly relates to the ease of the transfer of data or programs within the network and between systems. An understanding of compatibility issues can help network users and managers diagnose and resolve connectivity problems thus saving valuable time and money that can be used toward other productive endeavors within an organization. This thesis will discuss hardware and software concepts, LAN architecture, and design issues as they relate to network compatibility. A LAN Manager's Guide covering the above issues is included as an appendix. It is written specifically for the Administrative Sciences/Information Systems (AS/IS) computer network laboratories as supplemental information for students on LANs.

COST MODELS AND THE CORPORATE INFORMATION MANAGEMENT (CIM) INITIATIVE

David Philip Faulk-Lieutenant, United States Navy
B.S., University of Pittsburgh, 1983
Master of Science in Information Systems-March 1991
Advisor: Joseph G. San Miguel-Department of Administrative Sciences

This thesis provides a brief history of the Corporate Information Management (CIM) initiative, and includes a summary of the methodology being employed to complete the initiative. The focus of this thesis is on the alternative cost models that are available to the Department of Defense (DoD), and the information requirements for each of them. The cost models reviewed include: actual, normal, standard, variable, cost-volume-profit analysis, and job order. Advantages and disadvantages of each of these models is discussed. In addition, the current DoD implementation of unit costing is also discussed and compared and contrasted to the alternative models that exist.

CONSIDERATIONS FOR CONVERSION OF MICROFICHE TO OPTICAL STORAGE

John D. Fowler-Commander, United States Navy
B.S., Duke University
Master of Science in Information Systems-March 1991
and
Robert W. Clipper, Jr.-Lieutenant, Medical Service Corps, United States Navy
M.A., University of West Florida, 1983
Master of Science in Information Systems-March 1991
Advisor: Barry A. Frew-Department of Administrative Sciences

Information maintained in a digital format which enables full-text search and retrieval capabilities provides significant advantages over hard-copy or microfiche based information. Recent advances in optical storage technology and full-text retrieval software have made it possible to maintain and access large information bases quickly and inexpensively. Conversion from existing microfiche format to an optical format is possible, but still quite expensive. A case study concerning conversion of microfiche from the Naval Postgraduate School Knox Library Research Reports Division is presented to demonstrate the costs and benefits of having information in a full-text format. Alternatives to full backfile conversion are presented with policy recommendations for organizations considering implementing optical storage systems.

DESIGNING THE USER INTERFACE: CONSIDERING THE CONCEPT OF COMPLEXITY

John B. Frank, Jr.-Commander, United States Navy
B.S., University of New Mexico, 1974
Master of Science in Information Systems-September 1991
Advisor: Kishore Sengupta-Department of Administrative Sciences

The human-computer interface may be defined as the dialogue that allows communication between the human and the computer, the purpose of such dialogue being the accomplishment of some task. This thesis explored the relationship between task complexity, interface complexity, and user performance in the context of direct manipulation interfaces. Two different levels of task and interface complexity were introduced to subjects in two groups. Each group was presented with identical task sets. There were three task sets, one a practice set, one a simple set requiring five inputs, and a complex task set requiring 24 inputs. The dependent variable measured were 1) task completion time, 2) number of errors committed, and 3) number of help references needed. Results indicate that the complex interface took longer to learn, and more errors were made while learning. Results for the simple task set favored the simple interface as well, but once the subject learned the complex interface, the completion time was shorter and there were fewer errors made during the accomplishment of the complex task set on the complex interface. With an increase in task complexity, subjects using the complex interface showed an improvement in performance.

THE TOP TEN CRITICAL MIS ISSUES IN THE DEPARTMENT OF DEFENSE

Rafael A. Gacel-Captain, United States Marine Corps
B.S., University of Washington, 1983
M.B.A., National University, 1986
Master of Science in Information Systems-March 1991
Advisor: William J. Haga-Department of Administrative Sciences

Information systems (IS) professionals in the Department of the Navy (DoN), face a multitude of IS management problems. Unfortunately, the U.S. Navy and Marine Corps do not have the financial, managerial, or technical resources to tackle ev ry one of these problems. Therefore, it is helpful to determine which are the most critical issues facing IS offices in the Navy and Marine Corps, and how much agreement there is among IS officers in the Navy and Marine Corps regarding the importance of these critical issues. It is also helpful to determine how those critical issues identified by Navy IS officers compare with those identified by Marine Corps IS officers, and how their critical issues compare with those identified by civilian corporate IS executives.

INFORMATION RESOURCE MANAGEMENT ABOARD USS CORINTH (CG-44): A CASE STUDY

Cheryl Louise Gonzalez-Lieutenant Commander, United States Naval Reserve
B.A., University of Michigan, 1978
Master of Science in Information Systems-March 1991
Advisor: William J. Haga-Department of Administrative Sciences

This thesis is a case study that chronicles the information resource management on board an Aegis class cruiser in the U.S. Navy. The events, organization, environment, and personnel involved in the installation and subsequent use of the local area network are documented. Also documented is the "STONED" virus attack on the computers after a light-off assessment of the ship's Engineering plant.

FEEDBACK IN DYNAMIC DECISION MAKING: AN EXPERIMENT IN SOFTWARE PROJECT MANAGEMENT

Robert Donald Goodwin, Jr.-Lieutenant, United States Navy
B.S., United States Naval Academy, 1986
Master of Science in Information Systems-March 1991
Advisors: Kishore Sengupta & Tarek K. Abdel-Hamid-Department of Administrative Sciences

Software project development has been plagued with an infamous reputation for cost overruns, late deliveries, poor reliability and users' dissatisfaction. Much of this blame has been placed on the manner in which software development projects are managed. The System Dynamics Model of Software Project Management is a quantitative model of software project dynamics that is attempting to gain some valuable insight into the managerial side of developing software systems. The objective of this thesis is to use the Sys' n Dynamics Model's gaming interface to investigate the effects of feedback on software project managers. Specifically, subjects were provided with either feedforward, outcome feedback or cognitive feedback to determine which feedback form, if any, improved the subjects' performance when confronted with a complex dynamic task, such as software project management. The results show that subjects in the cognitive feedback condition achieve a higher level of performance than those in either the feedforward or outcome feedback conditions.

DECISION SUPPORT SYSTEMS: A FRAMEWORK FOR EVALUATION AND JUSTIFICATION

Gary M. Griggs-Captain, United States Army
B.S., Southwest Missouri State University, 1982
Master of Science in Information Systems-March 1991
Advisors: William J. Haga & Moshe Zviran-Department of Administrative Sciences

Decision Support Systems have been evolving for over a decade to assist an individual or organization in the decision making process. DSS are often difficult to justify or evaluate because many of the benefits that they will provide are intangible benefits and are difficult to measure. Over the past decade, there have been several methods published that can assist in evaluation or justification. In this thesis, I propose a framework designed to assist the user in selecting the best available method for evaluation or justification for his/her organization. The framework considers: 1. The goals and objectives of the DSS and the organization; 2. The tangibility of the goals and benefits; and 3. The need or requirement to quantify goals and benefits. DSS are continually evolving and are gaining importance in the information systems area. Evaluation and justification will become increasingly more important. The framework will provide a basis for selecting the most appropriate method available for an organization.

AN ADPE PROTEST PRIMER: LESSONS LEARNED FROM GSBCA PROTEST DECISIONS

Dennis R. Grimes-Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1977
Master of Science in Information Systems-June 1991
Advisor: Martin J. McCaffrey-Department of Administrative Sciences

The General Services Administration's Board of Contract Appeals (GSBCA) is a significant venue for Federal Automated Data Processing Equipment (ADPE) protests. Since the GSBCA was granted jurisdiction over Brooks Act ADPE procurements in 1985, over 1,200 decisions have been rendered. Developing lessons learned from these protest decisions will benefit Federal ADPE managers by increasing awareness of the protest process. The highly complex Federal ADPE acquisition process is governed by numerous statues and regulations. This study also discusses the pertinent statutory background of the protest process, as well as the protest process itself. General lessons learned are presented in areas such as acquisition phases most likely to sustain protests and the amount of processing time expected for protest actions. Specific lessons learned pertaining to GSBCA jurisdiction, timeliness of protests, and evaluation/selection of offers are also presented. The study is intended to serve as a sound overview of the protest process, its mechanics, and lessons learned from over 200 significant GSBCA decisions. The primer is intended to serve an introductory document for the new Federal ADPE manager.

INFORMATION ENGINEERING OF THE CURRICULAR OFFICERS' SEGMENT OF A UNIFIED STUDENT ACADEMIC DATABASE SYSTEM FOR NPS

Michael S. Haas-Captain, United States Marine Corps
B.S., Cornell University, 1983
Master of Science in Information Systems-September 1991
and
Mary L. Hochstetler-Captain, United States Marine Corps
B.A., Messiah College, 1976
Master of Science in Information Systems-September 1991
Advisor: Daniel R. Dolk-Department of Administrative Sciences

The Naval Postgraduate School (NPS) plans to develop the Unified Student Academic Database (USAD), using an Integrated Computer-Aided software Engineering (I_CASE) tool. USAD is intended to consolidate requirements of the Director of Programs, Registrar, Admissions Office, and Curricular Officers. The current strategy for utilizing an I_CASE tool at NPS is sub-optimal. Texas Instrument's (TI's) Information Engineering Facility (IEF), was purchased to conduct analysis and design of USAD. IEF is designed to commence with a thorough analysis of an organization's Information Strategy Plan (ISP). However, TI proclaims ISP is not essential. An investigation was conducted into the advisability of omitting the ISP phase at NPS. The Curricular Officers' USAD requirements were modeled commencing with the Business Area Analysis (BAA), the second stage of IEF. This thesis determined bypassing the ISP phase for USAD would be inappropriate. Furthermore, using I_CASE tools for a project's front-end management only is not recommended. Payback is realized only when an organization commits to a full-scale strategic I_CASE implementation plan.

MEASURING THE PERCEIVED EFFECTIVENESS OF THE INTERNAL REVENUE SERVICE'S (IRS) DIRECT FILING SYSTEM FROM THE END-USER PERSPECTIVE

Margaret Yvonne Hall-Lieutenant, United States Navy
B.A., Benedict College, 1979
Master of Science in Information Systems-March 1991
Advisor: Tung Bui-Department of Administrative Sciences

Although the objectives and potential benefits are clear for the Internal Revenue Service and some software developers on promoting Electronic Filing Systems (EFS), it is not that obvious for tax preparers and the public at large. As a consequence, the current rate of EFS usage is still below expectation. Based on a study on the Measurement of End-User Computing Satisfaction, an empirical survey was conducted among the tax preparers community in Central California to determine factors that could help increase EFS use. Our findings seem to confirm the results cited in the End-User Computing literature. Software reliability, flexibility, efficiency and ease of use, quality of documentation, ability to make corrections, and timeliness were the most relevant findings. These factors received high scores from the interviewees. Nevertheless, training appears to be a crucial factor to convince tax preparers of the reliability of EFS, and tax preparers should be encouraged to devote more time in getting acquainted with the documentation provided by the IRS which was generally perceived as satisfactory. Another concern in EFS use was cost, although this factor was not included in the statistical analysis.

AN ANALYSIS OF SOCIO/CULTURAL IMPACT OF CIM ON THE DEPARTMENT OF DEFENSE AND POSSIBLE IMPLEMENTATION STRATEGY

William Michael Hantjis-Lieutenant Commander, United States Naval Reserve
B.S., Pennsylvania State University, 1977
and
Donald Anthony Kelley, Jr.-Lieutenant, United States Navy
B.S., University of Utah, 1984
Master of Science in Information Systems-March 1991
Advisors: Kenneth J. Euske & William J. Haga-Department of Administrative Sciences

The Corporate Information Management (CIM) initiative in the Department of Defense (DoD) is an attempt to eliminate duplicate Automatic Data Processing (ADP) systems through the standardization of functional area requirements across all DoD agencies. CIM initiative management recognized that the DoD organizational culture might impact or be impacted by such an all-encompassing initiative. The purpose of this thesis is to estimate the possible impact of culture on information systems implementations by conducting a literature review of cultural theory, change theory, resistance to change, and information systems implementation. The thesis concludes with a recommendation for implementation of the CIM initiative through a four part plan based on the findings of the literature review.

DECISION MAKING FOR SOFTWARE PROJECT MANAGEMENT IN A MULTI-PROJECT ENVIRONMENT: AN EXPERIMENTAL INVESTIGATION

Michael J. Hardebeck-Lieutenant, United States Navy
B.S., The University of Texas, Austin, 1983
Master of Science in Information Systems-September 1991
Advisor: Tarek K. Abdel-Hamid-*Department of Administrative Sciences*

Software project development can be characterized as failing to meet the user's needs within budget and schedule limitations. The number of software development failures far exceeds the number delivered as specified throughout industry and specifically in the Department of Defense. The System Dynamics Model of Software Project Management is a sustained and generally accepted quantitative model for simulating the software development lifecycle. Dynamic management issues can now be evaluated in an experimental setting which eliminates the financial risks. The objective of the thesis is to use the System Dynamics Model's gaming interface to investigate the effects of managerial motivation on software project managers in a multi-project environment. Specifically, this experiment was conducted to determine the effect of individual or team motivation on subsystem managers of a larger project. The effect of the two motivation styles are measured in terms of staffing level decisions, final cost and final duration.

TCP/IP IMPLEMENTATION CONSIDERATIONS FOR ADMINISTRATIVE SCIENCES DEPARTMENT LOCAL AREA NETWORKS

Michael S. Hill-Lieutenant, United States Navy
B.S., Miami University, 1985
Master of Science in Information Systems-September 1991
Advisor: Norman F. Schneidewind-Department of Administrative Sciences

The ability to rapidly access and exchange information by Department of Defense activities is critical to successfully accomplishing their mission. At the Naval Postgraduate School in Monterey, California, the need for connectivity with other organizations, such as research facilities and other academic institutions is just as critical, with computer communications through the Internet providing this capability. This thesis discusses the issues surrounding providing Internet connectivity through implementation of TCP/IP software in a LAN setting. Especially emphasized are the unique circumstances faced by the Administrative Sciences Department LAN managers in using TCP/IP in an academic Lan environment. Options for TCP/IP implementation are discussed, along with what would comprise the optimum LAN TCP/IP configuration, given various constraints.

INFORMATION ENGINEERING OF THE CURRICULAR OFFICERS' SEGMENT OF A UNIFIED STUDENT ACADEMIC DATABASE SYSTEM FOR NPS

Mary L. Hochstetler-Captain, United States Marine Corps
B.A., Messiah College, 1976
Master of Science in Information Systems-September 1991
and
Michael S. Haas-Captain, United States Marine Corps
B.S., Cornell University, 1983
Master of Science in Information Systems-September 1991
Advisor: Daniel R. Dolk-Department of Administrative Sciences

The Naval Postgraduate School (NPS) plans to develop the Unified Student Academic Database (USAD), using an Integrated Computer-Aided software Engineering (I_CASE) tool. USAD is intended to consolidate requirements of the Director of Programs, Registrar, Admissions Office, and Curricular Officers. The current strategy for utilizing an I_CASE tool at NPS is sub-optimal. Texas Instrument's (TI's) Information Engineering Facility (IEF), was purchased to conduct analysis and design of USAD. IEF is designed to commence with a thorough analysis of an organization's Information Strategy Plan (ISP). However, TI proclaims ISP is not essential. An investigation was conducted into the advisability of omitting the ISP phase at NPS. The Curricular Officers' USAD requirements were modeled commencing with the Business Area Analysis (BAA), the second stage of IEF. This thesis determined bypassing the ISP phase for USAD would be inappropriate. Furthermore, using I_CASE tools for a project's front-end management only is not recommended. Payback is realized only when an organization commits to a full-scale strategic I_CASE implementation plan.

EVALUATION OF USER INFORMATION SATISFACTION OF THE COMPOSITE HEALTH CARE SYSTEM

Lyn Eric Hurd-Lieutenant, Medical Service Corps, United States Navy
B.S., University of Toledo, 1983
Master of Science in Information Systems-March 1991
Advisor: Moshe Zviran-Department of Administrative Sciences

This thesis describes the level of User Information Satisfaction with the Composite Health Care System (CHCS). A short-form User Information Satisfaction questionnaire, developed by Baroudi and Orlikowski (1988), was administered to CHCS users at the Naval Hospital, Charleston. Dividing the users into three work groups: Physicians, Administrative, and Ancillary personnel; statistically significant differences in satisfaction between groups were found. Overall, physicians were least satisfied and administrative personnel were the most satisfied of the groups. The respondents as a whole showed noticeable differences in satisfaction with factors that comprise User Information Satisfaction. The respondents were dissatisfied with the factor relating to software contractor's services. However, the users were very satisfied with the factor describing local Management Information Department services.

COMPARISON OF DATA INTEGRITY MODELS

Thomas R. Ivan-Captain, United States Marine Corps
B.S., United States Naval Academy, 1984
Master of Science in Information Systems-March 1991
Advisor: Moshe Zviran-Department of Administrative Sciences

Data integrity in computer-based information systems is a concern because of the damage that can be done by unauthorized manipulation or modification of data. While a standard exists for data security, there currently is not an acceptable standard for integrity. There is a need for incorporation of a data integrity policy into the standard concerning data security in order to produce a complete protection policy. There are several existing models which address data integrity. The Biba, Goguen, and Meseguer, and Clark/Wilson data integrity each offer a definition of data integrity and introduce their own mechanisms for preserving integrity. Acceptance of one of these models as a standard for data integrity will create a complete protection policy which addresses both security and integrity.

HUMAN FACTORS IN NETWORK SECURITY

Francis Bradley Jones-Lieutenant, United States Navy
B.S., United States Naval Academy, 1983
Master of Science in Information Systems-March 1991
Advisor: Tung X. Bui-Department of Administrative Sciences

Human factors, such as ethics and education, are important factors in network information security. This thesis determines which human factors have significant influence on network security. Those factors are examined in relation to current security devices and procedures. Methods are introduced to optimize security effectiveness by incorporating the appropriate human factors into network security controls.

U.S. COAST GUARD FLEET MIX PLANNING:
A DECISION SUPPORT SYSTEM PROTOTYPE

Thomas J. Kaiser-Lieutenant Commander, United States Navy
B.S., Michigan Technological University, 1977
Master of Science in Information Systems-March 1991
and
Louis A. Cortez-Lieutenant, United States Navy
B.S., Florida A&M University, 1985
Master of Science in Information Systems-March 1991
Advisor: Hemant K. Bhargava-Department of Administrative Sciences

The objective of this thesis is to analyze the fleet mix planning problem, develop an approach to evaluate alternative fleet mixes, and implement the approach in a decision support system (DSS). In particular, this research is conducted in the context of the acquisition of a mix of patrol boats to replace the aging Point Class patrol boats within the U.S. Coast Guard. The analysis of an alternative fleet mix involves, among other things, the evaluation of cost, activity and performance measures for that fleet mix. Several analytic and forecasting models are used to determine costs and activity measures for various fleet mixes, and simulation games are played to assess expected mission performance for each mix under a set of mission scenarios. A rule-based deductive model is employed to determine and score the response of a given fleet mix to events occurring during the simulation. These models are implemented and integrated in a decision support system which combines the mathematical models with a database system, an expert system, and user interface tools. It is hoped that repeated use of the system, analysis of the alternative fleet mixes using a large number of data sets, and post-evaluation analysis and explanations, will help provide the decision-maker insight in to the problem, and will facilitate a judicious decision.

AN ANALYSIS OF SOCIO/CULTURAL IMPACT OF CIM
ON THE DEPARTMENT OF DEFENSE AND
POSSIBLE IMPLEMENTATION STRATEGY

Donald Anthony Kelley, Jr.-Lieutenant, United States Navy
B.S., University of Utah, 1984
Master of Science in Information Systems-March 1991
and
William Michael Hantjis-Lieutenant Commander, United States Naval Reserve
B.S., Pennsylvania State University, 1977
Master of Science in Information Systems-March 1991
Advisors: Kenneth J. Euske & William J. Haga-Department of Administrative Sciences

The Corporate Information Management (CIM) initiative in the Department of Defense (DOD) is an attempt to eliminate duplicate Automatic Data Processing (ADP) systems through the standardization of functional area requirements across all DOD agencies. CIM initiative management recognized that the DOD organizational culture might impact or be impacted by such an all-encompassing initiative. The purpose of this thesis is to estimate the possible impact of culture on information systems implementations by conducting a literature review of cultural theory, change theory, resistance to change, and information systems implementation. The thesis concludes with a recommendation for implementation of the CIM initiative through a four part plan based on the findings of the literature review.

ARCHITECTURAL GUIDELINES FOR MULTIMEDIA AND HYPERMEDIA DATA INTERCHANGE: COMPUTER AIDED ACQUISITION AND LOGISTICS SUPPORT/CONCURRENT ENGINEERING (CALS/CE) AND ELECTRONIC COMMERCE/ELECTRONIC DATA INTERCHANGE (EC/EDI)A

Alexander D. Korzyk-Major, United States Army
B.S.E., United States Military Academy, 1978
M.B.A., Florida Institute of Technology, 1985
Master of Science in Information Systems-September 1991
Advisor: Myung Suh-Department of Administrative Sciences

This study proposes the best strategy to integrate information systems to effectively support several common Department of Defense initiatives, in line with Corporate Information Management and Total Quality Management principles. This research examines Computer-aided Acquisition and Logistics Support/Concurrent Engineering, Electronic Commerce/Electronic Data Interchange, Modernization of Defense Logistics Standard System, and the Defense Information System. The study proposes an interchange architecture on top of the OSI-compliant Defense Information System, which serves as a telecommunications infrastructure, for multimedia and hypermedia data interchange. This interchange architecture is necessary to successfully implement the functions and applications of DoD activities.

THE EVOLUTION OF USER SATISFACTION AS A SURROGATE MEASURE OF INFORMATION SYSTEM EFFECTIVENESS

Stephen M. Lardner-Lieutenant, United States Navy
B.S.C.E., University of Illinois, 1981
Master of Science in Information Systems-March 1991
Advisor: William J. Haga-Department of Administrative Sciences

With information technology being "the largest line item in Corporate America's capital spending budget...companies need to develop better ways of measuring office productivity and the contribution that managers and other white-collar workers make to the bottom line." This thesis reviews the MIS literature over the last 20 years dealing with measuring information system (IS) effectiveness. In particular it tracks the genesis and evolution of user satisfaction as a surrogate measure of system effectiveness. The concern is whether the surrogate, user satisfaction, an opinion is the same effectiveness, the behavior, an action. It was found that an instrument for measuring user satisfaction developed by Bailey and Pearson (1983) has been widely accepted and used by the MIS community for measuring IS effectiveness. However, it was also found that many studies failed to consider other methods of measuring effectiveness and many also have misapplied the instrument as well.

A TESTBED TO EVALUATE COGNITIVE FEEDBACK THEORIES

Paul Kevin Larson-Lieutenant, United States Coast Guard
B.S., United States Coast Guard Academy, 1979
Master of Science in Information Systems-March 1991
Advisor: Kishore Sengupta-Department of Administrative Sciences

Researchers have begun to use a variety of process tracing techniques to understand the cognitive processes underlying decision making and the effects of feedback on decision making. This study describes a computer program which monitors repetitive decision making behavior to allow researchers to infer the cognitive processes that underlie the use of decision feedback. This program has a number of commands which provide researchers with many ways to present decision data and feedback. The program uses a computer mouse and information board to implement process tracing based on the information acquisition search methodology. Brunswik's lens model is used as the decision making paradigm.

SOFTWARE AND THE VIRUS THREAT: PROVIDING AUTHENTICITY IN DISTRIBUTION

George M. LaVenture-Lieutenant, United States Navy
B.S., Syracuse University, 1981
Master of Science in Information Systems-March 1991
Advisor: Norman F. Schneidewind-Department of Administrative Sciences

Computer viruses have threatened the integrity and reliability of computer systems since 1983. Literally hundreds of viruses exist for the IBM compatible computer alone. These viruses can cause corruption or loss of program and data files, incidental damage to hardware, and degradation or loss of system performance. This paper examines the nature of the virus threat by discussing virus types, methods and rates of propagation, relative frequencies of occurence, and genealogy. Possible methods for virus detection and identification, followed by disinfection, are outlined. Minimum capabilities and testing criteria for these products are also detailed. Methods for controlling and limiting infection and damage are discussed. These are considered minimum acceptable safeguards to be implemented by any organization. Lastly, software authentication means are examined, which, when used in conjunction with the minimum safeguards, would eliminate the possibility of viral infection.

NAVAL POSTGRADUATE SCHOOL 1990 MAINFRAME PROCUREMENT: A CASE STUDY

Gerard Michael Lewis-Lieutenant, United States Navy
B.S., Southern University, A&M College, 1983
Master of Science in Information Systems-June 1991
Advisor: Martin J. McCaffrey-Department of Administrative Sciences

This thesis is a case study which reviews the chronological events surrounding the Naval Postgraduate School's (NPS) 1990 mainframe computer procurement. The focus is on the issues which resulted in a protest in 1989 by PacifiCorp Capital, Inc., a systems integrator in the high-technology computer industry. The protest led to a one year delay in which NPS was required to start the procurement process over from the beginning. The major finding is that requesting agencies seldom make major automated data processing equipment (ADPE) procurements and, as a result, may not be fully informed of market trends and industry politics. This can lead to personnel unfamiliar with the current trends in an ever-changing procurement system. Major recommendations include restructuring the procurement process to include extensive training for activities procuring ADPE and emphasizing a Navy philosophy of procuring the "best-value" acquisition that industry has to offer.

ENHANCED PRODUCTIVITY TOOLS: AN ANALYSIS OF THEIR PROCUREMENT, IMPLEMENTATION AND OPERATIONS

Eric James Lindenbaum-Lieutenant, United States Navy
B.S., United States Naval Academy, 1981
Master of Science in Information Systems-March 1991
Advisor: Robert Knight-Department of Administrative Sciences

Reductions in available Information Resources (IR) dollars in the budget places increased emphasis on the productivity of both system developers and users. New technologies have been proposed to improve these productivities. Three software development tools in particular have been proposed to the Navy. One was developed using Naval assets. Another is available Off-The-Shelf and the third was developed by both government assets and by a contractor. This paper will evaluate and compare the three products and their associated development techniques.

REQUIREMENTS ANALYSIS AND DESIGN FOR IMPLEMENTATION OF A SATELLITE LINK FOR A LOCAL AREA COMPUTER NETWORK

Richard B. Lorentzen-Lieutenant, United States Navy
B.S., United States Naval Academy, 1971
Master of Science in Information Systems-September 1991
Advisor: Norman F. Schneidewind-Department of Administrative Sciences

The purpose of this thesis is to provide naval computer students with a basic knowledge on Very Small Aperture Terminal (VSAT) satellite technology and to define the hardware and software requirements at the interface between a VSAT and a Local Area Network (LAN). By restricting a computer network to terrestrial links, a vast amount of knowledge is not accessed because either the terrestrial links can't access the information or the information services are only available via satellite. Existing satellite networks could fill this void. It is important for naval officers to understand the VSAT alternative to terrestrial networking. For the purpose of demonstration, a functional design will be presented for the VSAT linkage to an existing Naval Postgraduate School (NPS) Administrative Sciences (AS) Department Token-Ring LAN. This study will include a technological overview of a VSAT network, requirements analysis for establishing VSAT link to a LAN, and the functional design of a VSAT link to the NPS AS Department Token-Ring LAN.

A CONCEPTUAL DESIGN FOR THE TELECOMMUNICATIONS EMERGENCY DECISION SUPPORT SYSTEM (TEDSS)

Stuart Niel Manning, Lieutenant, Civil Engineer Corps, United States Navy
B.S., West Virginia University, 1983
Master of Science in Information Systems-September 1991
Advisor: Daniel R. Dolk-Department of Administrative Sciences

The Telecommunications Emergency Decision Support System (TEDSS) was developed by the National Communications System (NCS) to assist in the management of national communication assets during times of emergency. TEDSS is currently approaching the end of its system life, and is only marginally capable of meeting existing and future requirements. The personal computer-based system uses a structured menu-oriented interface developed within an INGRES database management system application environment. This system provides predefined queries and menus which minimize the amount of decision support provided for emergency management. This thesis reviews the current operational capabilities of TEDSS and the emergency decision making environment in which it operates. It proposes a conceptual shift of TEDSS from its current textually-oriented information system to a graphically-oriented Tactical Decision Aid (TDA). The proposed system would employ a Graphical User Interface (GUI) providing a standard interface to a Geographical Information System (GIS). The GIS would provide a map-based environment in which the user manipulates data and models. Software and hardware issues relating to the development of a TDA-based TEDSS are discussed.

INTEGRATED FINANCIAL REPORTING FOR A SMALL BUSINESS

Bradford Laurence Martin-Captain, United States Marine Corps
B.S., United States Naval Academy, 1984
Master of Science in Information Systems-March 1991
Advisor: Tarek K. Abdel-Hamid-Department of Administrative Sciences

The small business manager is faced with increasing competition on a world wide scale in today's marketplace. Business decisions which affect planning and operations are more critical today than in the past. The manager is typically faced with making sense out of large quantities of accounting information. Decision support tools are needed to simplify this endeavor. Electronic spreadsheets have been used extensively in accounting departments for years. Recently, electronic spreadsheets have dramatically increased in capability while decreasing in price. The objective of this thesis is to demonstrate the feasibility of using off-the-shelf spreadsheet software to develop an integrated financial reporting system for a small business.

QUANTITATIVE MEASUREMENT OF AUTOMATION: AN ASSESSMENT OF APADE

Nicholas K.K. Mato-Lieutenant, Supply Corps, United States Navy
B.S., Michigan Technological University, 1979
M.B.A. University of Detroit, 1982
Master of Science in Information Systems-March 1991
and
Basil Belden Bates, Jr.-Lieutenant Commander, Supply Corps, United States Navy
B.S., United States Naval Academy, 1980
Master of Science in Information Systems-March 1991
Advisor: William J. Haga-Department of Administrative Sciences

This study examined the productivity of the Automation of Procurement and Accounting Data Entry (APADE) system, in a before/after quasi-experimental design that measured outputs (workload, productivity), inputs (staff size, staff grade structure, usage of overtime), and by-product social effects (annual leave, sick leave, and leave without pay) using archival data. While workload decreased, the procurement action lead time (PALT) decreased by 55% after APADE implementation. This result was obtained as the size of the staff decreased and overtime usage declined sharply. The implementation of APADE streamlined the document process significantly at the test site.

TASKING AND COMMUNICATION FLOWS IN THE F/A-18D COCKPIT: ISSUES, PROBLEMS AND POSSIBLE SOLUTIONS

Mark F. McKeon-Major, United States Marine Corps
B.S., United States Naval Academy, 1978
Master of Science in Information Systems-September 1991
Advisor: Tung Bui-Department of Administrative Sciences

The U.S. Marine Corps is replacing its A-6E TRAM aircraft with the two seat F/A-18D. With the exception of the F-15E "Strike Eagle", never has a tactical aircraft been capable of processing such vast amounts of multi-mission data and displaying that fighter/attack information to the aircrew. These vast capabilities have led to some problems in the area of F/A-18D aircrew coordination. This thesis will review communication flows and tasking procedures that exist in many Group Decision Support Systems (GDSS) to develop guidelines that are applicable to tactical aircraft aircrew coordination procedures. These guidelines will then be applied to combat mission essential F/A-18D cockpit communication and tasking procedures that should be executed during various scenarios. Additionally, simulator flight profiles will be postulated to test, evaluate and verify these procedures. This study provides a framework on combat procedures that will not only benefit the Marine Corps' F/A-18D community, but as they start bringing into their inventory the two seat F/A-18E/F, to U.S. Navy as well.

ELECTRONIC FILING EVALUATION OF TAX PROGRAMS

Gretchen Ochs Merryman-Lieutenant, United States Naval Reserve
B.S., Pennsylvania State University, 1985
Master of Science in Information Systems-June 1991
Advisor: Tung Bui-Department of Administrative Sciences

The goal of this thesis was to evaluate the electronic filing capabilities of three tax programs that are currently available. The systems discussed are CPAid Master Tax Program, Drake 89 Personal Income Tax and Orrtax PC Program. The evaluation was based upon the Representation, Operation, Memory Aids, and Control (ROMC) model by Sprague and Carlson, 1982. The evaluation was concerned with two questions: 1) What features are inherent in the electronic filing module of the three tax program and 2) What features are not provided by the systems that should be included. Two techniques were employed to compare the findings of the evaluation conducted. The methods used were the figures of merit and the electre method. Both of these techniques revealed CPAid as the best tax program among the three systems evaluated.

TRAINING METHODOLOGIES FOR DEPENDENT SPEECH RECOGNITION (SR) SYSTEMS

Richard L. Miller-Commander, United States Navy
B.S., United States Naval Academy, 1974
Master of Science in Information Systems-March 1991
Advisor: Gary K. Poock-Department of Administrative Sciences

A research experiment was conducted to determine whether a dependent SR system would perform with different accuracies given different ways in which it was trained. The experiment used a SR system (Voice Navigator) which is based on Dragon Systems, Inc. (proprietary) technology. Fifteen subjects trained three different voice patterns each and conducted four tests to compile statistics about the recognition accuracy for each pattern. The experiment was successful and demonstrated that the training methodology used can have significant impact on the performance of a dependent SR system. This thesis discusses the research methodology, reviews and analyzes the data collected, and states conclusions drawn about the particular dependent SR system used in the experiment.

THE IMPACT OF SELECTED MODIFICATIONS TO THE DEFENSE INVESTIGATIVE SERVICE CREDIT REPORT ACQUISITION PROCESS

Alan Richard Moeller-Major, United States Army
B.S., University of Maryland, 1987
Master of Science in Information Systems-March 1991
Advisor: William Haga-Department of Administrative Sciences

This thesis examines whether it is necessary to manually enter credit history inquiry information instead of using similar information in DIS data bases when processing credit report requests pertaining to DoD security clearance applicants. Although the precise applicant addresses are not currently contained in these data bases, the identities of the DIS field offices requested to gather information at those locations is available. The research used actual security clearance applicant information which was submitted to a national credit vendor in two formats. The first format used the applicant's full address information while the second substituted the full address with a general delivery address and the regional DIS office ZIP code that would provide investigative coverage for the applicant's address. The results of the study showed that the credit reports obtained for TRW with the general delivery address and the regional DIS office ZIP code were of the same quality as those obtained in the current procedure. Therefore, it appears that manually entering the inquiry information may not serve a useful purpose.

CONCEPTUAL DATA MODEL FOR ADMINISTRATIVE FUNCTIONS OF A TYPICAL NAVAL SHIP, TO INCLUDE: DRUG AND ALCOHOL PROGRAM ADVISOR, WATCH, QUARTER AND STATION BILL, SAFETY, MEDICAL AND SECURITY

Daniel John Montgomery-Lieutenant Commander, United States Navy
B.A., Ottawa University, 1976
Master of Science in Information Systems-September 1991
Advisor: Magdi N. Kamel-Department of Administrative Sciences

Data management standardization has been identified by the Office of the Secretary of Defense as a method to achieve savings in the $9 billion spent annually on information technology in DoD and to promote interoperability and information exchange among systems. Most efforts have been directed at standardizing data elements, the lowest level in the hierarchy of data, as a foundation for standardizing Management Information systems with DoD. In this thesis we propose extending the standardization effort to the schema level of an organizational unit. We examine the administrative functions carried out onboard a generic Navy ship and develop a data model (view) for each function. The administrative functions addressed in this thesis are Drug and Alcohol Program Advisor, Watch, Quarter and Station Bill, Safety, Medical and Security. The separate views are integrated to form a global, high-level conceptual data model. This complex view is then simplified by creating higher levels of abstraction using an entity clustering technique.

AN EXPERT SYSTEM FOR AVIATION SQUADRON FLIGHT SCHEDULING

John Bartholmew O'Connor-Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1980
Master of Science in Information Systems-September 1991
Advisor: Marty J. McCaffrey-Department of Administrative Sciences

An aviation squadron's flight schedule has a major impact on that organization's performance and morale. The ability to consistently draft a correct flight schedule that accounts for all applicable factors, requires a flight schedules officer with significant experience and good judgement. Even with those qualities, the task will normally be a lengthy one. The traditional procedure of using grease boards is antiquated in this age of microcomputers and user-friendly software. An integrated database application and expert system would provide the capability of expediting the flight scheduling process while simultaneously producing a consistently high quality schedule. It would also provide the training to elevate non-expert schedulers to an expert level of performance.

TRANSMISSION CONTROL PROTOCOL/INTERNET PROTOCOL: AN ETHERNET IMPLEMENTATION

Pamela H. Patrick-Lieutenant, United States Navy
B.A., Tulane University, 1984
Master of Science in Information Systems-September 1991
Advisor: Norman F. Schneidewind-Department of Administrative Sciences

This thesis will provide and overview of the hardware and protocols required for the implementation of the communications package Transmission Control Protocol/Internet Protocol for the PC. A User's manual is included as an Appendix. The manual is specifically written for use in the Administrative Sciences Department Information Systems Laboratory at the Naval Postgraduate School.

DE-CERTS: A DECISION SUPPORT SYSTEM FOR A COMPARATIVE EVALUATION METHOD FOR RISK MANAGEMENT METHODOLOGIES AND TOOLS

James G. Pound-Lieutenant, Supply Corps, United States Navy
B.A., Aurora College, 1975
Master of Science in Information Systems-September 1991
and
Leonard A. Crump, Jr.-Major, United States Army
B.S., Fitchburg State College, 1979
Master of Science in Information Systems-September 1991
Advisor: Magdi N. Kamel-Department of Administrative Sciences

A new approach was recently proposed to effectively and objectively evaluate risk management methodologies and tools for their suitability to a given organizational situation. The proposed approach, known as CERTS, is based on defining suitability in terms of criteria which in turn are described in terms of attributes and metrics. Using the Analytic Hierarchy Process, this thesis develops the CERTS approach into a Decision Support System, that could be used easily and effectively by organizations for selecting a risk management methodology or tool. The thesis also applies the developed DSS to three case studies to gain insights on the applicability of the DSS.

SPAN: A DECISION SUPPORT SYSTEM FOR SECURITY PLAN ANALYSIS

Stephen H. Ramsey-Lieutenant, United States Navy
B.S., University of Illinois, 1983
Master of Science in Information Systems-September 1991
Advisor: Moshe Zviran-Department of Administrative Sciences

Computer-based information systems provide countless opportunities to improve an organization's functioning and enhance its products or services. They also expose organizations to significant risks as they become increasingly dependent on information resources. To minimize the risks to an organization's information systems, and information system (IS) security plan must be formulated. A decision support system (DSS) can provide managers with consistent and concise guidance for the development and analysis of an IS security plan. SPAN, a Decision Support System for Security Plan Analysis has been developed to provide IS managers with information necessary to make informed IS security plan decisions. This thesis will address how SPAN can be applied for security plan analysis resulting in better and more informed security plan decisions.

THE STATE OF GROUP SUPPORT SYSTEM RESEARCH THROUGH A SURVEY OF PAPERS 1980 TO 1991

Matthew G. Rausch-Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1978
Master of Science in Information Systems-September 1991
Advisor: Tung X. Bui-Department of Administrative Sciences

Group Support Systems (GSS) have gone through a tremendous period of growth during the 1980s. Group Decision Support Systems (GDSS), Negotiation Support Systems (NSS) and Computer Supported Collaborative Work (CSCW) systems are but a few of the acronyms that represent the application of computer technology to group work. One of the difficulties in such a rapidly growing field is simply keeping abreast of the existing literature, current research, issues and future trends. This thesis provides: a short tutorial on GSS; reviews existing GSS taxonomies; identifies key research findings, issues, and future trends; and proposes a classification framework to aid in information retrieval of the extensive GSS literature database provided.

DESIGN AND IMPLEMENTATION OF A DECISION SUPPORT SYSTEM TO AID IN THE FORECASTING AND SCHEDULING OF ADMINISTRATIVE SCIENCES COURSES

William George Reagle-Captain, United States Army
B.S., University of Pittsburgh
and
Mark David VanUs-Captain, United States Army
B.B., Western Illinois University
Master of Science in Information Systems-March 1991
Advisors: Shu S. Liao & Daniel R. Dolk-Department of Administrative Sciences

The Administrative Sciences Department's faculty and course scheduling process is complex and data intensive. The process is driven by student enrollment forecasts provided to the department by the Naval Postgraduate School's Program Administration Assistant. The department currently has no means for manipulating the forecasts. This thesis develops a decision support system and its associated dBASE IV-based relational database for use by the Administrative Sciences Department in the forecasting and scheduling processes. The system consists of four major applications comprised of over 65 separate modules. The database management application allows for management and maintenance of the database files. The scheduling application generates teaching schedules. The report generating application produces all the reports required of the system by the department. Finally, the estimation application provides the decision support portion of the system by allowing "what-if" manipulation of the student enrollment data to see what impact there will be on teaching requirements. The system was developed within a Systems Development Life Cycle framework. Due to the need to quickly produce a working copy of the system, individual modules were developed using a Version Development technique.

AN ANALYSIS OF DATA VALIDITY FOR MEASURES OF EFFECTIVENESS OF INFORMATION SYSTEMS

Gregory M. Regens-Captain, United States Army
B.S., University of Arizona, 1981
Master of Science in Information Systems-March 1991
Advisor: William J. Haga-Department of Administrative Sciences

This thesis examines validity issues associated with the use of data collection techniques in information systems research. It presents an analysis of 37 studies that purported to empirically assess the effectiveness of information systems. These studies were evaluated to determine the validity of measures of effectiveness of information systems. Each study was reviewed to identify (1) data collection techniques used, (2) purported measures of the techniques, (3) ways in which the techniques were administered, and (4) discussions of validity issues arising from the use of the techniques. Findings indicate that information systems researchers have adopted data collection techniques commonly used by social scientists; however, they largely ignore or are unaware of associated validity issues. Over three-quarter of the studies involved questionnaires and fewer than a quarter addressed validity issues. Consequently, the credibility of information systems research is vulnerable to challenge.

THE EFFECT OF TASK COMPLEXITY ON USER INTERFACES: A COMPARISON OF COMMAND LANGUAGE INTERFACE AND DIRECT MANIPULATION INTERFACE

Nancy A. Reinhard-Lieutenant, United States Naval Reserve
B.S., Wright State University, 1983
Master of Science in Information Systems-March 1991
Advisor: Kishore Sengupta-Department of Administrative Sciences

A computer-user interface is the software that communicates the user's inputs to the computer and returns information from the computer back to the user. A variety of user interfaces have been developed, including command language interfaces, direct manipulation interfaces, and menus. This research explored the relative benefits of command language interfaces (CLI) and direct manipulation interfaces (DMI) for performance of simple and complex tasks by novices. Two levels of task complexity were used, one requiring five inputs (simple) and one requiring 24 inputs (complex). Dependent variables were (1) time to complete each task set, (2) number of errors, and (3) number of references to one-line help. Results indicate that learning to use a DMI takes longer than learning to use a CLI. No significant difference was observed in time to complete the simple task. However, once a novice learns to use a DMI, a complex task requires less time, fewer errors are made, and references to help screens are required less often. With complex tasks, direct manipulation interfaces appear to help novices to be more productive than do command language interfaces.

SECURITY CONSIDERATIONS IN DISTRIBUTED SYSTEMS

Donovan Ross Rhead-Lieutenant, United States Navy
B.S. Wayne State University, 1983
Master of Science in Information Systems-September 1991
Advisors: Myung Suh & Moshe Zviran-Department of Administrative Sciences

This thesis investigates computer security considerations in distributed systems. In particular, it concentrates on assisting managers to gain an appreciation for what distributed systems are, and what are the inherent security issues in these systems. A survey of the literature on computer security was conducted to identify those issues unique to distributed systems. Although many controls are discussed, management must design and support a comprehensive security plan tailored to their unique organization.

A PROTOTYPE SEMANTIC INTEGRITY FRONT END EXPERT SYSTEM FOR A RELATIONAL DATABASE

George Joseph Salitsky-Lieutenant, United States Navy
B.S., University of Scranton, 1980
Master of Science in Information Systems-September 1991
Advisor: Magdi Kamel-Department of Administrative Sciences

Information is critical resource in today's enterprises. Whether they are industrial, commercial, educational, or military, these organizations maintain an ever increasing amount of information in databases. Ensuring the accuracy of information in a database is paramount to the organizations that maintain these databases. Many decisions are made from the information extracted from the database, and incorrect data will lead to incorrect decision making. This thesis examines the feasibility of using expert systems for enforcing semantic integrity constraints to relational databases. To accomplish this goal, the thesis develops a classification for semantic integrity constraints, applies it to develop rules for the Navy's Naval Aircraft Flight Record application, and builds a front end expert system to enforce these rules dynamically. The expert system enforces integrity rules for all maintenance operations (UPDATE, INSERT, and DELETE).

A PERSONAL COMPUTER BASED DSS FOR COMPUTER-FAMILY SELECTION

Donald A. Schmieley-Lieutenant, United States Navy
B.S., United States Naval Academy, 1984
Master of Science in Information Systems-March 1991
Advisor: Moshe Zviran-Department of Administrative Sciences

A decision support system to select a computer-family using an objective evaluation process is developed. A computer-family is defined as a group of computers from microcomputer to mainframe with compatible operating systems and software. Saaty's analytic hierarchy process is applied to the weighing and scoring stages of the computer-family selection methodology presented by Borovits and Zviran. The result is a decision support system incorporating an objective and comprehensive methodology for computer-family selection.

STRATEGIC PLANNING FOR DFAS-CLEVELAND EXPERT SYSTEMS

Frederick J. Schwarz, II-Lieutenant, United States Navy
B.A., Catholic University of America, 1978
Master of Science in Information Systems-March 1991
Advisor: Tung Bui-Department of Administative Sciences

Managing expert systems development is complicated by fear of the unknown-a new technology and a new approach to problem solving. This thesis proposes a scenario approach to expert systems technology planning for the Defense Finance and Accounting Service-Cleveland. The intuitive logic method used in this study suggests four scenarios that would progressively take place over time. Ultimately, the expert systems technology at DFAS-Cleveland would move towards an open system architecture environment. Expert systems would be run on a network of distributed systems with micro-mainframe connectivity.

CORPORATE INFORMATION MANAGEMENT: A CASE STUDY

David D. Schweizer-Lieutenant, United States Navy
B.S., United States Naval Academy, 1985
and
James P. Steele, III-Lieutenant, United States Navy
B.S., United States Naval Academy, 1982
Master of Science in Information Systems-March 1991
Advisor: William J. Haga-Department of Administrative Sciences

This thesis documents in a case format the events, environment and decisions in the genesis and evolution of the Department of Defense's Corporate Information Mangement initiative.

DESIGN AND IMPLEMENTATION OF A NUCLEAR WEAPONS MANAGEMENT SUBMODULE: SHIPBOARD SECURITY FORCE SYSTEM

Sidney R. Settlemyer-Lieutenant, United States Navy
B.S., Savannah State College, 1984
Master of Science in Information Systems-September 1991
Advisor: Tung Bui-Department of Administrative Sciences

The Nuclear Weapons Management System combines the strengths of an expert system with the flexibility of a database management system to assist the Weapons Officer, Security Officer, and the Personnel Reliability Program Officer in the performance of administrative duties associated with the nuclear weapons programs in the United States Navy. This thesis examines the need for, and ultimately the design of, a system that will assist the Security Officer in administrative duties associated with the Shipboard Self Defense Force. This system, designed and coded utilizing dBASE IV, can be implemented as a stand alone system. Furthermore, it interfaces with the expert system submodule that handles the PRP screening process.

ANALYSIS OF TRAINING-RELATED ISSUES IN THE TRANSITION TO ADA IN THE DON

Jean Marie Shkapsky-Lieutenant Commander, United States Naval Reserve
B.S., University of Missouri-Columbia, 1978
Master of Science in Information Systems-September 1991
Advisors: Roger Stemp-Department of Operations Research &
Tung X. Bui-Department of Administrative Sciences

The Department of Defense has been continually plagued with problems in software development in terms of cost, reliability and performance. To combat these problems, Congress enacted Public law 101-511, requiring that after June 1, 1991, all Department of Defense software be written in the programming language Ada. However, for this transition to be effective, training of personnel must be accomplished. This thesis addresses issues involved in training of personnel in the Department of the Navy in Ada, the philosophy of training, the number of personnel to be trained and the potential costs involved.

PERSONALITY TYPES AND AFFINITY FOR COMPUTERS

Jane H. Smith-Major, United States Army
B.S., Loyola University of Chicago, 1978
Master of Science in Information Systems-March 1991
Advisor: William J. Haga-Department of Administrative Sciences

This study investigated whether personality differences, as measured by the Myers-Briggs Type Indicator, of 349 graduate school students were associated with computer affinity, an attraction to the study and use of computers. A computer affinity index was created to measure a student's degree of computer affinity. Analysis was performed to see if there were any significant differences on personality dimensions between the respondents, and to explore the relationship between these differences and computer affinity. The results revealed no significant differences between personality types and affinity for computers. The findings also revealed a common personality type for respondents who showed an interest in computers.

INVESTIGATING THE UTILITY OF COUPLING COCOMO WITH A SYSTEM DYNAMICS SIMULATION OF SOFTWARE DEVELOPMENT

Richard W. Smith-Lieutenant, United States Navy
B.S., United States Naval Academy, 1982
Master of Science in Information Systems-September 1991
Advisor: Tarek K. Abdel-Hamid-Department of Administrative Sciences

Cost estimation of software, in this era of budgetary constraints, is vitally important to the success or failure of a software project. Although there are many cost estimation models available, cost overruns and late deliveries still persist. Coupling the Constructive Cost Model (COCOMO) and the System Dynamics Model of Software Project Management can provide a tool to study project management over the life of a project, to use sensitivity analysis to enhance COCOMO's cost driver set, and to utilize an automated optimization system for software cost estimation in a single or multi-project environment. This new type of model creates a means to study the multi-project environment. This new type of model creates a means to study the multi-project environment and determine what the advantages and disadvantages are to sharing resources between different software projects. Several 'C' programs were developed, that when interfaced and coupled with the system dynamic model, provide a tool to optimize cost estimates in a two project environment. It also creates an environment to perform extensive sensitivity analysis for the enhancement of COCOMO's cost driver set in the single and two project environment.

A PERFORMANCE ANALYSIS OF VIEW MATERIALIZATION STRATEGIES FOR SELECT-PROJECT-JOIN EXPRESSIONS

Jesse Thomas South-Lieutenant, United States Navy
B.S., University of Arizona, 1984
Masters of Science in Information Systems-September 1991
Advisor: Magdi N. Kamel-Department of Administrative Sciences

In conventional relational database systems, a view is a virtual relation whose definition is stored in the systems catalog. When a query is issued on the view, the system retrieves the view from the catalog and modifies the query to an equivalent one on the base relations. Recently several approaches have been proposed that store some form of the computed view as a method for improving the performance of queries on relational databases. This thesis develops a computer program to empirically compare and evaluate three view materialization strategies: query modification, semi-materialization and full materialization. The program simulates user updates and queries, and measures the cost performance of the three materialization strategies. The strategies are compared for select-project-join expressions under three different view models. The results show that the most efficient view strategy is heavily application dependent. The performance of semi-materialization and full materialization, however, are comparable for most conditions tested, and preferred over the conventional query modification method.

CORPORATE INFORMATION MANAGEMENT: A CASE STUDY

James P. Steele, III-Lieutenant, United States Navy
B.S., United States Naval Academy, 1982
Master of Science in Information Systems-March 1991
and
David D. Schweizer-Lieutenant, United States Navy
B.S., United States Naval Academy, 1985
Master of Science in Information Systems-March 1991
Advisor: William J. Haga-Department of Administrative Sciences

This thesis documents in a case format the events, environment and decisions in the genesis and evolution of the Department of Defense's Corporate Information Mangement initiative.

INFORMATION SYSTEMS PLANNING METHODOLOGIES: A FRAMEWORK FOR COMPARISON AND SELECTION

Robert E. Steffensen-Major, United States Marine Corps
B.S., Northern Arizona University, 1975
Master of Science Information Systems-September 1991
Advisor: Moshe Zviran-Department of Administrative Sciences

The success of organizational information systems (IS) depends largely upon effective planning for those information systems. A comprehensive IS plan should provide a coordinated approach to strategic business goals, organizational information requirements, and an overall measure of performance. Acknowledging the importance of comprehensive planning in the process of managing the organization's information resource, a collection of methodologies has been accumulated, to serve in carrying out the IS planning effort. However, a managerial problem that often arises is how to make best use of current planning methodologies. The purpose of this thesis is to survey the existing methodologies; establish a framework for analyzing the IS planning methodologies, and examine some of their advantages and limitations.

LOCAL AREA NETWORK ANALYSIS

Larry W. Stone-Lieutenant, United States Navy
B.S., California State University at Fresno, 1975
Master of Science in Information Systems-September 1991
Advisor: Norman F. Schneidewind-Department of Administrative Sciences

This thesis focuses on the performance of the Ethernet local area network in Ingersoll Hall, room 250, Naval Postgraduate School, Monterey, California. The primary research is in performing a cost benefit analysis, using the economic value imputed to a reduction in average response time as the return on investment. The major objective is to find the best configuration for the network, based on integrating user-computer response time guidelines and the cost benefit analysis to indicate what might be economically acceptable response times for processing initial simultaneous requests for software installed on network servers. Word Perfect 5.0 was chosen for performance evaluation tests because it is typical of the software that is used in the lab under conditions of simultaneous access. Additionally, some of the effects of response time on human performance will be researched and noted in the conclusions along with the results of the feasibility test of user-computer interfaces and related cost benefit values.

THE DEVELOPMENT OF A KNOWLEDGE BASE FOR USE IN AN EXPERT SYSTEM ADVISOR FOR AIRCRAFT MAINTENANCE SCHEDULING (ESAAMS)

Mark H. Stone, Jr.-Lieutenant Commander, United States Navy
B.S.M.E., University of Wisconsin, 1980
Master of Science in Information Systems-March 1991
Advisor: Martin J. McCaffrey-Department of Administrative Sciences

The Expert System Advisor for Aircraft Maintenance Scheduling (ESAAMS) was originally proposed to assist in the scheduling of discrepancies in a naval aviation squadron maintenance department. The thesis addresses the development of a knowledge base for ESAAMS which will support the stated goals of the system. An overview of expert systems in general and specifically the ESAAMS system is presented as background information to the reader. A specific approach to acquiring, documenting and storing the knowledge is suggested which will facilitate further development of the system prototype. Based on interviews with experienced maintenance controllers, an initial knowledge base is provided for use in the prototype system. Concluding the thesis are recommendations for further study based upon the findings discovered during this research.

A NEURAL MODEL OF BILATERAL NEGOTIATION CONSISTING OF ONE AND TWO ISSUES

Neil Bernard Strand-Lieutenant, United States Navy
B.A., University of Minnesota, 1984
Master of Science in Information Systems-September 1991
Advisor: Tung Bui-Department of Administrative Sciences

This thesis demonstrates that neural technology may be successfully employed to mimic some of the thought processes of a negotiator during a bilateral negotiation. Using the constraint satisfaction paradigm, originally developed to explore parallel distributed processing, a neural network is proposed to simulate the thought process of a buyer who negotiates the purchase of a good based on price and quality. The findings of this thesis suggest that continued research in neural networks to replicate the mental model of the negotiator holds great promise. The ability to model true beliefs and evaluation methods has an advantage over more traditionally prescriptive models. The neural network model allows incorporation of human irrationality and provides an ability to assess how that irrationality affects the negotiation outcome.

HYPERCARD DATABASE TECHNOLOGY AS APPLIED TO A THREAT EVALUATOR REFERENCE TOOL

Frank Erwin Sutton-Lieutenant, United States Navy
B.S., United States Naval Academy, 1984
Master of Science in Information Systems-March 1991
Advisors: Bruce B. Giannotti-Department of Administrative Sciences
& Barry Frew-Department of Computing & Information Services

The paperless ship concept proposed by VADM Metcalf has been advocated at the highest levels in the Navy. ARGOS is a prototype multi-media database system under development at the Naval Postgraduate School in support of this superior concept. This thesis has implemented a tactical evaluation and assistance tool called Threat Evaluator that can be used as an additional module to the ARGOS system or as a stand alone application. Threat Evaluator automates many of the evaluation and information keeping duties that a Tactical Action Officer is required to perform during normal watchstanding evolutions. It demonstrates the advanced capabilities attainable in a system implemented with economical, off-the-shelf technology.

THE IMPACT OF VERBAL REPORT PROTOCOL ANALYSIS ON A MODEL OF HUMAN-COMPUTER INTERFACE COGNITIVE PROCESSING

Barbara Lynn Treharne-Captain, United States Army
B.S., United States Military Academy, 1980
Master of Science in Information Systems-March 1991
Advisor: Kishore Sengupta-Department of Administrative Sciences

This exploratory study used the "think-aloud" protocol to demonstrate the effectiveness of Kieras and Polson's Goals, Operators, Methods and Selection Rules and the Cognitive Complexity Model. An experiment comparing the cognitive processes of users on two file management interfaces, a Command Language and Direct Manipulation interface, was conducted. The think-aloud process was chosen as the methodology for conducting this experiment because of its insights into the users' perceptions of both the task and device representations. The experimental results provide implications for the study of cognitive processes--the nature of the interface design influences the users' mental models of a system, which has a direct affect on the user's performance on a given interface; this methodology also provides an evaluation technique which may improve the design process for the user interfaces; and, finally, the results support the think-aloud protocol as an effective evaluation tool of user interface designs.

IS HYPERTEXT A SOLUTION TO IMPLEMENTING AN ADP SECURITY PROGRAM IN DON? ISSUES AND PROBLEMS

Robert Andrew VanMeter-Lieutenant Commander, United States Naval Reserve
B.A., University of Rochester, 1979
Master of Science in Information Systems-September 1991
Advisor: Tung Xuan Bui-Department of Administrative Sciences

The goal of this thesis is to provide an overview of hypertext to determine its feasibility for resolving some of the problems currently facing newly assigned and inexperienced ADP security officers. The proclivity within DoD for using documents in virtually every facet of work suggests that hypertext has a promising future in the DoD. To implement an ADP security program in the Navy, the information presented in the DoN AIS Security Guidelines should be carefully selected and filtered to derive a tool that provides an effective and circumstance-shaped source of information, guidance and reference. From a design standpoint, it is important to integrate hypertext technology with other computer based tools -- such as expert systems and simulations models -- to fully exploit the potential of this new technology.

DESIGN AND IMPLEMENTATION OF A DECISION SUPPORT SYSTEM TO AID IN THE FORECASTING AND SCHEDULING OF ADMINISTRATIVE SCIENCES COURSES

Mark David VanUs-Captain, United States Army
B.B., Western Illinois University
Master of Science in Information Systems-March 1991
and
William George Reagle-Captain, United States Army
B.S., University of Pittsburgh
Master of Science in Information Systems-March 1991
Advisors: Shu S. Liao & Daniel R. Dolk-Department of Administrative Sciences

The Administrative Sciences Department's faculty and course scheduling process is complex and data intensive. The process is driven by student enrollment forecasts provided to the department by the Naval Postgraduate School's Program Administration Assistant. The department currently has no means for manipulating the forecasts. This thesis develops a decision support system and its associated dBASE IV-based relational database for use by the Administrative Sciences Department in the forecasting and scheduling processes. The system consists of four major applications comprised of over 65 separate modules. The database management application allows for management and maintenance of the database files. The scheduling application generates teaching schedules. The report generating application produces all the reports required of the system by the department. Finally, the estimation application provides the decision support portion of the system by allowing "what-if" manipulation of the student enrollment data to see what impact there will be on teaching requirements. The system was developed within a Systems Development Life Cycle framework. Due to the need to quickly produce a working copy of the system, individual modules were developed using a Version Development technique.

A GRAPHICAL BROWSER INTERFACE FOR THE NAVAL ENVIRONMENTAL OPERATIONAL NOWCASTING SYSTEM

Joseph P. Voboril-Lieutenant, United States Navy
B.S., University of Nebraska, 1986
Master of Science in Information Systems-September 1991
Advisor: Madgi N. Kamel-Department of Administrative Sciences

A database management system for the Naval Environmental Operational Nowcasting System has been developed at the Naval Oceanographic and Atmospheric Research Laboratory (NOARL), Monterey, California. The systems design presents a high level view of diverse environmental data for meteorologists at NOARL. Currently the NEONS DBMS has a function key based data browser written in 4GL. This browser, however, is unpopular and little used because of its user unfriendliness and limited functionality. This thesis presents a design for a graphical user interface for the browser based on ergonomic design principles. The purpose of this design is to increase user friendliness and enhance functionality over the existing user interfaces for other information systems with rich data types. The design has been favorably evaluated and is currently being implemented by the NOARL development staff.

SELECTING A METHOD TO GATHER MANAGEMENT INFORMATION FOR THE NAVAL PLANT REPRESENTATIVE OFFICE AFTER CONVERSION TO A DEFENSE PLANT REPRESENTATIVE OFFICE

Craig J. Voth-Lieutenant, United States Navy
B.S., University of Minnesota, 1980
Master of Science in Information Systems-March 1991
Advisor: Rodney F. Matsushima-Department of Administrative Sciences

In 1989, the Defense Management Review (DMR) recommended the conversion of the Plant Representative Offices of each service into Defense Plant Representative Offices (DRPOs). Once an office has been converted to a DPRO, it will be required to use the automated reporting system, Mechanization of Contract Mangement Services (MOCAS), as the organizational management information system. This thesis research was undertaken to recommend the most efficient method for a specific DPRO Commander to gather on-site management information to meet the organizational business goals after the conversion and also support the required use of MOCAS. The results of this research indicate the MOCAS, while a necessary system for strategic management at levels above a DPRO, does not provide the level of detail required by the DPRO manager. Furthermore, the currently used Contract Administration Management System (CAMIS) should be maintained and modified for use in conjunction with MOCAS by Navy offices that are converted to DPROs. This will support the new organization while continuing to support the needs of the existing customer base.

ECONOMIC ANALYSIS OF INFORMATION SYSTEMS

Charles G. Walker, Jr.-Lieutenant, United States Navy
B.S., Auburn University, 1984
Master of Science in Information Systems-March 1991
Advisor: William Haga-Department of Administrative Sciences

This paper examines the utilities of present value analysis, discounted payback analysis, uniform annual cost, benefit-cost ratio, savings investment ratio, internal rate of return, and break even analysis, as economic analysis techniques. These techniques are analyzed using comparative four-way data sets that have front-loaded benefits. The findings of this analysis are then summarized in a matrix that scores the category of utility for each technique. An expert system (COSTEX) is then developed using the Intelligence Complier expert system shell. This system directs MIS managers in the selection of appropriate techniques of analysis for a given set of economic analysis contingencies. The Basic Economic Analysis Decision Support (BEADS) system is also developed to provide users with both a decision support framework and a tutorial on the methodologies and virtues of each of the economic analysis techniques.

AN EVALUATION OF COMNAVSURFPAC's INFORMATION ENGINEERING INITIATIVE FOR THE MODERNIZATION OF TYPE COMMANDER HEADQUARTERS AUTOMATED INFORMATION SYSTEM (THAIS)

Edward A. Whitehouse-Lieutenant, United States Navy
B.S., United States Naval Academy, 1985
Master of Science in Information Systems-March 1991
Advisor: Robert Knight-Department of Administrative Sciences

A state-of-the-art management information system which would allow a Type Command to efficiently control assigned assets by thorough integration of the many currently distinct management systems is critical in this era of rapid technological growth, data overabundance, and expanding naval commitments. A significant problem with the current development of such a system is its inherent large size and a requirement to use an unproven methodology, Information Engineering (IE). This thesis analyzes the modernization of the Type Commander Headquarters Automated Information System, THAIS, identifies problems related to the effort and discusses the use of IE on a major redesign project.

TARPS: A PROTOTYPE EXPERT SYSTEM FOR TRAINING AND ADMINISTRATION OF RESERVES (TAR) OFFICER PLACEMENT

George A. Zolla, Jr.-Commander, United States Naval Reserve
B.S., Pennsylvania State University, 1971
Master of Science in Information Systems-September 1991
Advisor: Magdi N. Kamel-Department of Administrative Sciences

The billet assignment duration for Training and Administration of Reserves (TAR) officers is normally two to three years. A placement officer determines where the TAR officer's subsequent assignment will be based on the officer's qualifications and billet requirements. This assignment is vitally important because it significantly affects the officer's career opportunities for promotion and command. This thesis describes the design and implementation of a prototype expert database system that enhances the placement officer's ability to efficiently select the optimum billet for each officer. The prototype integrates a rule based expert system with officer and billet databases to produce a list of billets that match an officer's qualifications and desires. A rudimentary prototype of TARPS has already been evaluated in the field. Initial feedback is encouraging. Placement officer recommendations have been implemented into an enhanced prototype, detailed in this thesis.

MASTER OF SCIENCE
IN
MANAGEMENT

ALLOCATING THE INCREASED OPERATIONAL COSTS IN RETAIL PRICES AT THE DEFENSE ELECTRONICS SUPPLY CENTER AS A RESULT OF DEFENSE MANAGEMENT REPORT DECISION 901

Michael G. Ahern-Lieutenant Commander, United States Navy
B.S., John Carrol University, 1979
Master of Science in Management-June 1991
Advisor: Alan W. McMasters-Department of Administrative Sciences

Defense Management Review Decision (DRMD) 901 requires inventory control points managing Department of Defense (DoD) stock-funded material to include all the costs of doing business in the stock fund surcharge. The inventory control points will no longer receive direct operational and maintenance (O&M) funding in the defense budget. As a result of DMRD 901, for fiscal year 1991, the Defense Electronics Supply Center (DESC) must recoup, through its operational surcharge, $84.1 million of its own operational costs and $100.9 million of DLA Headquarters and support activity costs (a total of $185.0 million). The increased surcharge has significantly raised the retail price DESC's customers must now pay for material requisitioned. This thesis will present alternative methods for allocating costs by changing the allocation base and examine the use of a fixed order charge to determine their effect on the retail prices of material.

TESTING, VALIDATION, AND VERIFICATION OF AN EXPERT SYSTEM ADVISOR FOR AIRCRAFT MAINTENANCE SCHEDULING (ESAAMS)

Christian W. Andrieu-Lieutenant Commander, United States Navy
B.S., University of New Orleans, 1977
Master of Science in Management-March 1991
Advisor: Martin J. McCaffrey-Department of Administrative Sciences

Aircraft maintenance control operates in a dynamic, high intensity environment. Maintenance work priorities are made several times daily under extremely demanding and time sensitive conditions. The person responsible for scheduling aircraft, usually the Maintenance Master Chief, draws upon years of experience when assigning priorities for both scheduled and unscheduled maintenance. An Expert System Advisor for Aircraft Maintenance Scheduling (ESAAMS) is being implemented at the Naval Postgraduate School. This thesis examines what should be included within an expert system test plan and proposes a prototype test plan for ESAAMS. Development of ESAAMS will provide valuable insight for incorporation of a leading edge technology into today's complex military. The potential improvement in operational readiness, consistent decision making, and ability to replicate an expert's decision making process for scheduling aircraft maintenance makes implementing ESAAMS a worthwhile venture.

AN ANALYSIS OF THE NAVY's OVERSEAS SCREENING POLICY

Scott L. Archer-Lieutenant Medical Service Corps, United States Navy
B.A., Columbia College, 1985
Master of Science in Management-December 1990
and
John D. Walker-Lieutenant, United States Navy
B.A., Texas A&M University, 1983
Master of Science in Management-March 1991
Advisor: Alice M. Crawford-Department of Administrative Sciences

This study analyzes the performance of the Navy's Overseas Screening Policy for 1989, with specific emphasis on determining how many personnel were returned to the U.S. prior to the end of their tour. Overseas screening in its present form is the result of 16 years worth of development. The purpose of screening is to avoid sending service members oveseas with problems that cannot be handled by the overseas command. The data collected for this thesis included information on personnel incarcerated overseas, administratively discharged while overseas, medically evacuated from overseas, and those returned at the request of an overseas command. Estimates made from the data showed that the number of early returns is much larger than previously thought, and that there are substantial costs associated with these early returns.

ACCOUNTING FOR THE COMMERCIAL USE OF GOVERNMENT FURNISHED PROPERTY

David Folk Baucom-Lieutenant, Supply Corps, United States Navy
B.S., Auburn University, 1981
Master of Science in Management-June 1991
Advisor: Rodney F. Matsushima-Department of Administrative Sciences

One area not identified by the Defense Management Review currently in progress is accountability for the commercial use of the Government Furnished Property located in Defense contractors' facilities. This study focused on this issue to determine if the Department of Defense should strengthen its accounting for contractors' use of Government Furnished Property on commercial work. The results of interviews with 50 Government and contractor Property Administrators at headquarters, field level activities, and contractors' facilities are reported. It was concluded that the current accounting procedures utilized by Defense agencies involved with contractors using Government Furnished Property for commercial work are inadequate and 15 recommendations are presented to correct these accounting deficiencies.

A PROCESS FOR MAKING ON-GOING IMPROVEMENTS FOR DISPENSING MEDICATION: USING A TQM APPROACH

Bradley R. Bosch-Lieutenant, Medical Service Corps, United States Naval Reserve
B.A., Eastern Washington University, 1981
M.S., Golden Gate University, 1985
Master of Science in Management-June 1991
Advisor: Daniel Trietsch-Department of Administrative Sciences

This thesis is an examination of the workflow processes of the outpatient pharmacy at Silas B. Hays Army Community Hospital and stresses a TQM approach to identify acceptably improvement strategies. Through the application of statistical, technical and managerial techniques, an analysis is made for determining more effective and efficient methods for dispensing medication to the medical beneficiaries of the Army's Fort Ord region. A detailed description of the outpatient pharmacy's operations define the parameters in which the operating manager's strategies must perform. This study is to facilitate the process for making on-going improvements and assist in creating a strategic integrating management system to achieve the goals of the hospital's administration and of the pharmacy department.

OPTIMIZATION OF SEALIFT SHIP TYPES IN THE READY RESERVE FLEET (RRF) AND MARITIME PREPOSITIONED SHIP (MPS) FLEETS

Robert K. Briede-Lieutenant, United States Navy
B.S., Purdue University, 1985
Master of Science in Management-June 1991
Advisor: Richard Harshman-Department of Administrative Sciences

This thesis examines a method for optimizing the effectiveness of existing sealift fleets given a limited budget. A brief background of U.S. military mobility is presented. Relevant cost categories of the Ready Reserve Force (RRF) and prepositioned forces are determined by looking at the life-cycle of sealift ships. A methodology for determining an optimal fleet mix is presented. Two models for optimizing the direct costs of mobilizing the RRF and prepositioned forces are developed. The first model is based upon a single trip to the war zone. The second model develops the possibility that sealift ships may make multiple trips to the war zone and return to U.S. seaports. Methodologies for determining an optimal fleet mix are presented.

INTRODUCTION TO FINANCIAL MANAGEMENT FOR FOREIGN MILITARY STAFF OFFICERS

Rodney Eugene Bryant-Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1979
Master of Science in Management-June 1991
and
Paul Raymond Jensen-Lieutenant Commander, United States Navy
B.S., Coastal Carolina College, 1979
Master of Science in Management-June 1991
Advisor: Joseph San Miguel-Department of Administrative Sciences

The nature of our research was to determine the content, scope and structure for a course in basic financial management which would be used to introduce foreign military officers to the field of financial management. The Naval Education and Training Security Assistance Field Activity (NETSAFA) indicated there was a need for a generic, introductory financial management course because of the numerous inquiries from foreign governments concerning financial management subject matter. Foreign official requested that their staff officers, which have varying degrees of familiarity with the financial arena, be schooled in the basics of financial management. Research determined that the course should be approximately two weeks in length in order to adequately cover the following subject areas: accounting, budgeting, management fundamentals, auditing, management information systems (MIS) and total quality management (TQM). In addition to formulating the content, scope and structure of the course, a draft student and instructors' guide were developed and are included in Appendices A and B.

COMPARATIVE COST ANALYSIS OF P-3 ACTIVE AND RESERVE AVIATION FORCES: THE ECONOMICS OF PROPOSED FORCE MIX ALTERNATIVES

Carl Eugene Carson,III-Lieutenant Commander, United States Naval Reserve
B.A., Furman University, 1978
Master of Science in Management-June 1991
and
Michael Richard Wrinkle-Commander, United States Naval Reserve
B.S., San Jose State University, 1974
Master of Science in Management-June 1991
Advisor: Jerry McCaffery-Department of Administrative Sciences

This thesis describes a methodology for estimating the annual operating and support costs of similarly equipped active and reserve VP squadrons. The costs analyzed include expenditures for personnel, equipment and support associated with maintaining a VP capability. A costing methodology developed by the RAND corporation provided the basis for developing the cost comparisons. The annual cost of the reserve VP squadron ($14.6 million) was found to be 44.5% of the cost of the active squadron. An annual savings of over $18.2 million results when a reserve squadron replaces an active squadron. The primary recurring cost factors that drive the annual costs of active and reserve VP squadrons and contribute to cost differentials are identified and discussed. Realization of cost savings are valid only for marginal changes in the total VP force. The total cost implications of large VP force mix changes, as currently proposed by DoD and the DoN, are addressed.

PROFILE OF AN EFFECTIVE ENGINEERING MANAGER AT THE NAVAL AVIONICS CENTER

Daniel W. Chang-Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1979
Master of Science in Management-June 1991
and
Natalie A. Quick-Lieutenant, United States Navy
B.S., United States Naval Academy, 1984
Master of Science in Management-June 1991
Advisors: Kenneth W. Thomas, Susan P. Hocevar & Gail F. Thomas
Department of Administrative Sciences

This thesis examines behaviors that affect the managerial effectiveness of first-level engineering supervisors (branch managers) at the Naval Avionics Center. Data were collected using a survey designed and administered by the authors and their advisors. The survey asked engineers to rate their manager on a wide range of managerial behaviors to answer questions representing several "effectiveness"-related variables. The effectiveness variables were correlated with each specific managerial behavior to identify which behaviors had the strongest relationship with the effectiveness outcomes. The results were used to develop a profile of an effective engineering manager at the Naval Avionics Center. General managerial effectiveness ratings were most strongly related to behaviors demonstrating interpersonal skill and sensitivity along with administrative skill in task management. In contrast, intrinsic task motivation, job satisfaction and positive group climate were more strongly related to behaviors representing the management of external interfaces, building cooperative teamwork and the assignment of task and development opportunities based on performance. Recommendations are offered for managerial development at the NAC Institute.

FLEET LEVEL BUDGETING: 1981 TO 1997

Peter Brady Clark-Lieutenant, *United States Navy*
B.S., United States Naval Academy, 1983
Master of Science in Management-June 1991
Advisor: Larry R. Jones-Department of Administrative Sciences

The objective of this study is to identify patterns in past appropriations to CINCPACFLT and to project trends thus identified into the future. The study analyzes data, examines trends and patterns, and addresses implications relative to budget expectations for the future. The data and analysis may aid the Navy in formulating strategies to justify future budgets to improve the allocation of financial resources.

AN EXAMINATION OF THE COST REIMBURSEMENT POLICIES AND PROCEDURES FOLLOWED BY DOD WHEN PROVIDING SERVICES TO PRIVATE ORGANIZATIONS

Michael David Conn-Lieutenant, United States Naval Reserve
B.S., University of Illinois, 1983
Master of Science in Management-June 1991
Advisor: Kenneth J. Euske-Department of Administrative Sciences

This thesis examines the billing policies followed by the Department of Defense (DoD) in recovering costs incurred from providing services to private enterprises. Examples studied include DoD assistance provided to the Paramount Pictures Corporation in the production of the motion pictures *Top Gun* and *The Hunt for Red October*, as well as to the Exxon Corporation for assistance provided in the *Exxon Valdez* oil-spill cleanup. Although the purposes for the assistance provided in each case were unique, the types of resources used (i.e., ships, aircraft, and personnel) were the same. Due to differences in DoD billing policies, DoD did not seek the same reimbursements from both corporations. For example, DoD required reimbursements from Exxon for all military personnel costs incurred in the *Exxon Valdez* case, but not from Paramount Pictures for similar costs in *The Hunt for Red October* production. Inconsistencies were also found in the implementation of the various policies by the DoD Components involved. If uniformity and consistency in billing procedures are to be attained, additional billing guidance and policy revisions are required.

A FEASIBILITY ON THE IMPLEMENTATION OF THE RED/YELLOW/GREEN PROGRAM

Richard O. Cowart-Lieutenant, Supply Corps, United States Navy
B.S., Roosevelt University, 1980
Master of Science in Management-June 1991
Advisor: Rodney F. Matsushima-Department of Administrative Sciences

The implementation of the Red/Yellow/Green Program is the Navy's newest source selection improvement program. The RYG Program provides the Contracting Officer with a means of selecting the contractor which offers the best overall value to the Government by considering the contractor's past performance, rather than the lowest price. The RYG Program classifies contractors according to their past quality performance using an automated Navywide data base. Thc use of the RYG Program should reduce unnecessary quality assurance oversight and allow activities to concentrate scarce resources where they are required. This thesis addresses the key issues for successful Navywide implementation of the RYG Program. Based on the research, it is recommended that the RYG Program be immediately implemented on a Navywide basis.

AN ANALYSIS OF THE FEASIBILITY OF CONSOLIDATING CONTRACTING FUNCTIONS IN HAWAII

Charles Cyrus-Lieutenant, Supply Corp, United States Navy
B.A., Elon College, 1982
Master of Science in Management-June 1991
Advisor: Rodney F. Matsushima-Department of Administrative Sciences

This research assessed the feasibility of consolidating the major DoD components' contracting organizations in Hawaii. Six primary factors were used in this analysis: the DoD environment, mission support, personnel costs, administration costs, procurement automation systems, and the vendor base. This assessment indicates that the DoD component contracting organizations in Hawaii should be consolidated. Consolidation will result in the unification of procurement expertise under one central organization. This pooling of expertise will result in improved efficiency and effectiveness created by the synergism among the procurement specialists. The larger organization will be able to set up centers of excellence, institute upward mobility and trainee positions, have backup personnel for critical positions, and better maintain corporate knowledge. This study recommends that an analysis be conducted to determine the optimum organizational structure and the development of an effective implementation plan.

GENDER INDUCED DIFFERENCES IN NAVAL FITNESS REPORTS

Barbara J. Davis-Lieutenant, United States Navy
B.B.A., National University, 1985
Master of Science in Management-June 1991
and
A. Renee Gutierrez-Lieutenant, United States Navy
B.A., University of Virginia, 1984
Master of Science in Management-March 1991
Advisor: Alice Crawford-Department of Administrative Sciences

This thesis replicated a 1983 study by Navy Personnel Research and Development Center reviewing the possible differences in the narrative portions of Naval Fitness Reports. The sample used in this study consisted of FitReps of Naval Postgraduate School student and those written by senior officers with both men and women in their commands. NPRDC discovered significant differences in the average number of descriptors used in FitReps written about women as opposed to those written about men. There were 16 different descriptors which showed a difference. The current study showed no differences in the mean number of descriptors used in FitReps in this sample. However, FitReps written by women showed differences in two descriptors, "Relations with Others" and "Recommendations." FitReps written on women received more recommendations than those written on men.

FLIGHT HOUR COST VARIANCE IN THE NAVAL AIR RESERVE: AN ANALYSIS OF POSSIBLE SOURCES

Michael Downs-Lieutenant Commander, United States Navy
B.A., University of Maryland 1978
Master of Science in Mangement-December 1990
Advisor: Douglas Moses-Department of Administrative Sciences

This thesis is an analysis of flight hour cost variance in the Naval Air Reserve and Fourth Marine Aircraft Wing. The broad objective of the thesis was to identify and analyze factors hypothesized to cause variance in cost per flight hour. An overview of the Naval Air Reserve Force structure and budgetary organization is presented. The relatively recent shift in the use and role of reserve forces towards Total Force concept goals is highlighted. Any interview process is described in which four possible sources of cost per hour variance were identified for investigation: flight hours, primary mission area, repairables pipeline and overseas detachments by reserve VP squadrons. For each possible variance factor, statistical tests were applied to available cost data to determine if its impact on cost per hour variance was significant. Findings indicate that primary mission area and VP detachments each have a significant impact on cost per hour variance. Recommendations are provided concerning headquarters and field level flight budget execution. Conclusions pinpoint further areas of research gleaned from the investigation.

RESOURCE MANAGEMENT STRATEGY IN THE FRENCH NAVY

Michael Allister Durnan-Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1978
Master of Science in Management-June 1991
Advisors: David Yost-Department of National Security Affairs &
Francois Melese-Defense Resources Management Education Center

This thesis focuses on the French Navy's resource management effects in the areas of ship construction, maintenance, and personnel. The central question is whether the French Navy will be able to both upgrade an ageing fleet, and man that projected new fleet with qualified personnel, given defense budget constraints and the fact that naval pay scales are falling below those in the private sector. The thesis concludes that novel approaches to maintenance and upkeep, and a reform of length of service contracts may help the French Navy meet its global missions. The thesis recommends that the French Navy consider greater cooperation with the U.S. Navy so that both navies may avoid wasting time and money investigating maintenance and procurement methods already employed or abandoned by the other. It also recommends greater standardization of responsibilities, methods, and programs in the French ship repair organization.

AN ANALYSIS OF THE MATERIAL RETURNS PROGRAM

Douglas R. Eades-Lieutenant, Supply Corps, United States Navy
B.S., Chapman College, 1981
Master of Science in Management-December 1990
Advisor: Joseph G. San Miguel-Department of Administrative Sciences

The volume of excess material is growing in virtually all of the Armed Services. A portion of this is "invisible" to the supply system and other potential users because it is still in the hands of the end-user. The management problem created by "holding" excess maybe due to disincentives for operational units to return material. This results from the complexity of the Material Returns Program and historically low rate of return experienced by many of the operational units. This thesis evaluates the Material Returns Program from a fleet perspective, concentrating on documented issues and experiences. Results indicate that acceptable changes can be implemented that will provide the incentive for end-users to return excess material to the supply system.

NEGOTIATIONS: EXPERIENCED VS. INEXPERIENCED NEGOTIATORS

Patrick James Fitzsimmons-Major, United States Marine Corps
B.S., Clemson University, 1975
Master of Science in Management-December 1990
Advisor: David V. Lamm-Department of Administrative Sciences

The negotiation process is one of conflict resolution. It is a process whereby parties come together and attempt to reach an agreement that is of mutual benefit to each and that will establish the framework for future business transactions. With an unlimited number of variables and possibilities, a negotiation can be a labyrinthine process of eternal frustration, or it can be as simple as the spoken word and a handshake. One common factor, however, binds all negotiations, and that factor is that the participants are there to strike a bargain. The negotiation is the route to that agreement. The purpose of this thesis is to examine the negotiation process from the standpoint of both the experienced and inexperienced negotiator and compare the two. The research will focus primarily on ethics in negotiations, and tactics and strategy in negotiations.

A DATA-BASED FINANCIAL MANAGEMENT INFORMATION SYSTEM (FMIS) FOR ADMINISTRATIVE SCIENCES DEPARTMENT

Neil Spencer Ford-Lieutenant Commander, United States Navy
B.S., Oklahoma State University, 1975
Master of Science in Management-December 1990
and
Nicholas Waldon Zimmon-Lieutenant, Supply Corps, United States Navy
B.S., University of Colorado, 1972
Master of Science in Management-December 1990
Advisor: Shu Liao-Department of Administrative Sciences

The Administrative Sciences (AS) Department of the Naval Postgraduate School (NPS) is placing an increasing emphasis on keeping department expenses at minimum levels requiring the AS Department to carefully monitor a large number of complex financial accounts. It becomes necessary to develop a Financial Management Information System that would result in improved management of financial assets, better use of clerical skills, and more detailed, accurate, and up-to-date reporting within the AS Department. Based on the requirement analysis and prototypes performed by previous work, this thesis develops and implements a personal computer-based Management Information System for the management of the many funding accounts controlled by the Administrative Sciences Department. The central objective was to integrate accounting transactions performed in several different offices, currently using different software programs, into a single all-encompassing Management Information System. The system was written using dBASE IV and is currently operational.

A GUIDE FOR MARINA AND HARBOR MANAGERS

Lizabeth L. Fruth-Lieutenant, United States Navy
B.S., University of Maryland, 1983
Master of Science in Management-March 1991
Advisors: Gail F. Thomas & Susan.P. Hocevar-Department of Administrative Sciences

This thesis outlines and develops a management guide for small craft harbor and marina managers. The final product, a guide for marina and harbor managers, is included as an appendix. The thesis describes a need for the guide, explains how it was developed, and provides background information on small craft harbors and marinas. Further, the thesis describes how the information for the guide was collected and makes recommendations for future studies and applications.

TRIGGERS OF THE GREAT DEPRESSION: COMPARING ECONOMIC CLIMATES IN THE 1920s WITH THE 1980s

Hidetoshi Fujita-Lieutenant Commander, Japan Maritime Self Defense Force
B.S., Japan National Defense Academy, 1979
Master of Science in Management-June 1991
Advisor: Francois Melese-Defense Resources Management Education Center

This thesis examines the similarities in economic climates between the 1920s and the 1980s. It concludes that dangerous economic conditions arise whenever there is an insufficient flow of funds to debtor nations. It is proposed that Japan contribute to the stability of the world economy through an expansion of its imports and, through its global corporations, encouraging continued direct investment abroad.

STRATEGIC SEALIFT: DECISIONS TODAY TO ENSURE TOMORROW

Mary Alice Fults-Lieutenant, United States Navy
B.F.A., University of Arizona, 1981
Master of Science in Management-June 1991
Advisor: Dr. Dan C. Boger-Department of Administrative Sciences

Strategic Sealift is considered vital for our national security, and is often termed the "Fourth Arm of Defense." It is made up of two fleets, one owned and operated by the U.S. government, the other owned and operated by commercial companies and often chartered by the U.S. government. The most recent studies on the status of strategic sealift in the United States have all indicated that our present capabilities, in both fleets, are insufficient to handle anticipated National defense requirements. This thesis is an investigation into strategic sealift capabilities in light of the recent Persian Gulf war. Some decision makers in Washington are saying that, due to the outstanding results of Operations Desert Shield and Desert Storm, the United States no longer needs an active Merchant Marine. Despite these results our "Fourth Arm" is still insufficient. This thesis examines the reasons why this is true and considers possible solutions to this problem, some of which have been provided by the government and commercial companies. The conclusion is that to ensure our national security the United States must take decisive action now to improve both the government and the Merchant Marine fleets.

HOUSEHOLD GOODS SHIPMENTS: "TENDER OF SERVICE FOR UNPACKING" A COST SAVINGS PROPOSAL

Matthew T. Gardner-Brown-Lieutenant, Supply Corps, United States Navy
B.S., University of Houston, 1983
Master of Science in Management-June 1991
Advisors: Alan W. McMasters & Nancy C. Roberts-Department of Administrative Sciences

This thesis attempts to prove that cost-savings are attainable within the present Department of Defense Household Goods Personal Property Movement System. Using a sample population of officers attending the Naval Postgraduate School, the author evaluates personal property moves within the continental United States and focuses primarily on accessorial services, which includes packing/loading and unloading/unpacking, for the purpose of presenting a moving option regarding unpacking at shipment destination. This thesis will provide the Military Traffic Management Command with two alternative cost-savings proposals that have potential to yield substantial dollar savings to the government.

FACTORS AFFECTING JAPANESE DEFENSE POLICY
John Sylvester Gauthier-Lieutenant, United States Navy
B.S., University of Rochester, 1985
Master of Science in Management-September 1991
Advisors: Lawrence R. Jones & Katsuaki L. Terasawa-Department of Administrative Sciences

This thesis describes many of the important factors influencing the process of Japanese defense policy formulation. The questions posed include: 1) What will Japan's Role be in the emerging international security structure? 2) What internal factors affecting defense policy need to be better understood by U.S. policy makers? 3) What are some implications of the decision-making process and political situation in Japan for the U.S.? The national debate in Japan about defense is analyzed with a description of the major advocacy groups, as well as the influence of the press and public opinion. Political, historical, and social forces are examined, as well as the Japanese defense policy-making process. The thesis also examines the Japanese response to the Persian Gulf Crisis of 1990-91, to gain a current perspective on Japanese attitude toward defense and security issues. Conclusions are drawn to answer the initial questions and to propose what the U.S. may expect from Japan in the Area of defense matters in the future.

AN EVALUATION OF THE NAVY's RED/YELLOW/GREEN PROGRAM TEST
John L. Gebhart-Lieutenant Commander, Supply Corps, United States Navy
B.S., University of Hawaii, 1980
Master of Science in Management-June 1991
Advisor: Rodney F. Matsushima-Department of Administrative Sciences

The Navy conducted a test of a new source selection tool known as the Red/Yellow/Green Program (RYG). The program was designed to assist field contracting activities obtain the best purchase value and reduce problems associated with poor contractor product quality. The RYG Program uses the information contained in the Contractor Evaluation System (CES) and the Product Deficiency Reporting and Evaluation Program (PDREP) data base to assess contractor product quality. This thesis evaluated the result of the one-year test conducted at five locations.

STRATEGY AND LOGISTICS FOR THE NEW WORLD ORDER
Cory Ward Gildersleeve-Lieutenant, Supply Corps, United States Navy
B.A., Yale University, 1973
Master of Science in Management-December 1990
Master of Arts in National Security Affairs-December 1990
Advisors: Dan Trietsche-Department of Administrative Sciences &
Richard M. Brown-Department of National Security Affairs

This is an interdisciplinary analysis of the post-Cold War world to determine the optimal strategy to attain the national interests of the United States, and the requisite logistic structure to support that strategy. The optimal solution is found to be a strategy based on multinational defense centered on a permanent force of United Nations garrison port complexes. This multilateral force would be augmented by as small a national defense force as necessary to ensure national security. The thesis endeavors to reconnect the cultural and philosophical past of the United States with its immediate future. National interests are identified through examination of American Pragmatism and the philosophies of John Locke and Jean-Jacques Rousseau. To determine the current status of common defense based upon the Foreign Military Sales system, an analysis of current data is accomplished. Future threats to the United States are examined with special emphasis on nuclear terrorism. The ability of Islamic nations in North Africa and the Middle East to mine significant quantities of uranium is demonstrated. The grave political as well as ongoing environmental consequences of this recent capability are discussed in detail.

AN ANALYSIS OF SPECIFIC CONTRACTING ISSUES REGARDING THE DEVELOPMENT AND ACQUISITION OF EXPERT SYSTEMS

Daniel J. Gillan-Captain, United States Marine Corps
B.A., Purdue University, 1984
Master of Science in Management-December 1990
Advisor: Marty J. McCaffrey-Department of Administrative Sciences

The increasing complexity of our every day jobs requires us to pursue flexible and more adaptive technologies with which to respond to our professional requirements. One such method is an expert system. This computer software "tool" is one means to augment and streamline ones professional decision making process. The expert systems can be used as a means to assist new or inexperienced personnel to make informed decisions about their jobs. It can also assist in the decision making process when the technical expert is not present. Due to the fast paced, rapidly changing nature of computer software development, the need exists for a specific methodology to direct the development and acquisition of this technology within the Department of Defense (DoD). This study will provide an objective summary and analysis of specific contractual considerations that need to be addressed with regard to the acquisition of an expert system. A selected review of DoD and industry responses to personal interviews, conference presentations and published papers, served as the basis for discussion of the problems and issues in this arena.

THE SUITABILITY OF AWARD FEE CONTRACTS FOR THE ISRAELI MINISTRY OF DEFENSE (MOD)

Eidit Givaty
B.A., The Hebrew University, 1975
Master of Science in Management-June 1991
Advisor: Rodney F. Matsushima-Department of Administrative Sciences

The primary objective of this thesis was to analyze the suitability for use of the Award Fee Types of Contracts in the Israeli Ministry of Defense. The researcher used the Navy's Supervisor of Shipbuilding, Conversion and Repair award fee monitoring organization as a sample for comparison with the Israeli Ministry of Defense organization. The purpose for this comparison was to determine if there was an organization structure barrier that would prevent implementation of the Award Fee Types of Contracts. Other barriers were identified and discussed through the use of a written survey conducted with key personnel within the Israeli Ministry of Defense. A guide was developed for use when implementing the Award Fee Types of Contracts. The analysis revealed that there were no barriers that could not be overcome and that the benefits to be gained by incorporating the Award Fee Types of Contracts far outweigh any impediments. It was recommended that the Israeli Ministry of Defense consider incorporating these types of contracts into their procurement regulations after evaluating the results of a test case.

AN IMPLEMENTATION STUDY OF AN ACCOUNTING SYSTEM DESIGN FOR THE NAVAL AVIONICS CENTER

Thomas David Goodwin-Lieutenant, United States Navy
B.B.A., Northeast Louisiana University, 1981
Master of Science in Management-June 1991
Advisor: Kenneth J. Euske-Department of Administrative Sciences

The Navy is constructing an automated manufacturing facility which incorporates a flexible manufacturing system (FMS) and computer-integrated manufacturing (CIM) technology. The facility, which is known as the RAMP PWA facility, will operate within the Navy Industrial Fund (NIF) system. This thesis conducts a comparative analysis of NIF cost accounting with activity-based cost (ABC) accounting in order to determine which system more accurately accounts for the resources of the RAMP PWA facility. Additionally, the thesis seeks to determine which costing system reports a more precise estimate of product costs. The author concludes that an ABC system can more accurately account for the resources of an automated manufacturing facility, and that an ABC system reports a more precise estimate of product costs.

DEMING's MANAGEMENT PHILOSOPHY AND THE DEFENSE INDUSTRIAL BASE

David Jacques Graff-Lieutenant, Supply Corps, United States Navy
B.A., Yale University, 1980
Master of Science in Management-June 1991
Advisor: Rodney Matsushima-Department of Administrative Sciences

The purpose of this thesis is to analyze why firms are leaving the defense industrial base and to determine if Dr. Edward Deming's Management Philosophy can offer a more constructive way of doing business in the Defense Acquisition System. A comparative analysis was conducted between industry's reasons for wanting to leave the defense sector and Deming's Management Philosophy. This analysis, determined if adoption of Deming's Management Philosophy can alleviate industry's existing concerns in addition to providing a means to incentivize industry to remain in the defense sector.

THE MILITARY HEALTH SERVICE SYSTEM: BENEFICIARY SATISFACTION AND AN OPTION FOR CHANGE

Amalie Ruth Fite Gulf-Lieutenant Commander, United States Navy
B.S., University of Texas, 1974
M.S., University of Houston, 1977
Master of Science in Management-December 1990
Advisor: Alice M. Crawford-Department of Administrative Sciences

This thesis investigates several factors associated with the current military health benefit. These included: (1) beneficiary satisfaction with military as well as civilian medical treatment facilities, (2) the number of active duty military personnel who choose to use military facilities and the personal cost incurred in making that decision, (3) the number of active duty military personnel who would purchase civilian health insurance, (4) and the benefits of retaining the current military health benefits as opposed to instituting a civilian group health insurance plan in its place. Five hundred forty-nine officers completed a questionnaire that was developed to address these issues. Trends noted were: (1) a slight rise in the level of dissatisfaction with the care provided by the current military health care benefit as time in service increases and (2) an increase in the use of civilian services in the military health service system, such as medical care for military beneficiaries at civilian treatment facilities and the use of commercial insurance plans for psychiatric treatment. The arguments presented in this thesis on this very sensitive issue will continue to be debated by both the Department of Defense and the legislative branch of the government.

GENDER INDUCED DIFFERENCES IN NAVAL FITNESS REPORTS

A. Renee Gutierrez-Lieutenant, United States Navy
B.A., University of Virginia, 1984
Master of Science in Management-March 1991
and
Barbara J. Davis-Lieutenant, United States Navy
B.B.A., National University, 1985
Master of Science in Management-June 1991
Advisor: Alice Crawford-Department of Administrative Sciences

This thesis replicated a 1983 study by Navy Personnel Research and Development Center reviewing the possible differences in the narrative portions of Naval Fitness Reports. The sample used in this study consisted of FitReps of Naval Postgraduate School student and those written by senior officers with both men and women in their commands. NPRDC discovered significant differences in the average number of descriptors used in FitReps written about women as opposed to those written about men. There were 16 different descriptors which showed a difference. The current study showed no differences in the mean number of descriptors used in FitReps in this sample. However, FitReps written by women showed differences in two descriptors, "Relations with Others" and "Recommendations." FitReps written on women received more recommendations than those written on men.

ECONOMIC ANALYSIS OF WATERFRONT OPERATIONS AT NAVAL STATION LONG BEACH

Shelly Marie Hammon-Lieutenant, United States Navy
B.S., University of Pennsylvania, 1984
Master of Science in Management-June 1991
Advisor: Dan C. Boger-Department of Administrative Sciences

This study is an economic analysis of the Waterfront Area Services operation at Naval Station Long Beach. The objective of this research was to determine the best strategy to improve operational efficiency with respect to both quality of service provided and dollar/asset utilization. Specific issues addressed are the establishment of a Naval Station Long Beach operated Waterfront Area Shop, allocation of crane service resources, and the improvement of communication between Naval Station Long Beach, Long Beach Naval Shipyard, and Fleet ships. Data was gathered through personal interviews with Naval Station and Shipyard personnel from the various operational and support offices involved with waterfront operations.

A MANAGEMENT CASE ANALYSIS OF THE DEPARTMENT OF DEFENSE CONTRACTOR RISK ASSESSMENT GUIDE PROGRAM

David Madison Harp-Lieutenant, United States Navy
B.S., Florida State University, 1979
Master of Science in Management-December 1990
Advisor: Paul M. Carrick-Department of Administrative Sciences

This thesis investigates the extent to which the Contractor Risk Assessment Guide (CRAG) Program at General Dynamics in San Diego, California, is achieving the goal of improved Department of Defense oversight processes and more effective contractor internal control systems. The study describes the development, reviews the basic audit procedures, and examines the five chapters of the CRAG Program. The research demonstrates that reduced duplication of effort was attained at General Dynamics' San Diego divisions through coordinated statistical sampling and audit planning. The environment created by the CRAG Program has resulted in an improved relationship between General Dynamics and government oversight personnel. The study concludes that the CRAG Program is an effective method to promote self-governance in the defense industry and recommends continued support from both industry and the Department of Defense.

AN ANALYSIS OF DEPOT LEVEL REPAIRABLES CARCASS MANAGEMENT AND POSITION CONTROLS UNDER THE ADVANCED TRACEABILITY AND CONTROL (ATAC) PROGRAM

Steven J. Harris-Lieutenant Commander, United States Navy
B.S., Indiana State University, 1977
Master of Science in Management-December 1990
and
William S. Munson-Lieutenant, Supply Corps, United States Navy
B.S., Ohio State University, 1980
Master of Science in Management-December 1990
Advisor: Alan W. McMasters-Department of Administrative Sciences

Defense Management Review Decision (DMRD) 901's objective to reduce supply system costs includes an initiative to achieve savings by retaining retrograde carcasses returned from the fleet at the first turn-in point rather than shipping them immediately to the repair depot or designated storage site. The purpose of this thesis is to analyze the operation of the Advanced Traceability and Control (ATAC) Program to determine a "ship or hold" decision for returned carcasses and to identify system shortcomings. A thorough study of ATAC's background, current management controls and operating procedures, and results from previous studies were combined with on-site HUB observations to show how and why the ATAC system works. Because of ATAC, the DMRD 901 initiative to retain carcasses at their first turn-in point is not cost effective except for those items experiencing rapid phase-out or numerous upgrades. Detailed indicators to measure and monitor ATAC cost and performance effectiveness do need to be implemented.

PHYSICAL READINESS TESTING OF SURFACE WARFARE OFFICERS

William Decker Hatch,II-Lieutenant, United States Navy
B.A., San Jose State University, 1982
Master of Science in Management-June 1991
and
Lori Dannette Swinney-Lieutenant, United States Navy
B.S., Lamar University, 1985
Master of Science in Management-June 1991
Advisors: Alice M. Crawford & Mark J. Eitelberg-Department of Administrative Sciences

This study focused on the appropriateness of the Navy's physical readiness test (PRT), particularly as it applies to surface warfare officer (SWOs). Physical requirements of fleet SWOs were addressed through two separate surveys and an extensive literature review. Differences in fleet PRT requirements and physical requirements set forth by SWO accession sources were also examined. Further review of literature allowed for evaluation of the individual components which currently comprise the PRT, in addition to possible alternatives. Methods of body fat measurement were also presented. Finally, situations which lead to difficulties in the administration of the PRT were assessed, including deployments, scoring of the PRT, medical waivers, and attitudes and perceptions of Navy members concerning the PRT. Based on information obtained in these areas, recommendations were made for changes in accession requirements, PRT components, and PRT administration.

UNIT COSTING AT THE NAVAL POSTGRADUATE SCHOOL

William Scott Hicks,III-Lieutenant, United States Navy
B.A., University of California at Santa Barbara, 1983
Master of Science in Management-June 1991
and
James Fletcher Hunter-Lieutenant, United States Navy
B.S., United States Naval Academy, 1983
Master of Science in Management-June 1991
Advisor: Joseph G. San Miguel-Department of Administrative Sciences

The purpose of this thesis is to discuss the implementation of unit costing at the Naval Postgraduate School (NPS). The research focuses on establishing a methodology to translate current financial accounting data at NPS into a format suitable to support the objectives of unit costing; specifically, improved visibility of the total cost of school operations and determination of the cost per graduate. Additionally, an overview of the new Department of Defense unit cost budgeting and resourcing system is included.

IMPACT OF ALTERING THE DELINQUENT DEBT THRESHOLD USED FOR BACKGROUND INVESTIGATION EXPANSION ON THE DENIAL RATE OF SECURITY CLEARANCES

Henry J. Hill-Lieutenant, United States Navy
B.S., Auburn University, 1983
Master of Science in Management-June 1991
Advisor: James M. Fremgen-Department of Administrative Sciences

The purpose of this thesis was to conduct an analysis of cases of requests for Top Secret security clearances from applicants whose backgrounds showed some derogatory financial information, to determine the impact of the delinquent debt threshold used to expand personnel security investigations on the final clearance decisions. To conduct the analysis, a sample of completed cases meeting the Defense Investigative Service's (DIS) delinquent debt criteria for investigation expansion ($500 or more outstanding for 120 days) was selected. The total amount of delinquent debt for each case was recorded and classified in one of three debt categories, under $1000, $1000 to $2000, and over $2000. In order to determine final clearance decisions, the sample data were merged with the Defense Central Investigations Index (DCII) data base. This provided a breakdown by clearance denials and approvals at the various delinquent debt categories. The analysis suggests that delinquent debt levels play less of a role in determining final clearance outcomes than was originally anticipated; it also provides some empirical support for raising the delinquent debt threshold above the current $500 threshold amount.

COLLEGE RESOURCES AND THE PERFORMANCE OF BLACK NAVAL OFFICERS

Joseph Emanuel Hines-Lieutenant, United States Navy
B.S., United States Naval Academy, 1986
Master of Science in Management-June 1991
and
Samuel Charles-Henry Howard-Lieutenant, United States Navy
B.A., The Citadel, The Military College of South Carolina, 1984
Master of Science in Management-June 1991
Advisors: Stephen Mehay & Mark J. Eitelberg-Department of Administrative Sciences

The purpose of this thesis was to examine the effect of college resources and attendance at a Historically Black College or University (HBCU) on the performance of Black Naval officers. The effects of college resources, college attendance, and other factors on officer performance measures were evaluated using multivariate logistic regression analysis techniques. The results of the analysis show that college resources have significant and positive effects on the probability of promotion for Black officers commissioned through the Navy Reserve Officer Training Corps or Officer Candidate School. Attending an HBCU had a negative effect on receiving the RAP mark on LT fitness reports and a positive effect on retention.

AN ANALYSIS OF REIMBURSABLE COSTS AND EXPENSE ITEMS FOR THE BASE OPERATING SUPPORT CONTRACT AT NAVAL SUBMARINE BASE BANGOR

Randall L. Hoffman-Lieutenant Commander, Civil Engineer Corps, United States Navy
B.S., University of Kansas, 1980
Master of Science in Management-December 1990
Advisor: Joseph G. San Miguel-Department of Administrative Sciences

Since 1977 the use of umbrella-type Base Operating Support Contract (BOSCs) at Naval installations has increased dramatically. These contracts encompass a number of services for which reimbursements are received. However, little guidance from headquarters has been issued on financial management of this type of contract. Naval Submarine Base (NSB) Bangor was one of the first installations to use a BOSC and is seeking improvements in the financial management areas of allocating the fixed contract price to reimbursable activities and to reportable expense items. This thesis analyzed contract procedures and related data that were gathered from eight different Naval installations with BOSCs and from NSB Bangor and their current BOSC. The analysis produced four separate recommendations for allocating the fixed contract price to reimbursable activities and the reporting of fixed contract price to various expense items for the current and future BOSC.

NAVY FAMILY HOUSING: A STUDY OF ADEQUACY STANDARDS AND THEIR RELATIONSHIP TO THE VARIABLE HOUSING ALLOWANCE

Tracy Diane Hofmann-Lieutenant, Civil Engineer Corps, United States Navy
B.S.M.E., Ohio State University, 1984
Master of Science in Management-June 1991
and
James Alan Worcester-Lieutenant, Civil Engineer Corps, United States Navy
B.Arch., California State Polytechnic University, Pamona, 1982
Master of Science in Management-June 1991
Advisor: Paul M. Carrick-Department of Administrative Sciences

This thesis investigates the current Navy and DoD policies regarding the Navy Family Housing and Variable Housing Allowance (VHA) programs. The study involved: (1) a comparison of civilian and Navy standards of adequacy for family housing, (2) an examination of the VHA rate production process, and (3) an analysis of Navy standards of adequacy for family housing and the ability of VHA to provide service members the opportunity to obtain civilian housing which meets those standards of adequacy. This study concludes that the VHA program does not ensure that service members relying on the civilian community have the opportunity to obtain family housing that meets the Navy's standards of adequacy. Recommendations are made to change this condition and, thereby, create equal housing opportunities for families living both on- and off-base.

AN ACCOUNT FOR SAVING ACTIVE PAY (ASAP): AND EMPLOYER-SPONSORED SAVINGS PLAN FOR ACTIVE DUTY MILITARY PERSONNEL

Stephen Elliot Honan-Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1980
Master of Science in Management-December 1990
Advisor: *Richard B. Doyle-Department of Administrative Sciences*

Legislators, recognizing the need to increase the national savings rate, have introduced profit-sharing and thrift savings plans to civilians, but have not included the military. This thesis examines the need for and the costs and benefits of an employer-sponsored savings plan for active duty military personnel. It concludes that it is both feasible and cost-effective to tailor tax-sheltered annuities (TSAs) currently available to nonprofit organizations to the military compensation system. It proposes an account for saving active pay (ASAP) which would permit contributions of one percent of base pay (up to the 20 percent which TSAs allow) per year of military service with the account maturing upon termination of active duty. This program, as envisioned for active duty military personnel, would provide an incentive to improve personal financial management practices. This, in turn, would encourage military personnel to contribute to improvement of the national savings rate.

COMPUTER AIDED NEWSPAPER CONTENT ANALYSIS

Masao Hosoya-Lieutenant Commander, Japan Maritime Self Defense Force
B.S., Japan Naval Academy, 1979
Master of Science in Management-June 1991
Advisor: Katsuaki L. Terasawa-Department of Administrative Sciences

This thesis explores issues concerning computer aided content analysis for newspaper articles. Articles relevant to the Japan Air Self Defense Force's new fighter support jet (code named FSX) were collected from three newspapers in the U.S. and Japan. These data were downloaded and stored in a PC then analyzed using word processing software. At the same time, three articles were selected and distributed, along with relevant survey questions, to over 150 people. The survey was intended to examine the reader's responses to those articles. The results from the questionnaire and computer aided content analysis were analyzed, summarized and compared. These complementary studies were conducted to help determine whether computer aided content analysis could identify the information and impressions conveyed by these newspaper articles. The results of this complementary effort indicated that additional work is needed, particularly in software development, to make computer aided content analysis more useful. However, the results also showed the complexities of conveying and interpreting information.

COLLEGE RESOURCES AND THE PERFORMANCE OF BLACK NAVAL OFFICERS

Samuel Charles-Henry Howard-Lieutenant, United States Navy
B.A., The Citadel, The Military College of South Carolina, 1984
Master of Science in Management-June 1991
and
Joseph Emanuel Hines-Lieutenant, United States Navy
B.S., United States Naval Academy, 1986
Master of Science in Management-June 1991
Advisors: Stephen Mehay & Mark J. Eitelberg-Department of Administrative Sciences

The purpose of this thesis was to examine the effect of college resources and attendance at a Historically Black College or University (HBCU) on the performance of Black Naval officers. The effects of college resources, college attendance, and other factors on officer performance measures were evaluated using multivariate logistic regression analysis techniques. The results of the analysis show that college resources have significant and positive effects on the probability of promotion for Black officers commissioned through the navy Reserve Officer Training Corps or Officer Candidate School. Attending an HBCU had a negative effect on receiving the RAP mark on LT fitness reports and a positive effect on retention.

CIVILIAN EARNINGS OF NON-RETIREE OFFICERS

Tsu-Sung Hsieh-Lieutenant, Republic of China Navy
B.S., Republic of China Naval Academy, 1983
Master of Science in Management-September 1991
Advisor: Stephen L. Mehay-Department of Administrative Science

This thesis looks at the post-service civilian earnings of non-retiree military officers. For this purpose, a data base was created using the 1986 DoD Reserve Components Survey. Log-earnings equations were estimated to measure the effect of (1) veteran status, (2) skill transferability, and (3) commissioning source. Empirical analyses were conducted using samples of officers categorized by race and gender. Age-earnings graphs were used to help explain differences in income between various groups of non-retiree officers and their civilian counterparts. The results indicate that non-retiree officers have, on average, higher incomes than their civilian counterparts. Although Navy officers earn the highest premium, Army officers earn less than their civilian counterparts. Male non-retiree officers have higher incomes than female non-retiree officers. White non-retiree officers exhibit increasing income growth rates while nonwhite non-retiree officers reveal no consistent growth pattern. Skill transferability yields a 10-percent earnings premium. Finally, military academy graduates were found to earn 17.3 percent more income than their civilian counterparts.

IMPLEMENTATION OF A MENTOR-PROTEGE PROGRAM BY A MAJOR DEPARTMENT OF DEFENSE CONTRACTOR

Andrew Duane Huff-Lieutenant Commander, United States Navy
B.A., University of West Florida, 1977
Master of Science in Management-June 1991
Advisor: David V. Lamm-Department of Administrative Sciences

Public Law 101-510 established the pilot Mentor-Protege Program. This is a voluntary program designed to provide incentives for major Department of Defense contractors to furnish disadvantaged small business concerns with assistance designed to enhance their capabilities to perform as subcontractors and suppliers under both Government and commercial contracts. This study was undertaken to assess the environment for program implementation by analyzing the perceptions of one large DoD contractor and the small disadvantaged business community regarding the Mentor-Protege program and DoD's implementing guidance. The results of this study indicate: There is generally a positive impression of this program and the assistance offered by this program would be effective in improving the capabilities of small disadvantaged businesses. There are, however, several barriers present that could prevent program implementation or limit its effectiveness.

UNIT COSTING AT THE NAVAL POSTGRADUATE SCHOOL

James Fletcher Hunter-Lieutenant, United States Navy
B.S., United States Naval Academy, 1983
Master of Science in Management-June 1991
and
William Scott Hicks,III-Lieutenant, United States Navy
B.A., University of California at Santa Barbara, 1983
Master of Science in Management-June 1991
Advisor: Joseph G. San Miguel-Department of Administrative Sciences

The purpose of this thesis is to discuss the implementation of unit costing at the Naval Postgraduate School (NPS). The research focuses on establishing a methodology to translate current financial accounting data at NPS into a format suitable to support the objectives of unit costing; specifically, improved visibility of the total cost of school operations and determination of the cost per graduate. Additionally, an overview of the new Department of Defense unit cost budgeting and resourcing system is included.

APPLYING RESOURCE BASED RELATIVE VALUE SCALES TO THE CHAMPUS PROGRAM

Graham David Ininns-Lieutenant, Medical Service Corps, United States Navy
B.S., University of Tennessee, 1980
Master of Science in Management-December 1990
Advisor: Richard Doyle-Department of Administrative Sciences

Resource Based Relative Value Scales (RBRVS) is a concept originating from the Harvard University School of Public Health which breaks procedures performed by physicians into components of work, training costs, and practice costs. The Medicare program is planning to implement a fee schedule based on RBRVS during fiscal year 1992 which will make some significant changes in medical care in the U.S. This thesis examines the applicability of RBRVS to the Civilian Health and Medical Program for the Uniformed Services (CHAMPUS) program.

THE ROLE OF THE BROADENED OPPORTUNITY FOR OFFICER SELECTION AND TRAINING (BOOST) PROGRAM IN SUPPORTING THE NAVY'S MINORITY ACCESSION POLICIES

James Talmadge Jackson,Jr.-Commander, United States Navy
B.S., United States Naval Academy, 1975
Master of Science in Management-March 1991
and
Mario Renara Maddox-Lieutenant, United States Navy
B.S., United States Naval Academy, 1985
Master of Science in Management-March 1991
Advisor: Mark J. Eitelberg-Department of Administrative Sciences

The purpose of this thesis was to conduct a comprehensive analysis of the role of the Broadened Opportunity for Officer Selection and Training (BOOST) program in supporting the Navy's minority accession policies. The methodology used involved reviews of the history and implementation of the Navy Affirmative Action Plan (NAAP) and the BOOST program's contribution to increasing the number of Black and Hispanic officers commissioned through the Naval Reserve Officer Training Corps (NROTC) program and the United States Naval Academy. The results indicate that the BOOST program has the potential for improving the quality and quantity of minority students who enter the Navy's officer commissioning programs. Much of this potential has already been realized by the Chief of Naval Education and Training through the recent increase in minorities commissioned under the NROTC program. The full potential of BOOST has not yet been realized due to the complexity of developing reliable selection criteria for the program. Several recommendations for improving BOOST are offered here.

WEIGHT STANDARDS AND MARINE CORPS ATTRITION

Kevin Adrian Jackson-Captain, United States Marine Corps
B.A., University of Florida, 1980
Master of Science in Management-June 1991
Advisor: George W. Thomas-Department of Administrative Sciences

The purpose of this thesis was to evaluate the effects on attrition of Marine recruits failing to meet height/weight standards at time of accession. This was accomplished by estimating two maximum-likelihood, logit models using different samples of historical Marine Corps attrition data. The boot camp model focused on attrition through the first three months of active duty. The first-term model examined attrition from the completion of boot camp to the end of the first enlistment term. The results of the study identified failure to meet height/weight standards as the most significant variable in the boot camp model. The significance of the variable was superseded in the first-term model by education, mental group, and program contract. Attrition probabilities proved to be significantly higher for overweight recruits, but decreased if the individual participated in the DEP, had an aviation contract guarantee, or attended recruit training at San Diego.

ACHIEVING QUALITY IN PROCUREMENT THROUGH AUTOMATION

Walter W. Jacunski-Lieutenant, United States Navy
B.A., Indiana University of Pennsylvania, 1977
Master of Science in Management-December 1990
Advisor: William J. Haga-Department of Administrative Sciences

Department of Defense has mandated that TQM be implemented in procurement. This research looks at achieving quality in procurement through the use of information systems. In doing so, it defines what quality in procurement means. The armed services' three automated systems: APADE, BCAS, and SAACONS are analyzed to see what tools they provide users to aid them in achieving procurement quality. It gives suggestions on how information systems could better be used to attain procurement quality.

COST ANALYSIS FOR THE PROPOSED CONSOLIDATION OF CARRIER AIRBORNE EARLY WARNING (VAW) FLEET REPLACEMENT SQUADRONS (FRS)

Thomas Eugene Jarrell-Lieutenant Commander, United States Navy
B.S., University of Maryland, 1980
Master of Science in Management-June 1991
Advisor: Shu S. Liao-Department of Administrative Sciences

This thesis reviews the proposed consolidation of the two E-2C Hawkeye Fleet Replacement Squadrons (FRS) into a single training site. Expected costs savings areas are evaluated against possible expense areas. Each savings/cost category is discussed and possible impact on training if omitted. Implementation scenarios are presented and evaluated on a break-even basis. In addition, possible future conditions in which FRS consolidation might be fiscally practical is discussed. Finally, impact of the consolidation on the E-2C aviation community is listed.

INTRODUCTION TO FINANCIAL MANAGEMENT FOR FOREIGN MILITARY STAFF OFFICERS

Paul Raymond Jensen-Lieutenant Commander, United States Navy
B.S., Coastal Carolina College, 1979
Master of Science in Management-June 1991
and
Rodney Eugene Bryant-Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1979
Master of Science in Management-June 1991
Advisor: Joseph San Miguel-Department of Administrative Sciences

The nature of our research was to determine the content, scope and structure for a course in basic financial management which would be used to introduce foreign military officers to the field of financial management. The Naval Education and Training Security Assistance Field Activity (NETSAFA) indicated there was a need for a generic, introductory financial management course because of the numerous inquiries from foreign governments concerning financial management subject matter. Foreign officials requested that their staff officers, which have varying degrees of familiarity with the financial arena, be schooled in the basics of financial management. Research determined that the course should be approximately two weeks in length in order to adequately cover the following subject areas: accounting, budgeting, management fundamentals, auditing management information systems (MIS) and total quality (TQM). In addition to formulating the content, scope and structure of the course, a draft student and instructors' guide were developed and are included in Appendices A and B.

MARINE CORPS WARRANT OFFICERS: A COMMUNITY IN TURMOIL

Oke I. Johnson-Major, United States Marine Corps
B.S., University of Montana, 1981
Master of Science in Management-December 1990
Advisor: Paul R. Milch-Department of Operations Research

The Marine Corps' restricted officer community (Warrant Officers and Limited Duty Officers) has been repeatedly modified throughout its history. The most recent changes include a major restructuring conducted in 1989 and proposed legislation that will create the new grade of Chief Warrant Officer, W5 (CWO-5). This study uses the WARRANT model (a modification of the interactive computer model, FORCE developed at the Naval Postgraduate School) to analyze the effects of these changes. Accessions, promotion rates, and grade distributions are examined for two WO specialties: Personnel Officer (0170) and Aircraft Maintenance Engineer Officer (6004). Data from the 1988 through 1990 Headquarters Marine Corps Master Files were used to estimate model parameters that were utilized to forecast grade distributions for fiscal years 1992, 1996, and 2001. The results suggest that an initial increase in accessions may be required in order to meet force requirements. Additionally, it appears that promotion opportunities to the senior warrant officer grades may have to be vacancy driven in order to attain the desired pyramid shaped force structure and to meet CWO-5 grade constraints.

WHAT CONSTITUTES NATIONAL SECURITY IN THE SEMICONDUCTOR INDUSTRY? A LOOK AT THE COMPETING VIEWS SURROUNDING DOD's SUPPORT OF SEMICONDUCTORS

William A. Johnson-Captain, United States Marine Corps
B.S., Auburn University, 1982
Master of Science in Management-December 1990
Advisor: William Gates-Department of Administrative Sciences

This thesis examines the current views surrounding federal support of the semiconductor industry, specifically from the Department of Defense. "National security" is often cited as a reason for federal intervention in the industry. How well founded are the arguments for this support? The current situation in the domestic semiconductor industry is examined, and the industry's explanations for recent changes in market position are identified. Prevailing economic theory is reviewed for possible alternative explanations. Industry views are then examined in light of this economic theory, and appropriate federal actions are recommended. Since these recommendations focus on the macroeconomic forces influencing the balance of trade, they will benefit the semiconductor industry and the economy as a whole.

MARGINAL COST OF TRAINING A NAVAL FLIGHT OFFICER

William Clarence Johnson-Lieutenant Commander, United States Navy
B.S., Illinois State University, 1976
Master of Science in Management-December 1990
Advisor: William Gates-Department of Administrative Sciences

This study was conducted to determine the marginal cost of training Category I and II Naval Flight Officers. Marginal costs are those costs incurred by training one additional or one less Naval Flight Officer and include undergraduate flight training, permanent change of station, and graduate flight training costs. Category I marginal costs range from $51,244.30 for a P-3 Naval Flight Officer to $309,833.36 for an A-6 Naval Flight Officer. Category II marginal costs range from $24,950.02 for a P-3 Naval Flight Officer to $155,782.71 for an A-6 Naval Flight Officer. An additional study of incremental costs will be required to fully evaluate the financial impact of a large change in the Naval Flight Officer training rate.

INNOVATIONS IN BASIC FLIGHT TRAINING FOR THE INDONESIAN AIR FORCE

Koesnadi Kardi-Major, Indonesian Air Force
B.S., Indonesian Air Force Academy, 1973
Master of Science in Management-December 1990
Advisor: Alice Crawford-Department of Administrative Sciences

This thesis discusses the basic flight training in the Indonesian Air Force Undergraduate Pilot Training (IAF-UPT) and the primary training in the United States Navy Undergraduate Pilot Training (USN-UPT) which uses the same type of aircraft, the T-34C "Turbo Mentor." The investigation into the IAF-UPT and the USN-UPT shows the differences in training methods and objectives. Further analysis is presented of three aspects of flight training: the training development, and the benefits of innovation in flight training. The Innovations referred to in the title of this thesis, "Innovations in Basic Flight Training for the Indonesian Air Force," are derived from the analysis and transferred from the USN-UPT to improve IAF training.

PROBLEMS IN NAVY REIMBURSABLE ACCOUNTING

Bernadette Anne Kernen-Lieutenant, United States Navy
B.A., University of Notre Dame, 1981
Master of Science in Management-December 1990
Advisor: Glenn D. Eberling-Department of Administrative Sciences

The purpose of this thesis is to identify problems in Navy reimbursable accounting and to develop a comprehensive, entry level financial management guide to assist financial managers at the field level in improving their accountability and control over reimbursable funds. This thesis discusses specific procedures for the effective administration and management of Intra- and Interservice Support Agreements, Economy Act Orders, and Project Orders as well as the problems peculiar to each. It provides an introductory overview of the reimbursable accounting process and defines key terms critical to understanding this system. Recommendations for improved accountability and control of reimbursables are offered.

READY RESERVE FORCE: WEST COAST ACTIVATION IN SUPPORT OF OPERATION DESERT SHIELD

Phillip Raymond Kessler-Lieutenant, United States Navy
B.S., Marquette University
Master of Science in Management-March 1991
Advisor: Dan C. Boger-Department of Administrative Sciences

The Ready Reserve Force (RRF) is a key element of the United States' strategic sealift capability. The Maritime Administration (MARAD) maintains RRF vessels in five-, ten-, and 20-day readiness status to provide responsive shipping in support of military operations worldwide in time of conflict. This thesis investigates the initial nine RRF vessels activated by MARAD Western Region in support of Operation Desert Shield. Problems encountered in the areas of condition at the time of breakout, engineering, crew, work force resources available for breakout, parts and stores, and bunkering are discussed for each vessel. In addition, several prior activities of RRF vessels are discussed and then compared to the activations for Operation Desert Shield. Recommendations for future activations are made.

MARKOVIAN ANALYSIS OF YOUTH LABOR FORCE TRANSITION PROBABILITIES

Bedirhan Koc-First Lieutenant, Turkish Army
B.S., Turkish Army Academy, Ankara, 1985
Master of Science in Management-December 1990
Advisor: George W. Thomas-Department of Administrative Sciences

In order to adopt strategic plans for allocating recruiting resources to market potential, accurate forecasts of the labor force participation patterns of American youths are needed. For this study data from the National Longitudinal Survey of Labor Force Behavior Youth Survey (NLSY) is used to estimate the transition probabilities between labor force educational and employment categories for 18-21 year-old males. Labor transition probabilities of 18-21 year-old males are examined for time invariance and for the relationships of transition probabilities with respect to race and mental quality. In general, it is found that transition probabilities of 18-21 year-old males are time invariant but they change by race and mental quality. However, transition probabilities of high quality males by race and transition probabilities of low quality males by race remain constant.

MANPOWER MANAGEMENT FOR JOINT SPECIALTY OFFICERS: A COMPARATIVE ANALYSIS

John Gordon Koran,III-Captain, United States Marine Corps
B.A., University of California, Los Angeles, 1979
Master of Science in Management-December 1990
Advisor: James E. Suchan-Department of Administrative Sciences

This thesis investigates the development of Title IV of the Goldwater-Nichols Department of Defense Reorganization Act of 1986 and the Joint Specialty Officer (JSO) management policies mandated by the law. Individual service manpower management procedures for the nomination/selection for Joint Professional Military Education (JPME) and Joint Specialty Officer designation are presented and analyzed. The size and composition of the Joint Duty Assignment List (JDAL) is also presented and analyzed. The results indicate significant progress has been made towards fulfilling the Title IV requirements regarding JPME, JSO designation, and improving the quality and stability of officers assigned to Joint Duty Assignments.

IMPROVING SMALL PURCHASE OPERATIONS AT THE NATIONAL NAVAL MEDICAL CENTER, BETHESDA, MARYLAND

Gregory T. Kuhn-Lieutenant, Medical Service Corps, United States Navy
B.S., Indiana University, 1982
Master of Science in Management-December 1990
Advisor: Rodney F. Matsushima-Department of Administrative Sciences

This research was accomplished to perform a management problem analysis study of the Procurement Department at the National Naval Medical Center Bethesda, MD. The goal of this research was to develop an organizational plan to increase small purchase productivity, improve quality of purchase documentation and strengthen customer service through improved utilization of personnel resources, increased levels of training, increased utilization of efficient procurement techniques and automation. Results of this research included recommendation for redesign of the Procurement Department's organizational structure and position classifications, a job specialization plan, and establishment of performance management measures. The study further developed a framework for an employee training plan. Recommendations for improvement to the Blanket Purchase Agreement system and increasing automation were also provided.

TOTAL QUALITY LEADERSHIP AS IT APPLIES TO THE SURFACE NAVY

Ernani Morena Lacson-Lieutenant, United States Navy
B.S., University of Idaho, 1983
Master of Science in Management-December 1990
and
Harold R. Morgan, Jr.-Lieutenant, United States Navy
B.S., Virginia Commonwealth University, 1977
Master of Science in Management-December 1990
Advisors: Alice Crawford & Benjamin Roberts-Department of Administrative Sciences

The implementation of Total Quality Leadership (TQL) into the Surface Warfare Navy requires specific leadership training for the entire community. A training needs analysis was conducted to examine these training requirements for surface warfare officers. First, personnel who are already using TQL at different Navy facilities were interviewed to determine the areas where TQL principles are applicable in the Surface Navy. Next, the Officer Survey Instrument (OSI) data base provided the information to determine the leadership competencies that are currently being used by Surface Warfare Officers. Finally, current Navy leadership training was examined to see if these competencies were being incorporated into the officer training program. Existing Surface Warfare Officer leadership training addresses many of the prescribed management principles of TQL and fleet officers demonstrate many characteristics in congruence with the requirements of this new management style. However, more emphasis is required in some areas. The strong support provided by the Chief of Naval Operations coupled with a systematic and continuous training program will guide the Navy through a smooth transition into Total Quality Leadership.

MILITARY HEALTH CARE SYSTEM: COMPARING OBSTETRICS COSTS BETWEEN A MILITARY TREATMENT FACILITY AND CHAMPUS

Julito Pedrozo Laluan-Lieutenant, United States Navy
B.S., University of the State of New York, Albany, 1978
M.A., National University, San Diego, 1987
Master of Science in Management-September 1991
Advisor: Dan Trietsch-Department of Administrative Sciences

For more than three decades, two systems or programs have provided health care for military beneficiaries: (1) the direct care system, whereby beneficiaries obtain health care services from military treatment facilities (MTFs), and (2) CHAMPUS (Civilian Health and Medical Program of the Uniformed Services, a health program in which beneficiaries receive care from civilian facilities. The high cost to DoD of supplying inexpensive medical care, as well as concern over timeliness of service, has prompted many suggestions for reforming the military health care system. Based on the above, the objective of this research is to compare costs between a military treatment facility and CHAMPUS and to determine whether a given MTF can provide inpatient care to its beneficiaries at lower cost than through CHAMPUS. By comparing MTF and CHAMPUS costs, a given MTF can identify those specialty areas in which to reduce costs either by increasing workload (use of recapture and/or normal increase of appointments) or increasing referrals to outside health care providers.

BUDGET EXECUTION: A MANAGEMENT GUIDE FOR NAVAL SECURITY GROUP COMMANDING OFFICERS, OFFICERS IN CHARGE AND DEPARTMENT HEADS

Reiner W. Lambert-Lieutenant, United States Navy
B.A., Southern Illinois University, 1981
Master of Science in Management-December 1990
Advisor: Glenn D. Eberling-Department of Administrative Sciences

The focus of this thesis is to identify some of the important elements of budget execution over which Naval Security Group Commanding Officers (CO), Officers in Charge (OIC) and Department Heads (DH) have some degree of control. This thesis is a compendium of information on budget execution collated from a multitude of Navy fiscal management directives, manuals, desk guides and instructions. This budget execution management guide, which addresses each element of the multi-faceted budget execution process, is intended to assist COs, OICs, and Department Heads in meeting the challenges of successful budget execution while operating in an increasingly austere budget environment.

AN ANALYSIS OF NON-DEPARTMENT OF DEFENSE AND DEPARTMENT OF DEFENSE SPECIAL BACKGROUND INVESTIGATIVE PROCEDURES USED IN DEVELOPING SOURCES THAT INDICATE THE PRESENCE OF AN ISSUE

Jeffrey Joseph Lauff-Lieutenant Commander, United States Navy
B.A., Washington and Jefferson College, 1979
Master of Science in Management-June 1991
Advisor: Ralph M. Carney-PERSEREC

This thesis examines the differences in investigative procedures of the non-Department of Defense and Department of Defense agencies in developing sources that indicate the presence of an issue during a special background investigation. Multivariate analysis of the survey was conducted to examine these differences. The results of this analysis indicate statistically significant differences in the organizational methods used to develop sources of derogatory information which are used in determining eligibility for sensitive compartmented information. This analysis also highlights the most effective and efficient methods of conducting a special background investigation for both organizations. The recommendations address the requirement for continued analysis to further refine the special investigative process thereby yielding greater efficiency and effectiveness in the detection of issue cases.

AN EXAMINATION OF THE EFFECTS OF FIRST-TERM CAREER PROGRESSION ON NAVY A-SCHOOL ATTRITION AND THE EXPERIENCES OF A-SCHOOL STUDENTS AFTER ATTRITION

James Mitchell Laury-Lieutenant, United States Navy
B.A., Kutztown University, 1984
Master of Science in Management-June 1991
and
David Lee McNamara-Lieutenant, Medical Service Corps, United States Navy
B.S., SUNY, Brockport, 1984
Master of Science in Management-June 1991
Advisors: Alice M. Crawford and Mark J. Eitelberg-Department of Administrative Sciences

The objective of this study is to contribute to the Navy's knowledge and understanding of high A-School attrition. The study organized the available data concerning attrition in the Navy's training programs, evaluated its significance, and offers prospective solutions. The significance of the data of personal characteristics may then aid the Navy in selecting those personnel with a higher propensity to succeed.

THE ATTRITION RATE AT DLI

Annette C. Lee-Captain, United States Army
B.S., Jackson State University, 1983
Master of Science in Management-December 1990
Advisor: Richard A. McGonigal-Department of Administrative Sciences

The primary purpose of this research is to identify if a correlation exists between the U.S. Army selection procedure for enlisted soldiers in the ranks of E-1 through E-4 attending the Defense Language Institute and the academic outcome. This thesis will focus on two specific concepts: (1) how the U.S. Army currently identifies those soldiers to be trained as Russian linguists; and (2) whether the Army needs to incorporate changes to its current identification procedures to reduce the attrition rate of Russian linguists. The approach to analyze these concepts was as follows. First the procedures currently used to select soldiers to attend the Russian linguist course at Defense Language Institute, Foreign Language Center (DLIFLC) are examined. A comparison is then made with the soldiers ability to successfully complete the courses in which enrolled. The purpose is to identify the causes that influence attrition. Secondly, this study analyzes the enrollment data produced by DLIFLC to determine if any reliable correlation exists between the current linguist identification procedures and the success or failure of soldiers enrolled in the Russian language course.

NAVAL LEADERSHIP: A STUDY OF VIEWS ON LEADERSHIP COMPETENCIES AND METHODS TO REINFORCE LEADERSHIP SKILLS

Raymond John Lewis-Lieutenant, United States Navy
B.S., Rutgers University, 1983
Master of Science in Management-December 1990
Advisor: Alice M. Crawford-Department of Administrative Sciences

The purpose of this thesis is to examine the perception of the leadership competencies that are being taught at the Navy's leadership course, NAVLEAD, and to investigate ways to reinforce leadership training in the operational environment. An analysis was conducted to identify the importance of the leadership competencies at a naval officer's current job. By determining the importance officers place on the leadership competencies, support can be made to determine if additional training would be beneficial. An investigation was conducted of the various media for leadership training to determine the best method for training in the operational environment. Additionally, an analysis was conducted across designator community and rank, to determine the percentage of time officers spend engaged in management, technical, and leadership tasks. This thesis provides support for implementing post-schoolhouse refresher training through computer-based instruction.

THE ROLE OF THE BROADENED OPPORTUNITY FOR OFFICER SELECTION AND TRAINING (BOOST) PROGRAM IN SUPPORTING THE NAVY's MINORITY ACCESSION POLICIES

Mario Renara Maddox-Lieutenant, United States Navy
B.S., United States Naval Academy, 1985
Master of Science in Management-March 1991
and
James Talmadge Jackson, Jr.-Commander, United States Navy
B.S., United States Naval Academy, 1975
Master of Science in Management-March 1991
Advisor: Mark J. Eitelberg-Department of Administrative Sciences

The purpose of this thesis was to conduct a comprehensive analysis of the role of the Broadened Opportunity for Officer Selection and Training (BOOST) program in supporting the Navy's minority accession policies. The methodology used involved reviews of the history and implementation of the Navy Affirmative Action Plan (NAAP) and the BOOST program's contribution to increasing the number of Black and Hispanic officers commissioned through the Naval Reserve Officer Training Corps (NROTC) program and the United States Naval Academy. The results indicate that the BOOST program has the potential for improving the quality and quantity of minority students who enter the Navy's officer commissioning programs. Much of this potential has already been realized by the Chief of Naval Education and Training through the recent increase in minorities commissioned under the NROTC program. The full potential of BOOST has not yet been realized due to the complexity of developing reliable selection criteria for the program. Several recommendations for improving BOOST are offered here.

NAVY STOCK ACCOUNT (NSA) MATERIAL EXPENDITURE ERRORS

Anacleto Magsombol Magsombol-Lieutenant, United States Navy
B.S., Far Eastern University, Manila, RP, 1974
Master of Science in Management-December 1990
Advisor: James M. Fremgen-Department of Administrative Sciences

This thesis was an investigation of the causes that prevented large numbers of Pacific Fleet units; NSA expenditures from processing through the Fleet Resource Accounting Module (FRAM) at the Fleet Accounting and Disbursing Center Pacific (FAADCPAC), San Diego, CA. Six consecutive months' NSA expenditure errors from December 1989 to May 1990 were used in the analysis. The researcher concluded that the major cause of the problem was the use of wrong fund codes by the fleet units when they requisitioned their materials from the shore supply activities. The researcher identified inadequate training of shipboard supply personnel and the lack of an edit/validation process at the shore supply activities, as the major deficiencies. Recommendations designed to prevent large numbers of NSA expenditure errors and to improve the current accounting system were provided.

FLEET REPLACEMENT SQUADRON CONSOLIDATION:
A COST MODEL APPLIED

Robert Michael Maholchic-Lieutenant Commander, United States Navy
B.A., University of Maryland, 1974
Master of Science in Management-June 1991
Advisor: Richard Harshman-Department of Administrative Sciences

The consolidation of Fleet Replacement Squadrons (FRS) represents one method of achieving planned force reductions. This thesis utilizes the Cost of Base Realignment Actions (COBRA) cost model to develop cost estimates for determination of the cost effective site location. The A-6 FRS consolidation is used as a case study. Data were compiled using completed Functional Wing studies as well as local information sources. A comparison between the cost estimates provided by the COBRA cost model for the alternate site locations is provided. Conclusions on the utilization of the COBRA cost model for the consideration of FRS consolidations and directions for future research are listed in the final chapter.

NATO BURDEN-SHARING: REDEFINITION FOR A CHANGING EUROPEAN THREAT

Charles P. Martello-Lieutenant Commander, United States Navy
B.S., University of Missouri, 1979
A.B., University of Missouri, 1979
Master of Science in Mangement-December 1990
Advisor: William Gates-Department of Administrative Sciences

This thesis develops a model of burden-sharing that includes both operational and non-operational contributions to the common defense. Based on the "Atlanticist" perspective of recognizing contribution, the model includes categories for standing forces, reserve forces, defense industrial capacity, reserve defense industrial capacity, and related defense factors that historically have not been recognized. This work addresses the availability of information suitable for the comparative evaluation of defense share within the model framework and identifies deficiencies in current data bases relative to the defense industrial capacities of participating nations. Recommendations for providing defense industrial base information center around tailoring OECD capacity utilization equations to defense industry parameters and reporting capacity and reserve capacity via the NATO Defense Planning Questionnaire.

AN EXAMINATION OF THE EFFECTS OF FIRST-TERM CAREER PROGRESSION ON NAVY A-SCHOOL ATTRITION AND THE EXPERIENCES OF A-SCHOOL STUDENTS AFTER ATTRITION

David Lee McNamara-Lieutenant, Medical Service Corps, United States Navy
B.S., SUNY, Brockport, 1984
Master of Science in Management-June 1991
and
James Mitchell Laury-Lieutenant, United States Navy
B.A., Kutztown University, 1984
Master of Science in Management-June 1991
Advisors: Alice M. Crawford & Mark J. Eitelberg-Department of Administrative Sciences

The objective of this study is to contribute to the Navy's knowledge and understanding of high A-School attrition. The study organized the available data concerning attrition in the Navy's training programs, evaluated its significance, and offers prospective solutions. The significance of the data of personal characteristics may then aid the Navy in selecting those personnel with a higher propensity to succeed.

POST-SERVICE EARNINGS OF VETERANS: A SURVEY AND FURTHER RESEARCH
Carolyn Jamie Miller-Lieutenant Commander, United States Navy
B.S. New York State University College at Buffalo, 1971
Master of Science in Management-March 1991
Advisor: Stephen L. Mehay-Department of Administrative Sciences

This thesis analyzes the post-service labor market experience of military veterans. First, an exhaustive survey of the literature on the post-service earnings was conducted. Research studies were classified according to survey sample, and empirical findings. Second, an empirical analysis of the effect of veteran status on post-service earnings was performed. A dataset was created using the 1986 Reserve Components Survey. Standard human capital models were estimated to measure the effect of (1) veteran status, (2) formal military training (3) military on-the-job training, and (4) civilian-reserve job similarity. The results indicate a small overall negative return to veteran status. However, results for the individual services varied. A positive return was found for service in the Air Force, Navy and Marine Corps, but a penalty was observed for service in the Army. It appears that black veterans were not hurt by military service. The results for training and transfer variables were positive for the Air Force, Navy and Marine Corps.

TURBULENCE AND CHANGE IN DEPARTMENT SPENDING PATTERNS
CASE STUDY: DEPARTMENT OF AGRICULTURE
Kenneth Steven Mitchell-Lieutenant, United States Navy
B.S., Prairie View A&M University, 1982
Master of Science in Management-June 1991
Advisor: Jerry L. McCaffery-Department of Administrative Sciences

This thesis examines the relationship between agency assertiveness and moderation of budget requests within the Department of Agriculture. It covers the budgetary roles and strategies used in the DoA, Office of Management and Budget, and Congressional appropriation committees. The database used was supplied by the DoA and contains agency initial budget requests and appropriation data from 1980 to 1990. The analysis compares agency budget requests increments to the actual increments appropriated, as a percentage of a common base. The study found that during periods of fiscal restraint the most assertive agencies were the most successful. However, with the support of clientele groups and legislative branch members, agencies requesting moderate increases as well as decreases experienced significant growth in their funding levels and restoral of budget cuts made earlier.

TOTAL FORCE: THE RESERVE RECALL PROCESS AND DESERT SHIELD/DESERT STORM

Daryce Lianne Moore-Lieutenant Commander, United States Navy
B.A., Illinois State University, 1973
Master of Science in Management-June 1991
Advisors: Mark J. Eitelberg & Richard S. Elster-Department of Administrative Sciences

The purpose of this thesis is to examine the Desert Shield/ Desert Storm reserve recall process in the context of the past and future of the Total Force Plan. The thesis provides an overview of the evolution of the Total Force Plan since its inception in 1973. It then takes a case analysis approach to describing the events of the Desert Shield/Desert Storm recall. The focus is on the systemic obstacles faced by the implementors of the recall process. Most notably, it finds that the focus of existing plans on mobilization rather than recall, and the incompatibility of the reserve and active personnel information systems complicated the recall process. It further looks at the requirements of horizontal integration and means of engendering a more active partnership between active and reserve components. Finally, it provides recommendations for developing a system of graduated personnel conditions related to contingency planning, in order to enhance the integration of reserve assets when needed.

COMMANDER, U.S. NAVAL SURFACE FORCES, PACIFIC BUDGET PROCESS

Howard Earl Moore,III-Lieutenant Commander, United States Navy
B.S., University of Texas, 1977
Master of Science in Management-June 1991
Advisor: Jerry L. McCaffery-Department of Administrative Sciences

This thesis researches the method by which Commander, U.S. Naval Surface Forces, Pacific develops an annual budget and the role the type commander plays in the Planning, Programming, and Budgeting System. It also examines the methods, vehicles, and procedures the COMNAVSURFPAC comptroller and his staff employ to gather, evaluate, and prioritize budget proposals from major subordinate commands. Additionally, perennial budget issues and budget strategies employed by COMNAVSURFPAC to achieve its mission and finance the naval bases and surface units of the Pacific Fleet are addressed.

TOTAL QUALITY LEADERSHIP AS IT APPLIES TO THE SURFACE NAVY

Harold R. Morgan, Jr.-Lieutenant, United States Navy
B.S., Virginia Commonwealth University, 1977
Master of Science in Management-December 1990
and
Ernani Morena Lacson-Lieutenant, United States Navy
B.S., University of Idaho, 1983
Master of Science in Management-December 1990
Advisors: Alice Crawford & Benjamin Roberts-Department of Administrative Sciences

The implementation of Total Quality Leadership (TQL) into the Surface Warfare Navy requires specific leadership training for the entire community. A training needs analysis was conducted to examine these training requirements for surface warfare officers. First, personnel who are already using TQL at different Navy facilities were interviewed to determine the areas where TQL principles are applicable in the Surface Navy. Next, the Officer Survey Instrument (OSI) data base provided the information to determine the leadership competencies that are currently being used by Surface Warfare Officers. Finally, current Navy leadership training was examined to see if these competencies were being incorporated into the officer training program. Existing Surface Warfare Officer leadership training addresses many of the prescribed management principles of TQL and fleet officers demonstrate many characteristics in congruence with the requirements of this new management style. However, more emphasis is required in some areas. The strong support provided by the Chief of Naval Operations coupled with a systematic and continuous training program will guide the Navy through a smooth transition into Total Quality Leadership.

LOST OPPORTUNITY:
THE HIGH QUALITY, REDUCED MILITARY FORCE OF THE 1990s:
IS THERE A ROLE FOR THE NATION's DISADVANTAGED YOUTH?

Valerie Ann Moule-Lieutenant Commander, United States Navy
B.S., San Francisco State University, 1979
Master of Science in Mangement-December 1990
Advisor: Mark J. Eitelberg-Department of Administrative Sciences

The trend toward increased quality of military recruits over the past decade is projected to continue into the 1990s. The effect of this trend, combined with the planned force drawdown, may limit opportunities for the nation's disadvantaged youth to serve in the military. A policy analysis was conducted using five previous studies of Project 100,000 to determine the feasibility of recruiting disadvantaged youth for military service. Project 100,000 (1966-1971) relaxed the military's entrance standards so that a large number of individuals who would have otherwise been disqualified could serve. The five previous studies were beset by numerous methodological weaknesses and produced conflicting results. Consequently, no definitive conclusion could be drawn regarding the merits of recruiting disadvantaged youth in the years ahead. Alternative approaches for further research are presented.

AN ANALYSIS OF DEPOT LEVEL REPAIRABLES CARCASS MANAGEMENT AND POSITION CONTROLS UNDER THE ADVANCED TRACEABILITY AND CONTROL (ATAC) PROGRAM

William S. Munson-Lieutenant, Supply Corps, United States Navy
B.S., Ohio State University, 1980
Master of Science in Management-December 1990
and
Steven J. Harris-Lieutenant Commander, Supply Corps, United States Navy
B.S., Indiana State University, 1977
Master of Science in Management-December 1990
Advisor: Alan W. McMasters-Department of Administrative Sciences

Defense Management Review Decision (DMRD) 901's objective to reduce supply system costs includes an initiative to achieve savings by retaining retrograde carcasses returned from the fleet at the first turn-in point rather than shipping them immediately to the repair depot or designated storage site. The purpose of this thesis is to analyze the operation of the Advanced Traceability and Control (ATAC) Program to determine a "ship or hold" decision for returned carcasses and to identify system shortcomings. A thorough study of ATAC's background, current management controls and operating procedures, and results from previous studies were combined with on-site HUB observations to show how and why the ATAC system works. Because of ATAC, the DMRD 901 initiative to retain carcasses at their first turn-in point is not cost effective except for those items experiencing rapid phase-out or numerous upgrades. Detailed indicators to measure and monitor ATAC cost and performance effectiveness do need to be implemented.

MARKET ALLOCATION OF AGRICULTURAL WATER RESOURCES IN THE SALINAS RIVER VALLEY

John P. Neagley-Lieutenant, United States Navy
B.S., University of New Hampshire, 1982
Master of Science in Management-December 1990
and
Robert T. O'Brien, Jr.-Captain, United States Army
B.S., San Jose State University, 1981
Master of Science in Mangement-December 1990
Advisor: Thomas P. Moore-Department of Administrative Sciences

The current drought conditions that the Central California coast has been facing and the increasing threat of saltwater intrusion have forced the Salinas Valley to consider alternatives that provide for conserving and allocating limited groundwater resources. Currently, groundwater resources are treated as a common pool resource where there are no clearly defined property rights for groundwater and there is no regulation of use. This thesis examines the question of how to implement a market system for groundwater in the Salinas Valley. The study compares a free-market approach of water allocation to other centralized water management practices. This study found that, in theory, the establishment of clearly defined groundwater rights and a free market system for groundwater would be an efficient method to allocate agricultural groundwater resources.

MARKET ALLOCATION OF AGRICULTURAL WATER RESOURCES IN THE SALINAS RIVER VALLEY

Robert T. O'Brien, Jr.-Captain, United States Army
B.S., San Jose State University, 1981
Master of Science in Mangement-December 1990
and
John P. Neagley-Lieutenant, United States Navy
B.S., University of New Hampshire, 1982
Master of Science in Management-December 1990
Advisor: Thomas P. Moore-Department of Administrative Sciences

The current drought conditions that the Central California coast has been facing and the increasing threat of saltwater intrusion have forced the Salinas Valley to consider alternatives that provide for conserving and allocating limited groundwater resources. Currently, groundwater resources are treated as a common pool resource where there are no clearly defined property rights for groundwater and there is no regulation of use. This thesis examines the question of how to implement a market system for groundwater in the Salinas Valley. The study compares a free-market approach of water allocation to other centralized water management practices. This study found that, in theory, the establishment of clearly defined groundwater rights and a free market system for groundwater would be an efficient method to allocate agricultural groundwater resources.

THE POLITICAL ECONOMY OF MILITARY BASE CLOSURE

Arthur John Ohanian-Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1979
Master of Science in Management-December 1990
and
Richard Douglas Suttie-Lieutenant Commander, United States Navy
B.S., University of Southern California, 1979
Master of Science in Management-December 1990
Advisor: Paul M. Carrick-Department of Administrative Sciences

This study investigates the political economy of military base closure: the federal and local public policy process and how it impacts the economic efficiency of public resource allocation. It describes and analyzes the socio-economic factors affecting the communities surrounding military bases targeted for closure. It does not discuss or analyze the base closure decision making process and which base should remain open or closed. A primary case study was used for research: George Air Force Base, Victorville, California which has been undergoing the actual closure process for approximately two years. This thesis draws on historical studies by the government and private individuals which conclude that military base closures most often result in positive socio-economic effects on local communities. Since no base has been closed in the United States in eleven years, our case study analyzes the efficacy of these historical reports and provides conclusions that suggest the closure of a military base and its transition into the private sector may provide strong stimulation to most local economies.

LOCAL AREA NETWORK STATEGIES AND GUIDELINES FOR A PERUVIAN AIR FORCE COMPUTER CENTER

Miguel A. Fonseca Palomino-Second Lieutenant, Peru Air Force
B.S., Peruvian Air Force Academy, 1988
Master of Science in Management-March 1991
Advisor: Myung Suh-Department of Administrative Sciences

This thesis examines the application of local area network (LAN) technology to the Peruvian Air Force Computer Center. The curent Peruvian Air Force Computer Center communication system and its problems are discussed, along with the basic concepts of data communication, protocols, and topologies. The IEEE 802.3 and IEEE 802.5 specifications are discussed in detail. This study is primarily concerned with how to design the best local area network for the Peruvian Air Force Computer Centers, and proposes a local area network implementation strategy for the Peruvian Air Force Computer Center.

TOTAL QUALITY MANAGEMENT IN INFORMATION SYSTEMS

Darlis Pangaribuan-Captain, Indonesian Air Force
B.A., Indonesian Air Force Academy, Jakarta 1982
Master of Science in Management-March 1991
Advisor: William J. Haga-Department of Administrative Sciences

In recent years, quality has become a priority concern in the area of manufacturing. The improvement of quality, which leads to improvement in productivity, lower costs, higher profits, and continuity for the business. In many cases, these concerns implementing Total Quality Management (TQM) program. This thesis recommends ways to improve the quality of Information Systems (IS) through Total Quality Management (TQM). The premise here is that the IS department must improve its information systems now and in the future, in order for them to survive and stay in business. The Demin's 14 points are applied to implement TQM in Information Systems.

EFFECT OF PRIME CONTRACTOR FINANCIAL POSITION ON MAJOR WEAPON SYSTEM COST AND DELIVERY PERFORMANCE

James Doran Peters-Lieutenant, United States Navy
B.A., Western Michigan University, 1981
Master of Science in Management-December 1990
Advisor: O. Douglas Moses-Department of Administrative Sciences

This thesis investigates the relationship of prime contractor cost and delivery performance with prime contractor financial health. The analysis used DoD major acquisition programs. Regression was used to analyze the relationship between outcome measures reflecting cost and schedule growth and summary indexes of financial health, constructed using indexes computed from financial distress models. The summary indexes were used to indicate contractor financial health, and change in financial health, before and during both development and production phases of a program. Major findings indicate that a relationship does exist between financial condition and contractor performance, but the relationship is small.

ANALYSIS OF THE ASBESTOS PERMISSIBLE EXPOSURE LEVEL THRESHOLD STANDARD

Michael William Peterson-Lieutenant, Civil Engineer Corps, United States Navy
B.S., Rose-Hulman Institute of Technology, 1979
Master of Science in Management-June 1991
Advisor: Paul M. Carrick-Department of Administrative Sciences

This thesis examines the reasoning of the Occupational Safety and Health Administration's (OSHA) decision to set stringent exposure levels for airborne asbestos in the work place. Technical recommendations from the National Institute for Occupational Safety and Health (NIOSH), the Bureau of Mines, and the American Conference of Governmental Industrial Hygienists were presented to OSHA for consideration. OSHA and the Environmental Protection Agency (EPA) set industry standards for permissible exposure levels (PEL) of airborne asbestos. Exposure to asbestos poses a health hazard to workers, their families, and consumers of asbestos products. Because it poses an unreasonable risk to human life, OSHA has repeatedly lowered the Permissible Exposure Levels and the EPA will ban the manufacture, importation, processing and commercial distribution of asbestos containing products from the United States in phases by 1997. These decisions may have been made too hastily because of the long latency (15-40 years) period before cancer develops, and the added risks that smoking imposes.

AVIATION DEPOT LEVEL REPAIRABLE SYSTEM GAINS

James T. Pullen-Lieutenant Commander, Supply Corps, United States Navy
B.B.A., James Madison University, 1978
Master of Science in Management-December 1990
and
Mary G. Ritchie-Lieutenant, Supply Corps, United States Navy
B.A., University of Tennessee, 1975
M.B.A., University of Tennessee, 1979
Master of Science in Management-December 1990
Advisor: Don R. Barr-Department of Mathematics

The purpose of this thesis is to analyze the aviation repairable system gains monitored under the UICP B35 carcass tracking program. It examines the composition of the system gains for selected activities and by aircraft type. Research was conducted on repairable turn-in procedures from the activity level to the carcass tracking program via the ATAC Hub. Emphasis was placed on identifying areas which would enable better retrograde management within the Inventory Control Point, at the activity level, and at the ATAC Hub. Seven areas were identified which offer potential repairable management improvement. Recommendations are provided which would assist in minimizing system gains and more accurately reflect the overall value of excess material.

OPTIMUM LEVELS OF WORK IN PROCESS (WIP) FOR NAVY FIELD CONTRACTING ORGANIZATIONS: A DECISION RULE

John F. Qua-Lieutenant, United States Navy
B.A., University of New Hampshire, 1977
Master of Science in Management-December 1990
Advisor: David V. Lamm-Department of Administrative Sciences

This thesis addresses growing concerns about work-in-process (WIP), or backlogs, of small purchase actions at Navy field contracting organizations. Managers of these organizations need an analytical tool to predict if the average age and numbers of contract actions in WIP are increasing. This tool can help management determine if action is necessary to maintain customer service. This thesis develops a two step decision rule to help managers predict whether WIP is getting larger and older, indicating a need for management action. Management tools and models are reviewed for applicability to the WIP problem. Regression analysis, inventory models, and queueing theory are examined as possible tools for forecasting levels of WIP. After concluding that these tools are not applicable, a two step decision rule is designed to predict: (1) the number of purchase requests in WIP and (2) whether the average age of the requests is increasing.

PROFILE OF AN EFFECTIVE ENGINEERING MANAGER AT THE NAVAL AVIONICS CENTER

Natalie A. Quick-Lieutenant, United States Navy
B.S., United States Naval Academy, 1984
Master of Science in Management-June 1991
and
Daniel W. Chang-Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1979
Master of Science in Management-June 1991
Advisors: Kenneth W. Thomas, Susan P. Hocevar & Gail F. Thomas
Department of Administrative Sciences

This thesis examines behaviors that affect the managerial effectiveness of first-level engineering supervisors (branch managers) at the Naval Avionics Center. Data were collected using a survey designed and administered by the authors and their advisors. The survey asked engineers to rate their manager on a wide range of managerial behaviors to answer questions representing several "effectiveness"-related variables. The effectiveness variables were correlated with each specific managerial behavior to identify which behaviors had the strongest relationship with the effectiveness outcomes. The results were used to develop a profile of an effective engineering manger at the Naval Avionics Center. General managerial effectiveness ratings were most strongly related to behaviors demonstrating interpersonal skill and sensitivity along with administrative skill in task management. In contrast, intrinsic task motivation, job satisfaction and positive group climate were more strongly related to behaviors representing the management of external interfaces, building cooperative teamwork and the assignment of task and development opportunities based on performance. Recommendations are offered for managerial development at the NAC Institute.

CASE STUDY ANALYSIS OF UNITED STATES NAVY FINANCIAL FIELD ACTIVITY

Patrick F. Rammel-Commander, United States Navy
B.S., University of Akron, 1975
Master of Science in Management-June 1991
Advisor: Glenn C. Eberling-Department of Administrative Sciences

The focus of this thesis is to examine the role of the Navy field activity comptroller in the management of funds and personnel under increasing resource constraints. This thesis introduces four complex case studies developed from interviews with field activity comptrollers and financial department personnel. Each case study represents a different aspect of DoN financial management. These case studies will be included in the Practical Comptrollership Course (PCC) offered by the Naval Postgraduate School in Monterey, California, and are intended for use by the PCC students as lessons in DoN personnel and financial management.

AN HISTORICAL ANALYSIS OF DON PROCUREMENT APPROPRIATIONS DURING FISCAL YEARS 1981 THROUGH 1989

Herschel H. Rector-Lieutenant, United States Navy
M.S., Naval Postgraduate School, 1990
Master of Science in Management-December 1990
Advisor: Richard B. Doyle-Department of Administrative Sciences

This thesis examines the U.S. Navy's involvement in the defense build up program by focusing on Department of the Navy procurement budgets during fiscal years 1981 through 1989. Appropriated Budget Authority for the five major procurement appropriations are examined for the major trends exhibited during this period. The data collected for the nine year period FY 1981 through 1989 indicated that Department of the Navy procurement budgeting, primarily incremental in nature, is significantly affected by other factors. The trends within the procurement appropriations indicated sensitivity to funding levels as well as explicit policy changes by the Congress and the President. These effects on Department of the Navy procurement budgets indicate a need for precise planning, programming, and budgeting by the Navy to ensure the necessary resources are on hand to meet future obligations.

ISSUES SURROUNDING THE DEPLOYABILITY OF SINGLE AND DUAL-SERVICE PARENTS IN THE NAVY

Valerie LaJetta Reynolds-Lieutenant, United States Navy
B.S., Savannah State College, 1984
Master of Science in Management-June 1991
Advisors: Alice M. Crawford & Mark J. Eitelberg-Department of Administrative Sciences

This thesis investigates some of the issues associated with single and dual-service parents in the Navy and the ability of the Navy to manage these individuals. Information from two surveys of active-duty Navy personnel, statistics from the Defense Manpower Data Center, and data from the Office of the Chief of Naval Operations (OP-13W) were obtained to meet the objectives of the thesis. This research determined that single and dual-service parents account for a relatively small proportion (8 percent) of the Navy's total force. The problems associated with these individuals appear minor and manageable. In addition, their productivity level is generally no different from that of other service members. The Navy has a policy governing the dependent care responsibilities of single and dual-service parents that proved to be effective during the Persian Gulf War. However, a slight modification of the policy may be required to ensure continuous readiness.

AVIATION DEPOT LEVEL REPAIRABLE SYSTEM GAINS

Mary G. Ritchie-Lieutenant, Supply Corps, United States Navy
B.A., University of Tennessee, 1975
M.B.A., University of Tennessee, 1979
Master of Science in Management-December 1990
and
James T. Pullen-Lieutenant Commander, Supply Corps, United States Navy
B.B.A., James Madison University, 1978
Master of Science in Management-December 1990
Advisor: Don R. Barr-Department of Mathematics

The purpose of this thesis is to analyze the aviation repairable system gains monitored under the UICP B35 carcass tracking program. It examines the composition of the system gains for selected activities and by aircraft type. Research was conducted on repairable turn-in procedures from the activity level to the carcass tracking program via the ATAC Hub. Emphasis was placed on identifying areas which would enable better retrograde management within the Inventory Control Point, at the activity level, and at the ATAC Hub. Seven areas were identified which offer potential repairable management improvement. Recommendations are provided which would assist in minimizing system gains and more accurately reflect the overall value of excess material.

THE EFFECT OF EXTENSION IN SYSTEM TECHNOLOGY ON CONTRACTOR COSTS AND PRODUCTION SCHEDULES DURING THE PROCUREMENT OF AIR-LAUNCHED TACTICAL MUNITIONS

Robert J. Ritchie-Lieutenant Commander, Supply Corps, United States Navy
B.A., Bates College, 1978
Master of Science in Management-December 1990
Advisor: O. Douglas Moses-Department of Administrative Sciences

This thesis investigates relationships between extension in technology and both cost and schedule slippages in the development and production phases of weapons system acquisition. The primary objective is to determine if the amount of technology embodied in a given weapons system can be employed to predict a Department of Defense (DoD) contractor's performance in meeting cost and schedule targets. The analysis used a sample of 15 U.S. military tactical air-launched munitions systems. It begins with a review of the literature regarding technology measurement and its connection to cost and schedule outcomes. Next, measures of technological progress are developed and displayed. Third, the process of creating cost growth and schedule slippage measures are discussed. The relationships between technological complexity and cost and schedule outcomes are then empirically tested. Major findings indicate that measures of extension in technology are worthwhile for explaining production and total program cost growth.

A DICTIONARY OF ACQUISITION AND CONTRACTING TERMS

Michael W. Robinson-Lieutenant, Supply Corps, United States Navy
B.S., Indiana University of Pennsylvania, 1979
Master of Science in Management-December 1990
Advisor: David V. Lamm-Department of Administrative Sciences

This thesis is a continuation of research initiated by Lieutenant Commander Daniel F. Ryan, SC, USN to establish a basis for defining words and terms used in the field of contracting. Concurrent research in this area is being conducted by students at the Naval Postgraduate School, Monterey,
CA and the Air Force Institute of Technology, Wright-Patterson Air Force Base, Dayton, OH. The twenty five terms selected were taken from a master list of contracting terms developed by previous researchers. A synthesized definition was developed for each term from various published sources. The synthesized definitions were then scrutinized by a selected group of contracting professionals. Their comments were then used to develop a revised definition based upon consensus.

IMPACT OF THE DEFENSE CRITICAL TECHNOLOGIES PLAN ON WEAPON SYSTEMS TEST AND EVALUATION

Edward Charles Romero
B.S., Engineering, California State University, Northridge, 1985
Masters of Science in Management-December 1990
Advisor: Richard Doyle-Department of Administrative Sciences

Thi· ıesis analyzes the impact of the Critical Technologies Plan (CTP) on planning and budgeting activities associated with weapons systems Test and Evaluation (T&E). It discusses the intent and purpose of the CTP. It develops the role and functional areas of T&E. Lastly, it analyzes the relationship between the objectives and processes involved in weapon systems T&E and the purpose of the CTP. The CTP is deemed to have a significant impact on T&E. Thirteen out 20 critical technologies are concluded to be capable of making major contributions in 11 of the 13 T&E functional areas. It is recommended that personnel from the Deputy Director, Defense Research and Engineering (Test and Evaluation) be placed on the working group responsible for developing the CTP. Further, it is recommended that the T&E community view the CTP not only as a method of anticipating future weapons, but as a process to acquire and advance T&E technologies.

DIVORCE AND FAMILY SUPPORT SERVICES: PROBLEMS AND PROSPECTS FOR THE U.S. NAVY

Kenneth Carl Rose-Lieutenant Commander, United States Navy
B.S., Indiana University, 1980
Master of Science in Management-March 1991
and
Elizabeth Anne Wallace-Lieutenant, United States Navy
B.S., Wheelock College, 1979
Master of Science in Management-March 1991
Advisor: Mark J. Eitelberg-Department of Administrative Sciences

This thesis examines marriage and divorce rates for Navy personnel and compares those rates with all military personnel and with the general U.S. population. In addition, it provides a qualitative evaluation of counseling support services available to Navy people involved in divorce. Specifically, the thesis provides two important pieces of information: the relative frequency of marriage and divorce among Navy people, and a look at the effectiveness of the Navy's primary weapon to fight family dysfunction, the Family Service Center. Results indicate that Navy and military marriage rates are generally lower than overall civilian marriage rates, but two to three times higher among seventeen-to-twenty-year-olds; that divorce rates are lower for military men, but much higher for military women; and that the Family Service Center, while it is an effective method of addressing marital stress and family dysfunction in the Navy, can be improved.

MANAGEMENT CONTROL OF AVIATION CAREER INCENTIVE PAY FOR SELECTED RESERVISTS OF THE NAVAL RESERVE

Eddie B. Ross-Lieutenant Commander, United States Navy Reserve
B.S., Tarleton State University, 1975
Master of Science in Management-June 1991
Advisor: Jerry L. McCaffery-Department of Administrative Sciences

This study was conducted to determine if the management controls currently being used by the Naval Reserve Force to control Aviation Career Incentive Pay (ACIP) to members of the Naval Reserve are effective in preventing erroneous payments. The current method of control was compared to the Mocker Management Control Model presented in the thesis. A systematic analysis of the different reports and documents currently being used by reserve field activities was conducted and determined to be inadequate. Based on the research conducted, this thesis recommends a new control report that combines all information necessary for reserve field activities to effectively and efficiently determine ACIP entitlement for Selected Reserve personnel.

MANAGEMENT OF DEMAND BASED INVENTORY ABOARD SUBMARINE TENDERS SERVICING ATTACK (SSN) SUBMARINES

Timothy Joseph Ross-Lieutenant, Supply Corps, United States Navy
B.S., University of Missouri, 1980
Master of Science in Management-December 1990
Advisor: Alan W. McMasters-Department of Administrative Sciences

This thesis examines the computation of inventory levels based on demand history aboard Submarine Tenders that use the Shipboard Automated Data Processing System (SUADPS) for inventory control. The focus of the thesis was the workload and supply effectiveness issues associated with the processing of the SUADPS levels setting program. The objective of the thesis was to determine the effect on supply effectiveness and stock churn if the levels program was processed less frequently. The thesis concludes that the likely effect of less frequent processing of the levels setting program would be an insignificant decrease in supply effectiveness and a significant decrease in stock churn. Further research involving a review of the assumptions and procedures of the SUADPS inventory model was recommended.

THE MARINE CORPS' PERMANENT CHANGE OF STATION (PCS) MOVE MODEL

Charles Theodore Rouse-Captain, United States Marine Corps
B.A., University of Mississippi, 1979
Master of Science in Management-September 1991
Advisors: James M. Fremgen & Shu S. Liao-Department of Administrative Sciences

This thesis examines the Marine Corps' permanent change of station (PCS) move model used to forecast PCS budgets -- programmed in the Interactive Financial Planning System (IFPS) of Execucom Corporation. This thesis further reviews several recommendations by the Center of Naval Analyses (CNA) for improvement of the PCS move model and develops data to implement those recommendations. Finally, the thesis reviews Computer Sciences Corporation's LOTUS and DBASE version of the PCS move model which incorporates the methodologies programmed is the IFPS software, CNA's recommendations, and the data developed within this thesis. Several shortcomings and recommendations are presented for further development of the Marine Corps' PCS move model.

THE ARMY TECHNOLOGY BASE: ISSUES AND COMPARISONS

John L. Russell-Lieutenant, United States Navy
B.S., United States Naval Academy, 1982
Master of Science in Management-December 1990
Advisor: James M. Fremgen-Department of Administrative Sciences

This thesis compares the Army, Navy, and Air Force technology base programs for the purpose of identifying features of the Navy and Air Force programs that might benefit the Army. This study also examines three technology base issues to assess how well the Army's program responds to their concerns. As a result of these efforts, four recommendations are proposed to improve the Army's technology base resource allocation process.

IMPLEMENTING TOTAL QUALITY MANAGEMENT AT THE INTERMEDIATE LEVEL OF AIRCRAFT MAINTENANCE

Rolando C. Salvanera-Lieutenant, United States Navy
B.S., United States Naval Academy, 1986
Master of Science in Management-December 1990
Advisors: Benjamin J. Roberts & Dan Trietsch-Department of Administrative Sciences

This thesis will show how Total Quality Management (TQM) can be taken from theory and operationalized at the intermediate level of aircraft maintenance. It begins by presenting four factors that will support the implementation process: top level commitment in the form of CNO support, the closed loop environment of the intermediate maintenance activities, the successful implementation at the depot level, and the fact that components of TQM already exist within the Navy. The thesis then introduces some of the TQM resource centers that can assist with the implementation process. The methods of TQM implementation as advocated by Navy resource centers (the Navy Personnel Research and Development Center and the Naval Aviation Maintenance Office) are explored. The thesis illustrates how the use of these resource centers, the early targeting of key personnel, and use of a pilot program can help facilitate the implementation process. An examination of the obstacles to the TQM implementation process, such as adapting existing programs and reward systems, concludes the thesis.

IMPACT OF NEW DOD DIRECTIVES ON MARINE CORPS ACQUISITION POLICY AT MILESTONE IV

Vernon T. Sapp-Major, United States Marine Corps
B.S., East Carolina University
Master of Science in Management-March 1991
Advisor: David V. Lamm-Department of Administrative Sciences

This thesis is an investigation of the new DoD directives concerning acquisition policy and procedures at Milestone IV. This thesis begins with background material concerning the Marine Corps acquisition process and the organizational structure of the Marine Corps Research Acquisition and Development Command. An analysis of how other Services view the activities at Milestone IV is presented to provide a basis to evaluate the Marine Corps' procedural approach to a logistic review of fielded systems. Adequate evidence is cited to establish the difference between a Principal End Item Management Transfer and a Milestone IV Review. An examination of the nature, characteristics and requirements for a Fielded System Logistics Review and a Major Modification Review are presented. Procedures are developed accordingly, based on this study, and are recommended for implementation by the Marine Corps for Fielded Systems Logistics Review and for a Major Modification Review and its subsequent approval.

FIXED-PRICE-AWARD-FEE: AN ECONOMIC, MOTIVATIONAL, AND CONTRACTING THEORY ANALYSIS

Don F. Schade-Lieutenant Commander, Supply Corps, United States Navy
B.A., University of New Mexico, 1978
Master of Science in Management-December 1990
Advisors: William R. Gates & Katsuaki L. Terasawa-Department of Administrative Sciences

The award fee is a unique incentive structure that provides the Government a method of subjective, after the fact evaluation of contractor performance and affords the Government additional flexibility to reward a contractor for above average performance. Additionally, the award fee is not subject to the Disputes clause of a Government contract. Use of award fee serves to enhance contractor performance in areas of quality, production management, ingenuity, timeliness, and cost effectiveness. Currently, the award fee is mostly utilized under cost reimbursement contracts. In order to obtain the full benefit of the award fee, its use in fixed price contracts should be considered. An analysis from the perspective of economic theory, motivational theory, and contracting theory was conducted. In addition, perspectives from Government and private sector contracting personnel were obtained to determine the most effective utilization of an FPAF contract.

THE RAMIFICATIONS OF COMPENSATION LIMITATIONS IN PERSONAL SERVICES CONTRACTS FOR DIRECT HEALTH CARE PROVIDERS

Carl Ernest Schauppner-Lieutenant, United States Navy
B.S., George Washington University, 1985
Master of Science in Management-December 1990
Advisor: Francois Melese-Defense Resources Management Education Center

The purpose of this study was to examine the effects of price restrictions in personal services contracts for direct health care providers. This is a unique method of contracting designed specifically to facilitate the hiring of highly specialized health care providers, primarily physicians, that typically demand a higher rate of compensation than that generally offered by the services. Legislation that authorized increased use of such contracts for health care services simultaneously mandated wage ceilings. Some economic impacts of wage ceilings in labor markets are presented. Shortages and a loss of military surplus are likely to be associated with wage ceilings. Recent data concerning personal services contracts are presented and examined. The result of the data evaluation provides some surprises. First, many personal services contracts are not being utilized as originally intended. In fact very few are actually used for physicians' services. Second, there is an appearance of impropriety in the administration of some of these contracts.

A STUDY OF FOREIGN ACQUISITION OF U.S. FIRMS PRIOR TO THE EXON-FLORIO AMENDMENT

Fred Otho Schellhammer-Lieutenant Commander, Supply Corps, United States Navy
B.A., Saint Francis College of Loretto, 1979
Master of Science in Management-December 1990
Advisor: Richard Doyle-Department of Administrative Sciences

This thesis examines the possible effects of foreign acquisition on the defense industrial base in the semiconductor industry. The problems and benefits of foreign acquisition are assessed in order to determine the consequences of foreign acquisition for industries critical to U.S. national security. Foreign investment in these critical areas has the attention of top officials in the legislative and executive branch, as evidenced by the passage of the Exon-Florio amendment. This legislation was intended to give the federal government the authority to prohibit foreign acquisition in cases where national security was a concern. This thesis examines foreign acquisition prior to the passage of Exon-Florio in order to discover whether such takeovers lead to the loss of such companies to the defense industrial base. Conclusions and recommendations are provided in the final chapter.

HOW IMPLEMENTATION OF TQM AND THE DEVELOPMENT OF A PROCESS IMPROVEMENT MODEL, WITHIN A FORWARD SUPPORT BATTALION, CAN IMPROVE PREPARATION OF THE MATERIAL CONDITION STATUS REPORT (DA FORM 2406)

John B. Simpson-Captain, United States Army
B.S., Mount St. Mary's College, 1981
Master of Science in Management-December 1990
Advisor: Sterling Sessions-Department of Administrative Sciences

The purpose of this thesis is to examine how implementation of Total Quality Management (TQM) and the development of a process improvement model, within a Forward Support Battalion (FSB), can improve preparation of the Material Condition Status Report (DA Form 2406). It attempts to establish the framework Forward Support Battalions can implement in order to develop a process improvement model and identifies some ways to monitor the progress the improvement model is making with the preparation of the DA Form 2406. The findings suggest that when TQM is implemented within the FSB, and if the "Plan-Do-Check-Act" process improvement model is also implemented, the preparation of the DA Form 2406 process can be improved.

PREDICTING ENLISTMENT BEHAVIOR FROM STATED INTENTIONS AND DEMOGRAPHIC CHARACTERISTICS

James A. Sinkiewicz-Lieutenant, United States Navy
B.B.A., National University, 1982
Master of Science in Management-December 1990
Advisor: Linda Gorman-Department of Administrative Sciences

This thesis uses a logit model to predict enlistment probabilities using stated intention measures and background characteristics from a sample of nearly 20,000 men age 16 to 21, who responded to the Youth Attitude Tracking Study II (YATSII) survey for the years 1984 through 1989. Those respondents who volunteered their social security number during the survey were matched with Military Entrance Processing Station Reporting System records to determine their actual enlistment behavior. The YATSII survey contains both aided and unaided mention questions designed to gauge the respondent's intentions and motivations toward military service. This study finds that measures of propensity are significant determinants of enlistment behavior, but that their effectiveness may have diminished somewhat from previous studies. The data suggest that 10 percent of the positive propensity men enlist compared to the 36 percent found in a study conducted with data eight years earlier than that used in this study.

A MICRO COMPUTER BASED PROCUREMENT SYSTEMS: AN APPLICATION OF REVERSE ENGINEERING TECHNIQUES

George T. Skrtich-Lieutenant, United States Navy
B.S., West Liberty State, 1976
Master of Science in Management-March 1991
and
Daniel E. Delaney-Lieutenant, United States Navy
B.S., New Hampshire College, 1980
Master of Science in Information Systems-March 1991
Advisor: Magdi N. Kamel-Department of Administrative Sciences

The Department of the Navy has developed a system called the Automation of Procurement and Accounting Data Entry (APADE), which automates the procurement of nonstandard materials. Small Navy Field contracting locations, however, cannot afford to utilize this service and the Navy currently has no standard micro computer software for such procurement. This thesis analyzes and reviews the Navy's APADE procurement system using a reverse engineering approach. It establishes an entity relationship model from the existing APADE flat files. This entity relationship model is then used to design and implement a prototype of the APADE system small procurement module on micro computers. The prototype micro computer version emulates the small procurement functions of the mainframe system.

A CLASSIFICATION AND ANALYSIS OF *NATIONAL CONTRACT MANAGEMENT JOURNAL* ARTICLES FROM 1966 THROUGH 1989

David Alan Smith-Lieutenant, Supply Corps, United States Navy
B.A., University of South Florida, 1980
Master of Science in Management-June 1991
Advisor: David V. Lamm-Department of Administrative Sciences

This thesis was an attempt to classify, analyze, and summarize a selected, finite body of acquisition and contracting literature. The primary objective of this thesis was to apply an existing taxonomy to the complete library of a publication that is representative of contracting literature. Analysis of the results of this classification effort provided conclusive information about focal points and trends in the literature and the evolution of the contracting discipline. A secondary objective of this thesis was to evaluate the effectiveness and usefulness of the taxonomy used to classify the literature. This evaluation included a recommendation for improving the taxonomy. The final objective of this thesis was to compile an annotated bibliography of all the articles printed in this publication. Each bibliography included a summary of how the article was classified after applying the taxonomy.

MANAGEMENT OF THE NAVY FLYING HOUR PROGRAM: RESPONSIBILITIES AND CHALLENGES FOR THE TYPE COMMANDER

George Stephen Smith-Lieutenant, United States Navy
B.S., United States Naval Academy, 1981
Master of Science in Management-December 1990
Advisor: Jerry L. McCaffery-Department of Administrative Sciences

This thesis examines the Navy Flying Hour Program at Commander, Naval Air Forces Pacific Fleet (CNAP) in order to understand the complexities and challenges of managing this program at the Type Commander level. An overview of the Flying Hour Program's budget formation and approval process is presented in order to provide a basic understanding of how fiscal resources for the Flying Hour Program are derived, documented, and granted within the Department of the Navy and the federal budge system. The analysis on the Flying Hour Program then centers on the specific procedures used at CNAP to ensure the efficient use of funds while simultaneously maximizing program effectiveness. Problems with managing the Flying Hour Program at the Type Commander and recommendations for resolving them are also presented as part of this study.

WORK-LOAD PLANNING FOR NAVY STOCK POINTS

Jane R. Smith-Lieutenant Commander, Supply Corps, United States Navy
B.S., University of Southern California, 1977
Master of Science in Management-December 1990
and
Julie E. Webb-Lieutenant Commander, Supply Corps, United States Navy
B.A., California State University, 1979
Master of Science in Management-December 1990
Advisor: Alan W. McMasters-Department of Administrative Sciences

With the ever changing environment of Navy stock points, the Navy Supply Systems Command saw the need to design and develop a course in Stock Point Operations for mid-grade managers. This thesis is a part of that effort. The focus of the thesis research was the design and development of eight hours of course material on work-load planning to be included as a finishing section of the 40-hour Stock Points Operations course. Included in this thesis are a history of the need for the course development and the management methodologies incorporated in the course material. Chapter IV provides the framework for mid-grade managers to standardize the formulation of the most effective and efficient work-load plan for their own organization.

AN ANALYSIS OF THE ECONOMIC EFFECTS OF U.S. ENERGY EFFICIENCY STANDARDS

Patrick W. Snellings-Lieutenant Commander, United States Navy
B.B.A., Stephen F. Austin State University, 1980
Master of Science in Management-June 1991
Advisor: Paul M. Carrick-Department of Administrative Sciences

The purpose of this study is to analyze the economic effects of Federally mandated energy efficiency standards on the market for home appliances. The analytical focal point of this thesis centers on representative studies and Congressional testimony supplemented by current articles and data. The benefits and costs of energy efficiency standard implementation are examined. Economic assumptions and key determinant factors that drive results such as discount rate selection, provide the basis for objective comparison. The findings of this study support the need for Federal intervention in the home appliance market to alleviate economic market failures.

AN ANALYSIS OF THE VARIABLES IN THE DECISION TO REVERT FROM A DUAL SOURCE TO SOLE SOURCE ACQUISITION METHOD

Suzanne Kay Spangler-Lieutenant Commander, Supply Corps, United States Navy
B.S., University of Northern Colorado, 1980
Master of Science in Management-December 1990
Advisors: Dan C. Boger & Paul M. Carrick-Department of Administrative Sciences

This thesis examines the various methods the Navy has used to develop and foster competition. It also discusses the economic analysis of using more than one source of supply. Rising costs and budgetary pressures have forced the Navy to reexamine its acquisition process. With the impending force draw down, the Program Manager is faced with reduced quantity requirements. Since the enactment of the Competition in Contracting Act in 1984, the Navy has required the use of dual sources in major weapons systems. However, this method of acquisition may no longer be economically feasible. Faced with reduced requirements and limited resources, the Program Manager must reevaluate the costs and benefits of his acquisition method. This thesis examines the economic issues the Program Manager must consider when reconsidering the dual source acquisition method and presents a decision model to assist in evaluating which programs would yield an economic benefit by down selecting to one source of supply.

EFFECTIVENESS OF THE U.S. NAVY'S BASIC SKILLS ENHANCEMENT PROGRAM ENTITLED FUNCTIONAL APPLIED SKILLS TRAINING (FAST)

John Kevin Spendley-Lieutenant, United States Navy
B.S., University of Notre Dame, 1985
Master of Science in Management-December 1990
Advisor: James Suchan-Department of Administrative Sciences

This thesis explores the effectiveness of the U.S. Navy's basic skills enhancement program entitled Functional Applied Skills Training (FAST) in providing the basic reading skills necessary for enlisted personnel to more ably perform their jobs in the U.S. Navy fleet during the first three years of their enlistment. Current FAST program mission, FAST's impact on fleet job performance, and future U.S. Navy enlisted manpower requirements are examined to identify mission areas where program improvements can be made. Enlisted advancement probabilities, which reflect enlisted job performance, for FAST program participants and non-participants were calculated using a statistical regression model. The results of these calculations indicate that a recruit's participation in the FAST program significantly increases his or her probability of advancing to grade E-4 within the first three years of his or her enlistment. However, considering the anticipated defense draw down and the need to enlist a cadre of high-quality service-members, the mission of the FAST program will require redefinition to avoid the ax that will be used to accomplish future budget cutbacks.

ECONOMIC ANALYSIS OF UNDERSTANDING AND IMPLEMENTING DESIGN CRITERIA FOR ACOUSTIC SUPPRESSION IN MILITARY RESIDENTIAL UNITS

James F. Stader-Lieutenant, Civil Engineer Corps, United States Navy
B.S.C.E., Virginia Military Institute, 1983
Master of Science in Management-June 1991
Advisor: Paul M. Carrick-Department of *Administrative Sciences*

This thesis examined and analyzed the Navy Military Housing acoustical design practices and procedures for military residential housing. The Uniform Building Code and Naval Facilities Engineering Command (NAVFACENGCOM) Instruction 11101.85 were used as base line guidance for design and construction of Navy Family Housing Projects. NAVFACENGCOM's design process was first examined to determine if more emphasis should be placed on noise suppression in Navy Family Housing. Based on the analysis, it was determined that the Navy Family Housing Program does address the design for noise suppression through the use of pre-established and factory tested Sound Transmission Class (STC) assemblies. However more emphasis should be placed on the acoustic evaluation process after a contractors' design is received for evaluation.

A COMPARATIVE ANALYSIS OF THE ARMY SPECIAL OPERATIONS FORCES SUPPORT STRUCTURE TO THE INFANTRY DIVISION (LIGHT) SUPPORT STRUCTURE

Robin James Stauffer-Captain, United States Army
B.S., Naval Postgraduate School, 1990
Master of Science in Management-December 1990
Advisor: Thomas P. Moore-Department of Administrative Sciences

The problem examined in this thesis is whether the current structure for the command and control of combat service support for Army special operations forces (ARSOF) is adequate for all ARSOF support units. This thesis is focused at the internal sustainment of ARSOF during contingency operations. The objective of this thesis is to conduct a comparative analysis of three alternative ARSOF support command and control structures to the support structure for the infantry division (light) to determine if the current ARSOF support command and control structure can be improved. The three ARSOF alternatives are: 1) the current ARSOF support organization, 2) the proposal by the U.S. Army Special Warfare Center and School and the U.S. Army Infantry Center to create a special operations support unit and a ranger support battalion, and 3) the author's proposal to create a special operations support command (SOSCOM). The analysis is based on the following measures of effectiveness (MOEs) for an efficient planning support structure: 1) "tooth-to-tail" ratio, 2) the number of support planning nodes/channels, 3)the proximity of support planning nodes to each other, and 4) the number of organic and nonorganic support units. The main conclusion of the research is that the SOSCOM proposal is the most comparable support structure to the infantry division (light) support structure, based on the defined MOEs. The major recommendation of this thesis is for the U.S. Army Special Warfare Center and School to initiate a collective feasibility study with the U.S. Army Logistics Center and the U.S. Army Infantry Center to determine the costs and benefits of creating a SOSCOM.

THE ROLE AND FUNCTION OF THE NAVY OFFICE OF LEGISLATIVE AFFAIRS IN THE CONGRESSIONAL PROGRAM AUTHORIZATION AND BUDGET PROCESS

Blair Perkins Stephenson-Lieutenant, United States Navy
B.A., Iowa State University, 1985
Master of Science in Management-December 1990
Advisor: Larry R. Jones-Department of Administrative Sciences

This thesis examines the role and function of the Navy Office of Legislative Affairs (OLA) in the congressional program authorization process and the budget process. Specifically, the thesis addresses the following: (1) the defense budge process beginning with Department of the Navy administrative budget formulation at the headquarters level through congressional action in budget enactment, (2) the role and mission of the Office of the Navy Comptroller, providing an overview of the Navy's administrative and legislative phases of budget formulation, (3) the role and mission of the Office of Legislative Affairs in the budgetary process, detailing OLA's relationship with Congress and the Office of the Navy Comptroller, and (4) evaluation of the effectiveness of the Office of Legislative Affairs in its role as the legislative liaison in the Congressional budget authorization process.

IMPROVING THE INDONESIAN AIR FORCE TECHNICIAN SKILL THROUGH TECHNOLOGY TRANSFER

Subandijo-Major, Indonesian Air Force
B.S., Indonesian Air Force Academy, 1974, Yogyakarta
Master of Science in Management-March 1991
Advisor: Richard A. McGonigal-Department of Administrative Sciences

The evolution in weapon system technology has led to the need of the innovative process. This thesis addresses the Technology Transfer as an improvement and development tool as it might be applied in development of skills for Indonesian Air Force technicians. Factors associated with the technology transfer process, aids and barriers to technology transfer, the innovative and creative processes, and managerial requirements for technology transfer are related to the job of the maintenance technician. From the relationship, a Paradigm is selected for the action for middle management and senior technicians as linkers and innovators to improve technical and skill capability by utilizing technology and the transfer concept.

AUTOMATED CONTRACTING: A PRODUCTIVITY STUDY

Thomas J. Summerour, Jr.-Lieutenant Commander, Supply Corps, United States Navy
B.S., United States Naval Academy
Master of Science in Management-December 1990
and
Dennis E. Wilson-Lieutenant Commander, Supply Corps, United States Navy
B.S., University of West Florida
Master of Science in Management-December 1990
Advisor: William J. Haga-Department of Administrative Sciences

This study examined the productivity of the Standard Army Automated Contracting System (SAACONS) and the Standard Automated Contracting System For Federal Agencies (SACONS-FEDERAL). Both systems were analyzed in a before/after quasi-experimental design using archival data that measured inputs, outputs, and social effects. The inputs measurements used were staff size, grade structure, and overtime usage. Output measurements included workload and quality of service as represented by Procurement Administrative Lead Time (PALT). The social effects (morale, teamwork, and professionalism) were represented by sick leave usage. While there was no statistically significant increase in workload, the quality of work measure-PALT-decreased by 24 percent for SAACONS and 3 percent for SACONS-FEDERAL after automation. This result was obtained as the staff size for each activity was reduced (the SACONS-FEDERAL staff size had to be adjusted to reflect an increase in the pre-automation authorized manning levels). Overtime usage for SAACONS reduced sharply while it increased for SACONS-FEDERAL.

THE POLITICAL ECONOMY OF MILITARY BASE CLOSURE

Richard Douglas Suttie-Lieutenant Commander, United States Navy
B.S., University of Southern California, 1979
Master of Science in Management-December 1990
and
Arthur John Ohanian-Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1979
Master of Science in Management-December 1990
Advisor: Paul M. Carrick-Department of Administrative Sciences

This study investigates the political economy of military base closure: the federal and local public policy process and how it impacts the economic efficiency of public resource allocation. It describes and analyzes the socio-economic factors affecting the communities surrounding military bases targeted for closure. It does not discuss or analyze the base closure decision making process and which base should remain open or closed. A primary case study was used for research: George Air Force Base, Victorville, California which has been undergoing the actual closure process for approximately two years. This thesis draws on historical studies by the government and private individuals which conclude that military base closures most often result in positive socio-economic effects on local communities. Since no base has been closed in the United States in eleven years, our case study analyzes the efficacy of these historical reports and provides conclusions that suggest the closure of a military base and its transition into the private sector may provide strong stimulation to most local economies.

PHYSICAL READINESS TESTING OF SURFACE WARFARE OFFICERS

Lori Danette Swinney-Lieutenant, United States Navy
B.S., Lamar University, 1985
Master of Science in Management-June 199
and
William Decker Hatch,II-Lieutenant, United States Navy
B.A., San Jose State University, 1982
Master of Science in Management-June 1991
Advisors: Alice M. Crawford & Mark J. Eitelberg-Department of Administrative Sciences

This study focused on the appropriateness of the Navy's physical readiness test (PRT) particularly as it applies to surface warfare officers (SWOs). Physical requirements of fleet SWOs were addressed through two separate surveys and an extensive literature review. Differences in fleet PRT requirements and physical requirements set forth by SWO accession sources were also examined. Further review of literature allowed for evaluation of the individual components which currently comprise the PRT, in addition to possible alternatives. Methods of body fat measurement were also presented. Finally, situations which lead to difficulties in the administration of the PRT were assessed, including deployments, scoring of the PRT, medical waivers, and attitudes and perceptions of Navy members concerning the PRT. Based on information obtained in these areas, recommendations were made for changes in accession requirements, PRT components, and PRT administration.

MINORITY WOMEN OFFICERS IN THE NAVY: PAST, PRESENT, AND FUTURE PROSPECTS

Robbie G. Turner-Lieutenant, United States Navy
B.A., Lambuth College, 1981
Master of Science in Management-March 1991
Advisors: Mark J. Eitelberg & Alice Crawford-Department of Administrative Sciences

This thesis is explanatory in nature and looks at the history, current status, and prospects of minority women in the officer corps of the U.S. Navy. The recruiting, promotion, and retention of these women is compared with that of whites, using information provided by the Defense Manpower Data Center and other sources. Research focuses on the period from 1972 through 1990. Overall, the study shows a very positive trend occuring for minority women, especially blacks, with steadily increasing representation in the officer corps. However, potential problem areas are found in the distribution of minority women across occupations and in their related prospects for advancement. In addition, evidence suggests that future participation by minority women may be adversely influenced by the planned reduction of Navy personnel. Several recommendations for further research are made, including the longitudinal tracking of minority women through their promotional flowpoints.

RETENTION IN THE NAVY NURSE CORPS

Penny Brady Turner-Lieutenant Commander, United States Navy
B.S.N., University of Texas at Austin, 1985
Master of Science in Management-December 1990
Advisor: Linda Gorman-Department of Administrative Sciences

The current nationwide nursing shortage has intensified the focus on retention in the Navy Nurse Corps. This thesis examines some of the influences on a Navy nurse's decision to stay in or leave the service. The sample was selected from the 1987 Occupational Task Inventory of the Navy Medical Department, conducted by the Navy Occupational Development Analysis Center. The sample was restricted to nurses in the grades 0-1 through 0-4, who were stationed at naval hospitals at the time of the survey. The study uses a logistic regression model to predict the probability that a nurse will stay, given independent variables that measure nurse demand, patient contact, workload and pay. The results suggest a need to examine the workload and incentive structure for Navy nurses.

AN ECONOMIC ANALYSIS OF THE ALTERNATIVES FOR PROVIDING MILITARY FAMILY HOUSING AT NPS MONTEREY, CALIFORNIA

Henry Paul Van Oss-Lieutenant Commander, United States Naval Reserve
B.S., United States Naval Academy, 1978
Master of Science in Management-December 1990
Advisor: William Gates-Department of Administrative Sciences

This thesis examines alternatives for increasing the supply of Military Family Housing (MFH) at NPS Monterey, California. Military construction, the traditional program, is compared with five other means by which the inventory of MFH units could be increased. Costs for each of the options are analyzed using accepted DoD cost models. Conclusions and recommendations are provided in the final chapter. Analytic cost computations are provided within the Appendices.

CONGRESS AND THE NAVY BUDGET: THE IMPACT OF THE BUDGET PROCESS ON THE FY 1990 NAVY PROGRAM BUDGET

Jonathan E. Vanscoy-Lieutenant, United States Navy
B.A., University of Maryland, University College, 1985
Master of Science in Management-December 1990
Advisor: Richard Doyle-Department of Administrative Sciences

The purpose of this thesis is to study the impact of the Congressional budget process on the Department of the Navy (DoN) fiscal year 1990 budget. The thesis focuses on four specific events that took place during the FY 1990 budget process. These four events are: 1) the actions of the Authorizing and Appropriating Committees, 2) a technical estimating difference between the Congressional Budget Office and the Department of Defense (DoD), 3) the Byrd Amendment which took money from DoD and other appropriations to fund the war on drugs and 4) the Gramm-Rudman-Hollings sequestration process. Each of these events had separate and distinct effect on the FY 1990 DoN budget.

THE ORGANIZATION AND FUNCTIONING OF THE LEGISLATIVE LIAISON OFFICES OF THE MILITARY DEPARTMENTS

Robert Frank Vellella-Lieutenant, United States Navy
B.S., University of Wisconsin, 1981
Master of Science in Management-December 1990
Advisor: Richard Doyle-Department of Administrative Sciences

Recognition of the importance of legislative liaison in the military departments is critical in an era of declining defense dollars. This thesis documents the organization, functions, and operation of the legislative liaison offices of the three military departments and provides evidence regarding congressional perceptions of these offices. The legislative liaison offices of the military departments are examined and compared using branch offices. Special attention is given to the division between liaison with appropriation committees and all other defense-related committees of Congress. This thesis was written in part to serve as a reference on legislative liaison for Administrative Science courses MN 3172 (Public Policy Processes) and MN 3301 (Systems Acquisition and Project Management). It is also germane to courses on legislative liaison and public affairs under development by the National Security Affairs Department.

AN ANALYSIS OF THE NAVY's OVERSEAS SCREENING POLICY

John D. Walker-Lieutenant, United States Navy
B.A., Texas A&M University, 1983
Master of Science in Management-March 1991
and
Scott L. Archer-Lieutenant Medical Service Corps, United States Navy
B.A., Columbia College, 1985
Master of Science in Management-December 1990
Advisor: Alice M. Crawford-Department of Administrative Sciences

This study analyzes the performance of the Navy's Overseas Screening Policy for 1989, with specific emphasis on determining how many personnel were returned to the U.S. prior to the end of their tour. Overseas screening in its present form is the result of 16 years worth of development. The purpose of screening is to avoid sending service members oveseas with problems that cannot be handled by the overseas command. The data collected for this thesis included information on personnel incarcerated overseas, administratively discharged while overseas, medically evacuated from overseas, and those returned at the request of an overseas command. Estimates made from the data showed that the number of early returns is much larger than previously thought, and that there are substantial costs associated with these early returns.

DIVORCE AND FAMILY SUPPORT SERVICES: PROBLEMS AND PROSPECTS FOR THE U.S. NAVY

Elizabeth Anne Wallace-Lieutenant, United States Navy
B.S., Wheelock College, 1979
Master of Science in Management-March 1991
and
Kenneth Carl Rose-Lieutenant Commander, United States Navy
B.S., Indiana University, 1980
Master of Science in Management-March 1991
Advisor: Mark J. Eitelberg-Department of Administrative Sciences

This thesis examines marriage and divorce rates for Navy personnel and compares those rates with all military personnel and with the general U.S. population. In addition, it provides a qualitative evaluation of counseling support services available to Navy people involved in divorce. Specifically, the thesis provides two important pieces of information: the relative frequency of marriage and divorce among Navy people, and a look at the effectiveness of the Navy's primary weapon to fight family dysfunction, the Family Service Center. Results indicate that Navy and military marriage rates are generally lower than overall civilian marriage rates, but two to three times higher among seventeen-to-twenty-year-olds; that divorce rates are lower for military men, but much higher for military women; and that the Family Service Center, while it is an effective method of addressing marital stress and family dysfunction in the Navy, can be improved.

WORK-LOAD PLANNING FOR NAVY STOCK POINTS

Julie E. Webb-Lieutenant Commander, Supply Corps, United States Navy
B.A., California State University, 1979
Master of Science in Management-December 1990
and
Jane R. Smith-Lieutenant Commander, Supply Corps, United States Navy
B.S., University of Southern California, 1977
Master of Science in Management-December 1990
Advisor: Alan W. McMasters-Department of Administrative Sciences

With the ever changing environment of Navy stock points, the Navy Supply Systems Command saw the need to design and develop a course in Stock Point Operations for mid-grade managers. This thesis is a part of that effort. The focus of the thesis research was the design and development of eight hours of course material on work-load planning to be included as a finishing section of the 40-hour Stock Points Operations course. Included in this thesis are a history of the need for the course development and the management methodologies incorporated in the course material. Chapter IV provides the framework for mid-grade managers to standardize the formulation of the most effective and efficient work-load plan for their own organization.

NAVY A-SCHOOL ACADEMIC SETBACKS: THEIR COST AND IMPLICATIONS FOR RETENTION PERFORMANCE

Dana Weiner-Lieutenant, United States Navy
B.S., United States Navy Academy, 1983
Master of Science in Management-June 1991
Advisor: Linda Gorman-Department of Administrative Sciences

This thesis analyzes the implications of academic setback for retention, performance, and training costs using extracts from the Enlisted Training and Tracking (TRAINTRACK) File, Special Cohort Accession and Continuer (DSCAC) Files, and Navy Enlisted Classification Tracking (NECTRACK) File. The proportion of A-school graduates who were and were not setback was compared for different mental categories and high school diploma status. Academic setbacks were promoted at lower rates than non-setbacks for all mental categories. The implication for training costs are ambiguous because the cost data and the setback data are incompatible.

INVENTORY MODELS FOR SLOW MOVING ITEMS FOR THE ISRAELI NAVY

Zvi Weingart-Lieutenant Commander, Israeli Navy
B.S.C., Tel Aviv University, 1983
Master of Science in Management-March 1991
Advisor: Alan McMasters-Department of Administrative Sciences

This thesis examines some cost/performance models for high cost, low demand insurance items. The motivation for this research is the lack of such analytical methodology in the Israeli Navy (IN). The models maximize selected supply measure of effectiveness and minimize average annual holding and backordering costs. The models have the ability to rank individual items in such a way that, under a constraint of an annual provisioning budget, only those that contribute the most to the objective function are selected for stocking.

A TAXONOMICAL STRUCTURE FOR CLASSIFYING THE GOODS PURCHASED BY THE FEDERAL GOVERNMENT

Brian L. Wenger-Lieutenant, United States Navy
B.A., University of Northern Iowa
Master of Science in Management-December 1990
Advisor: David V. Lamm-Department of Administrative Sciences

This thesis is an attempt to develop a taxonomical structure to use in the classification of the goods purchased by the Federal Government. The primary objective was to develop a usable scheme that practitioners could employ in classifying goods along a continuum from simple to complex. A secondary objective of this thesis was to determine the characteristics of the goods, other than their obvious physical differences, to utilize in classifying. Using 21 randomly selected heterogeneous goods and a scaling process, a survey was conducted to determine the relationship between these goods and the chosen characteristics. Cluster analysis was then utilized to group the goods into categories that exhibited similar characteristics. As a result of the research, a taxonomical structure for classifying the population of Government goods into five categories was developed. The potential benefits from using such a scheme could arise in the staffing and directing of procurement functions, training and education of the acquisition workforce, and refinement of procurement policy. It is recommended that the taxonomical model resulting from this research be validated and refined through further use.

INVENTORY ACCURACY IN NISTARS CONTROLLED NON-MECHANIZED WAREHOUSES

Stephen Douglas Westhoven-Lieutenant, United States Navy
B.B.A., University of Toledo, 1972
Master of Science in Management-December 1990
Advisor: Keebom Kang-Department of Administrative Sciences

This thesis is a study of the inventory accuracy in non-mechanized warehouses under the NISTARS automated warehousing system. This thesis is designed to answer two questions. Is there a significant difference between the NISTARS non-mechanized warehouses and the other types of warehouses? What are the reasons for the difference if one exists? The data were extracted from the official inventory reports of the Naval Supply Center, San Diego, California. To ensure the data were representative of the inventory position of all warehouses under the control of the supply center, they were taken from the NAVSUP required quarterly STATMAN random sampled inventories. The study indicates that there is a significant difference (13% less) in the inventory accuracy in non-mechanized warehouses under NISTARS control. Also, that the research codes used in the inventory reports are not effective. Additionally, the data output from the inventory reports is not fully utilized to improve the system.

AN ANALYSIS OF A NAVY STOCK FUND INVENTORY VALUATION MODEL

Kevin R. Wheelock-Lieutenant, Supply Corps, United States Navy
B.A., Davidson College, 1981
Master of Science in Management-June 1991
Advisor: O. Douglas Moses-Department of Administrative Sciences

The Comptroller General requires federal agencies to determine inventory values in accordance with the lower-of-cost-or-market accounting principle. The Naval Supply Systems Command (NAVSUP) is proposing for inclusion into the Department of Defense Stock Fund Regulations a model that determines the value of stock fund inventories in accordance with the Comptroller General's accounting policy. This research makes two recommendations that are intended to improve the proposed NAVSUP models's degree of compliance with the lower-of-cost-or-market accounting principle and to approximate the cost of the inventory more accurately. These two recommendations are incorporated into a second model. Using sensitivity analysis techniques, this research examined the differences in final inventory values produced by the two models under varying conditions and assumptions. It was found that under certain conditions the differences in final inventory values could be material.

EFFECTS OF TYPES OF COGNITIONS ON PERFORMANCE IN ORAL BRIEFINGS

Thomas B. Williams-Lieutenant Commander, Supply Corps, United States Navy
B.A., University of California, San Diego, 1977
M.P.A., Golden Gate University, 1986
Master of Science in Management-June 1991
Advisors: Kenneth W. Thomas & Gail F. Thomas-Department of Administrative Sciences

An empirical study was conducted to determine whether individuals' interpretations of oral briefing situations create functional "mind sets" or dysfunctional anxiety that impact performance, and to determine what implications such interpretations have for the training of Logistics Officers. Functional "mind sets" were measured using a variation of the "Stress Resiliency Profile." Communications Apprehension (anxiety) was measured using variations of the "Personal Report of Communication Apprehension." Significant correlations were found between "interpretive styles" and communications apprehension, and between communications apprehension and performance. These relationships have positive implications for the identification and training of logistics officers who have potential for experiencing difficulties in conducting oral briefings.

BUDGET REDUCTION IN THE NAVY

Ricky L. Williamson-Lieutenant, United States Navy
B.S., United States Naval Academy, 1985
Master of Science in Management-December 1990
and
James C. Workman-Lieutenant, United States Navy
B.S., University of Oregon, 1980
Master of Science in Management-December 1990
Advisor: Lawrence R. Jones-Department of Administrative Sciences

This thesis attempts to document and analyze budget and program reductions made by the Navy for fiscal years 1990, 1991 and beyond. Current and historical budget data were obtained from the Office of the Secretary of Defense, the Office of the Chief of Naval Operations and the Comptroller and the Navy and organized to permit analysis of budget trends employing several models of cutback budgeting. The thesis examines the following budgetary issues: (1) the trends and impact of budget cuts on DoD/DoN appropriation accounts; (2) projected DoD/DoN budget alternatives for FY 1992 through FY 1997; (3) the effect budget reductions have on the DoD/DoN budget process; (4) the degree of budgetary responsiveness in DoD/DoN cutback budgeting relative to criteria developed from two theoretical models of fiscal reduction methodology.

AUTOMATED CONTRACTING: A PRODUCTIVITY STUDY

Dennis E. Wilson-Lieutenant Commander, Supply Corps, United States Navy
B.S., University of West Florida
Master of Science in Management-December 1990
and
Thomas J. Summerour, Jr.-Lieutenant Commander, Supply Corps, United States Navy
B.S., United States Naval Academy
Master of Science in Management-December 1990
Advisor: William J. Haga-Department of Administrative Sciences

This study examined the productivity of the Standard Army Automated Contracting System (SAACONS) and the Standard Automated Contracting System For Federal Agencies (SACONS-FEDERAL). Both systems were analyzed in a before/after quasi-experimental design using archival data that measured inputs, outputs, and social effects. The inputs measurements used were staff size, grade structure, and overtime usage. Output measurements included workload and quality of service as represented by Procurement Administrative Lead Time (PALT). The social effects (morale, teamwork, and professionalism) were represented by sick leave usage. While there was no statistically significant increase in workload, the quality of work measure-PALT-decreased by 24 percent for SAACONS and 3 percent for SACONS-FEDERAL after automation. This result was obtained as the staff size for each activity was reduced (the SACONS-FEDERAL staff size had to be adjusted to reflect an increase in the pre-automation authorized manning levels). Overtime usage for SAACONS reduced sharply while it increased for SACONS-FEDERAL.

A MODEL PROCEDURE INTEGRATING TOTAL QUALITY MANAGEMENT INTO THE SOURCE SELECTION PROCESS

Richard Lincoln Wilson-Lieutenant, United States Navy
B.S., Virginia Polytechnic Institute and State University
Master of Science in Management-June 1991
Advisor: Rodney Matsushima-Department of Administrative Sciences

This thesis was an attempt to construct and refine a model procedure for DoD contracting activities to utilize when integrating quality factors such as Total Quality Management into the source selection process for major acquisitions. The primary objective of this thesis was to modify application guidelines for the Malcolm Baldridge Quality Award into source selection criteria, and then devise a procedure to temper the results of the basic proposal evaluation with a degree of risk determined from a Performance Risk Assessment of the offeror. A secondary objective of this thesis was to construct the model procedure in a manner which allowed maximum flexibility to contracting activities to tailor any aspects of the procedure to fit local requirements, regulations and standard operating procedures. The final objective of this thesis was to obtain feedback from knowledgeable and experienced Government contracting of policy personnel, and to modify or refine the procedure into a more feasible, useful model.

A DICTIONARY OF ACQUISITION AND CONTRACTING TERMS

Robert Eric Wilson-Lieutenant, Supply Corps, United States Navy
B.S., Old Dominion University, 1979
Master of Science in Management-December 1990
Advisor: David V. Lamm-Department of Administrative Sciences

This thesis is a continuation of research initiated by LCDR Daniel Ryan, SC, USN to establish a basis for defining words and terms used in the field of contracting. The twenty terms selected for this thesis were synthesized from collected definitions, Government regulations and contracting literature and reviewed once by National Contact Management Association Fellows in previous research efforts. This work differs from previous research in that it takes the terms from those efforts which generated significant diversity and refines them using the Delphi Technique. This research is a joint effort conducted by students at the Naval Postgraduate School, Monterey, California, and the Air Force Institute of Technology, Wright-Patterson Air Force Base, Dayton, Ohio.

COST AND SCHEDULE GROWTH DURING WEAPON SYSTEM ACQUISITION: AN INVESTIGATION OF THE IMPACT OF SELECTED ECONOMIC AND POLITICAL FACTORS

Jeffrey Guy Wolf-Lieutenant Commander, United States Naval Reserve
B.A., University of New Mexico, 1978
Master of Science in Management-December 1990
Advisor: O. Douglas Moses-Department of Administrative Sciences

The primary objective of this study is to document relationships between two weapon system program outcomes, cost and schedule growth, and aspects of the political and economic climate during system development. The data sample selected for study was aerospace industry-related weapon system programs. The central methodology used in the analysis included: 1. The identification of factors reflecting the economic and political conditions expected to be associated with program outcomes. 2. The creation of measures of cost and schedule growth. 3. Statistical analysis was conducted to test the hypothesized relationships between program outcomes and explanatory factors. The analysis was conducted to separately explain three program outcomes: development cost growth, development schedule growth, and total program cost growth. General conclusions from this study are that significant relationships do exist between cost and schedule growth and specific political and economic explanatory factors.

NAVY FAMILY HOUSING: A STUDY OF ADEQUACY STANDARDS AND THEIR RELATIONSHIP TO THE VARIABLE HOUSING ALLOWANCE

James Alan Worcester-Lieutenant, Civil Engineer Corps, United States Navy
B.Arch., California State Polytechnic University, Pomona, 1982
Master of Science in Management-June 1991
and
Tracy Diane Hofmann-Lieutenant, Civil Engineer Corps, United States Navy
B.S.M.E., Ohio State University, 1984
Master of Science in Management-June 1991
Advisor: Paul M. Carrick-Department of Administrative Sciences

This thesis investigates the current Navy and DoD policies regarding the Navy Family Housing and Variable Housing Allowance (VHA) programs. The study involved; (1) a comparison of civilian and Navy standards of adequacy for family housing, (2) an examination of the VHA rate production process, and (3) an analysis of Navy standards of adequacy for family housing and the ability of VHA to provide service members the opportunity to obtain civilian housing which meets those standards of adequacy. This study concludes that the VHA program does not ensure that service members relying on the civilian community have the opportunity to obtain family housing that meets the Navy's standards of adequacy. Recommendations are made to change this condition and, thereby, create equal housing opportunities for families living both on- and off-base.

BUDGET REDUCTION IN THE NAVY

James C. Workman-Lieutenant, United States Navy
B.S., University of Oregon, 1980
Master of Science in Management-December 1990
and
Ricky L. Williamson-Lieutenant, United States Navy
B.S., United States Naval Academy, 1985
Management of Science in Management-December 1990
Advisor: Lawrence R. Jones-Department of Administrative Sciences

This thesis attempts to document and analyze budget and program reductions made by the Navy for fiscal years 1990, 1991 and beyond. Current and historical budget data were obtained from the Office of the Secretary of Defense, the Office of the Chief of Naval Operations and the Comptroller and the Navy and organized to permit analysis of budget trends employing several models of cutback budgeting. The thesis examines the following budgetary issues: (1) the trends and impact of budget cuts on DoD/DoN appropriation accounts; (2) projected DoD/DoN budget alternatives for FY 1992 through FY 1997; (3) the effect budget reductions have on the DoD/DoN budget process; (4) the degree of budgetary responsiveness in DoD/DoN cutback budgeting relative to criteria developed from two theoretical models of fiscal reduction methodology.

COMPARATIVE COST ANALYSIS OF P-3 ACTIVE AND RESERVE AVIATION FORCES: THE ECONOMICS OF PROPOSED FORCE MIX ALTERNATIVES

Michael Richard Wrinkle-Commander, United States Naval Reserve
B.S., San Jose State University, 1974
Master of Science in Management-June 1991
and
Carl Eugene Carson,III-Lieutenant Commander, United States Naval Reserve
B.A., Furman University, 1978
Master of Science in Management-June 1991
Advisor: Jerry McCaffery-Department of Administrative Sciences

This thesis describes a methodology for estimating the annual operating and support costs of similarly equipped active and reserve VP squadrons. The costs analyzed include expenditures for personnel, equipment and support associated with maintaining a VP capability. A costing methodology developed by the RAND corporation provided the basis for developing the cost comparisons. The annual cost of the reserve VP squadron ($14.6 million) was found to be 44.5% of the cost of the active squadron. An annual savings of over $18.2 million results when a reserve squadron replaces and active squadron. The primary recurring cost factors that drive the annual costs of active and reserve VP squadrons and contribute to cost differentials are identified and discussed. Realization of cost savings are valid only for marginal changes in the total VP force. The total cost implications of large VP force mix changes, as currently proposed by DoD and the DoN, are addressed.

AN ANALYSIS OF THE EFFECT OF ASVAB WAIVERS ON A-SCHOOL ACADEMIC ATTRITION

Roland James Yardley-Lieutenant, United States Navy
B.B.A., University of New Mexico, 1983
Master of Science in Management-December 1990
Advisor: Alice M. Crawford-Department of Administrative Sciences

The purpose of this thesis was to analyze the effect of ASVAB waivers on A-School academic attrition. This was accomplished by developing a Statistical Analysis System (SAS) computer program, utilizing extracts of the Enlisted Training Tracking File (TRAINTRACK) and the Navy Enlisted Classification Tracking File (NECTRACK). In addition, a review of literature was undertaken to provide a summary of available information on factors that influence attrition, aptitude testing and ASVAB validity, trends in academic attrition, and criteria for the selection of waivered students to attend Navy A-School. The data base was explored by conducting an analysis of those individuals who did not have the prerequisite ASVAB score, and then comparing their A-School academic performance with those who had attained the prerequisite score. Several recommendations are offered concerning the policy of allowing ASVAB waivered individuals to attend specific high attrition A-School pipelines. In addition, further study is recommended, using the programs developed for this analysis, to analyze the A-School academic performance of ASVAB qualified and waivered students.

A DATA-BASED FINANCIAL MANAGEMENT INFORMATION SYSTEM (FMIS) FOR ADMINISTRATIVE SCIENCES DEPARTMENT

Nicholas Waldon Zimmon-Lieutenant, Supply Corps, United States Navy
B.S., University of Colorado, 1972
Master of Science in Management-December 1990
and
Neil Spencer Ford-Lieutenant Commander, United States Navy
B.S., Oklahoma State University, 1975
Master of Science in Management-December 1990
Advisor: Shu Liao-Department of Administrative Sciences

The Administrative Sciences (AS) Department of the Naval Postgraduate School (NPS) is placing an increasing emphasis on keeping department expenses at minimum levels requiring the AS Department to carefully monitor a large number of complex financial accounts. It becomes necessary to develop a Financial Management Information System that would result in improved management of financial assets, better use of clerical skills, and more detailed, accurate, and up-to-date reporting within the AS Department. Based on the requirement analysis and prototypes performed by previous work, this thesis develops and implements a personal computer-based Management Information System for the management of the many funding accounts controlled by the Administrative Sciences Department. The central objective was to integrate accounting transactions performed in several different offices, currently using different software programs, into a single all-encompassing Management Information System. The system was written using dBASE IV and is currently operational.

MASTER OF SCIENCE
IN
MECHANICAL ENGINEERING

MODELING OF EXPLORATIVE PROCEDURES FOR REMOTE OBJECT IDENTIFICATION

Juan C. Acosta R.-Lieutenant Commander, Colombian Navy
B.S., Mechanical Engineering, Escuela naval Almirante Padilla, 1986
Master of Science in Mechanical Engineering-September 1991
Advisor: Morris R. Driels-Department of Mechanical Engineering

This work addresses the issue of how humans manually explore remote objects using a telemanipulator. An understanding of how conceptual models are constructed is necessary since it will ultimately determine the efficiency of ROV's using telepresence. The representation of human search models is achieved by using the proprioceptive component of the haptic sensory system and the simulated foveal component of the visual system. Eventually it will allow multiple applications in remote sensing and superposition of sensory channels. The use of a force reflecting telemanipulator and computer simulated visual foveal component are the tools which offer the possibility of reconstructing these search patterns observed in different subjects under controlled laboratory conditions. The correlation between the two search strategies is explored and represented in code circles and strings which demonstrates the sequential nature of the two types of probing, as opposed of saccadic response in full vision.

EFFECTS OF POWER PULSATIONS ON NATURAL CONVECTION FROM DISCRETE HEAT SOURCES

Erhan Murat Akdeniz-Lieutenant Junior Grade, Turkish Army
B.S., Turkish Naval Academy Istanbul, 1984
Master of Science in Mechanical Engineering-March 1991
Advisor: Yogendra Joshi-Department of Mechanical Engineering

The natural convection heat transfer from an array of heaters flush mounted on a vertical test surface in response to both step and periodic input power has been investigated. Baseline surface temperature measurements in water were obtained for several steady power inputs, ranging from 0.2 W to 1.0 W for the vertical test surface. Also, the effects of the presence of a parallel shroud near the test surface on measured temperature values were studied. The effects of periodic variations in input power on the heater element temperatures were measured for various amplitudes, frequencies and average levels of the periodic input power. These transient measurements are compared with a two-dimensional numerical simulation of the relevant fluid flow and heat transfer processes. The computed heater surface temperatures supported the trends of the measurements and were within the expected range.

NATURAL CONVECTION IMMERSION COOLING OF AN ARRAY OF HEATED PROTRUSIONS IN AN ENCLOSURE FILLED WITH DIELETRIC LIQUID: EFFECTS OF ENCLOSURE WIDTH AND FLUID PRANDTL NUMBER

Erol Aytar-Lieutenant Junior Grade, Turkish Navy
B.S., Turkish Naval Academy, 1982
Master of Science in Mechanical Engineering-March 1991
Advisor: Matthew D. Kelleher-Department of Mechanical Engineering

An experimental investigation of natural convection immersion cooling of an array (3 by 3 horizontally-placed heated discrete protrusions in an enclosure filled with dielectric fluids has been conducted. Each rectangular protrusion simulates a 20 pin dualinline-package. Effects of enclosure width and fluid Prandtl number were examined. Five different spacings from 42mm to 7mm and two dielectric fluids, FC-75 (Pr=25 at 27°C) and FC-43 (Pr=82 at 27°C) were used. The top boundary of the enclosure was kept constant at 10°C and the bottom boundary was insulated during the experiments. Power dissipation levels per component ranged from 0.115 W to 2.9 W. Component surface temperature measurements were used to obtain the nondimensional heat transfer parameters. In the case of FC-75 and 30 and 7mm spacings, and in the case of FC-43 and 7mm spacing, timewise fluctuations of temperature at steady state in several locations were recorded with increasing power level.

AN INVESTIGATION OF THE INTERATOMIC BONDING CHARACTERISTICS OF A TI-51AT%AL ALLOY BY X-RAY DIFFRACTION

Steven C. Cade-Lieutenant, United States Navy
B.S., United States Naval Academy, 1985
Master of Science in Mechanical Engineering-June 1991
Advisor: Alan G. Fox-Department of Mechanical Engineering

The lattice parameters and atomic structure factors of an homogenized, binary, Ti-51at.%Al intermetallic alloy were investigated using powder X-ray diffraction procedures. Powder samples were prepared by pulverizing in a mortar and pestle lathe turnings taken from a sample ingot. The powder was then annealed to relieve the induced stress and passed through a U.S. Standard #400 sieve mesh (38 microns). Lattice parameters of the face-centered tetragonal structure determined from XRD peak positions indicated a c/a ratio of 1.020; values of 4.077Å and 3.997Å were obtained for c_o and a_o respectively. These results are in agreement with previous research into τ -phase TiAl. Measurement of diffracted integrated intensities was accomplished to determine the Debye-Waller temperature factor with a value of $B=0.58$ Å obtained by the Wilson Method. A reduction in expected measured intensities was noted, particularly at lower Bragg angles. This was attributed to extinction based on the results of a powder particle size average of 24.3 microns. Despite the problems of extinction, the observed Debye-Waller factor was judged to be reasonably accurate upon comparison to characteristic temperature and melting point data of the Ti-Al system.

ARTIFICIAL NEURAL NETWORKS AND THEIR APPLICATIONS IN DIAGNOSTICS ON INCIPIENT FAULTS IN ROTATING MACHINERY

David K. Carlson-Lieutenant, United States Navy
B.S., United States Merchant Marine Academy
Master of Science in Mechanical Engineering-March 1991
Advisors: Young S. Shin & D.S. Kim-Department of Mechanical Engineering

In an effort to curtail rising operating costs, machinery condition monitoring and diagnostics are being increasingly used as part of predictive maintenance programs. Vibration analysis is currently among the most effective tools in machinery condition monitoring and diagnostics but has proven difficult to automate fully. Artificial Neural Networks, patterned after neurological systems, provide a heuristic, data based approach to problems and have demonstrated robust behavior when faced with unique and noisy data. Thus neural networks may provide an alternative or complement to conventional rule based expert systems in machinery diagnostics applications. Research is presented wherein a series of neural networks utilizing the highly successful backpropagation paradigm are configured to provide machinery diagnostics for comparatively uncomplicated mechanical systems. Through observation of their responses to minor architectural changes and performance upon presentation of genuine and artificially generated vibration data, an effort is made to ascertain their utility in more complicated systems.

NUCLEATE BOILING CHARACTERISTICS OF R-113 IN A SMALL ENHANCED TUBE BUNDLE

Scott V. Chilman-Lieutenant, United States Navy
B.S.M.E.T., California Maritime Academy, 1983
Master of Science in Mechanical Engineering-September 1991
Advisors: Paul J. Marto & Stephen B. Memory-Department of Mechanical Engineering

Heat transfer tests were carried out using a small enhanced tube bundle in a pool of R-113. By accurately instrumenting five tubes within the bundle, both the convective and nucleate boiling regions were studied in detail, with emphasis on the 'bundle' effect (i.e., the effect of lower tubes in operation on upper tubes within the bundle). In addition, the effect of surface history and pool height on nucleation site activation/deactivation was studied to see how this affects the overall heat transfer and in particular, the shape of the hysteresis loop. From the results, recommendations can be made to improve start-up procedures on shipboard AC systems.

HEAT TRANSFER, ADIABATIC EFFECTIVENESS AND INJECTANT DISTRIBUTIONS DOWNSTREAM OF SINGLE AND DOUBLE ROWS OF FILM-COOLING HOLES WITH SIMPLE AND COMPOUND ANGLES

Salvatore Ciriello, Jr.-Lieutenant, United States Navy
B.A., Manhattanville College, 1979
M.S., University of Rhode Island, 1982
Master of Science in Mechanical Engineering-March 1991
Advisor: Phillip M. Ligrani-Department of Electrical Engineering

Experimental results are presented which describe the development and structure of flow downstream of single and double rows of film-cooling holes with both simple and compound angle orientations. Two configurations are investigated, a simple angle injection system in which the injectant is introduced into the freestream parallel to the main flow (as viewed in streamwise/spanwise planes), and a compound angle injection system in which the injectant is introduced with spanwise velocity components. Results indicate that effectiveness depends mostly on four parameters: simple or compound angle injection, spanwise hole spacing, one or two rows of holes, and blowing ratio. In general, for a given m, for all the configurations tested, effectiveness is greatest at low x/d values, and decreases with increasing x/d. As blowing ratio increases, effectiveness generally decreases, particularly at low x/d values because of lift-off effects. Iso-energetic Stanton number ratios vary between 1.0 and 1.25 for all cases, and generally increase with increasing blowing ratio at any given x/d. Effectiveness values measured downstream of two rows of holes are higher than values measured downstream of one row of holes. Adiabatic film-cooling effectiveness data for both the compound angle injection system and the simple angle injection collapse with minimal scatter in η /m vs xl/s coordinates.

A STUDY OF THE MICROSTRUCTURAL BASIS FOR THE STRENGTH AND TOUGHNESS PROPERTIES OF OVERAGED HSLA-100 STEEL

Lawrence Whitley Comerford-Lieutenant, United States Navy
B.S.M.E., United States Naval Academy, 1983
Master of Science in Mechanical Engineering-June 1991
Advisor: Alan G. Fox-Department of Mechanical Engineering

A certification program for the use of HSLA steel in ship construction is currently being funded by the U.S. Navy. Integral to this program is the characterization of the microstructure of the highly weldable HSLA-100 steel. In the present work, optical, scanning electron and transmission electron microscopy were employed to analyze the microstructural basis for the mechanical properties of as-quenched and tempered HSLA-100 steel in the form of 31.75 mm plate. The as-quenched microstructure contained bainite/martensite laths and a small amount of retained austenite. The strength and toughness in this specimen was based on the small transformation product packets with their fine laths and highly dislocated substructures. The best combination of strength and toughness occurred for the sample tempered at 621°C; the recovery of the dislocation substructures, the precipitation of overaged copper and carbides, and the small transformation product packet size accounted for the high toughness at this tempering temperature. The size, distribution, and composition of non-metallic inclusions were also determined; the inclusion population generally consisted of small, globular, homogeneously dispersed particles. However, exogenous oxides on the order of 50 μm were occasionally found as well as slightly brittle oxides which had broken up in the rolling direction. As a result of this investigation, it is suggested that the optimum aging temperature for 31.75 mm as-quenched HSLA-100 plate is around 600°C and that improved secondary steelmaking procedures are adopted to eliminate the large, deleterious non-metallic inclusions.

ENHANCEMENT OF BOILING HEAT TRANSFER IN DI-ELECTRIC FLUIDS

Robert A. Egger-Lieutenant, United States Navy
B.E. Mechanical Engineering, Cleveland State University, 1985
Master of Science in Mechanical Engineering-September 1991
Advisor: Matthew D. Kelleher-Department of Mechanical Engineering

Direct application of two-phase heat transfer in the liquid cooling of electronic components in fluorinated hydrocarbons (FC-72), is severely inhibited by the excessive amount of superheat required to initiate nucleate boiling. To conduct an experimental study of nucleate pool boiling of FC-72, an experimental test chamber was constructed. This chamber utilized five horizontal platinum wires of 0.05 mm diameter spaced 2.0 cm vertically from each other. The lowest wire was progressively heated from the natural convection region through nucleate boiling, and a study was made on the effects of the boiling wake plume on the heat transfer rate of the upper wires.

HEAT TRANSFER ENHANCEMENT DUE TO BUBBLE PUMPING IN FC-72 NEAR THE SATURATION TEMPERATURE

Ali Sukru Eren-Lieutenant Junior Grade Turkish Navy
Turkish Naval Academy, 1984
Master of Science in Mechanical Engineering-March 1991
Advisor: Matthew D. Kelleher-Department of Mechanical Engineering

The use of boiling heat transfer in the liquid immersion cooling of electronic components has always been hampered by the excessive superheat necessary to initiate nucleation in the fluorinated hydrocarbons used as dielectric cooling fluids. In an attempt to overcome some of these difficulties, an experimental study of the effects of nucleate pooling boiling, on the heat transfer from surface near the boiling surface was conducted. An experimental chamber was constructed which had a column of four horizontal wires spaced 2.5. cm vertically from each other. The lowest wire was progressively heated from the natural convection region through the nucleate boiling region. A study was made of the effects of the boiling wake from the lowest wire on heat transfer from the upper wires. Under certain conditions heat transfer enhancements of up to 30% were obtained.

VISUALIZATION OF GAS TUNGSTEN ARC WELD POOLS

Daniel C. Espinosa-Lieutenant, United States Navy
B.A., Chemistry, University of New Mexico, 1985
Master of Science in Mechanical Engineering-September 1991
Advisor: Yogendra Joshi-Department of Mechanical Engineering

Surface flow visualization of Gas Tungsten Arc weld pools for HY-80 steel is presented using a pulsed laser light source and a conventional night-vision image-intensifier tube equipped video camera. Visualization of the weld pool free surface is made possible by seeding the flow with alumina particles for both stationary and moving arc welds. These visualizations reveal several new features not incorporated in the existing models for stationary welds. A strong clockwise stirring is observed contrary to the axi-symmetric computational models. Also, the pool surface shows a bulge near the center. Complex flow patterns are observed for moving arc welding. Interpretations of the observed flows based on the driving forces are provided.

STUDY OF THE TRANSITION TO TURBULENCE WITHIN A CURVED RECTANGULAR CHANNEL WITH 40 TO 1 ASPECT RATIO

Steven Jay Fuqua-Lieutenant, United States Navy
B.S., Tennessee Technological University, 1984
Master of Science in Mechanical Engineering-September 1991
Advisors: Phillip M. Ligrani & Chelakara S. Subramanian
Department of Mechanical Engineering

Longitudinal turbulence intensity and streamwise mean velocity variations are studied from measurements using single-sensor hot-wire probes at Dean numbers form 50 to about 450 in a curved rectangular channel with 40 to 1 aspect ratio, mild curvature, and an inner to outer radius ratio of 0.979. Measured results show significant increases in the longitudinal turbulence intensity as the Dean number increases above 150. These increases are first apparent near the concave surface in upwash regions between individual vortices which make up each vortex pair. Such increases correspond closely with twisting vortex motions, which is important in regard to transition from laminar to turbulent flow because these variations provide evidence that twisting results in the first important increases in turbulence energy at a given location as the Dean number increases.

EFFECT OF ALUMINA PARTICLE ADDITIONS ON THE AGING KINETICS OF 2014-ALUMINUM MATRIX COMPOSITES

Christopher Paul Harper (PE)-Lieutenant, United States Navy
B.S.M.E., University of Evansville, 1983
Master of Science in Mechanical Engineering-September 1991
Advisor: Indranath Dutta-Department of Mechanical Engineering

Differential Scanning Calorimetry (DSC) was conducted on 2014 aluminum, 2014 aluminum reinforced with 10 and 15 percent by volume of alumina particles, 2024 aluminum, and a Al/4%Cu alloy. Electrical resistivity and matrix micro-hardness measurements were conducted on the 2014 aluminum alloy and the metal matrix composites (MMC) during isothermal aging. Transmission Electron Microscopy (TEM) and DSC were used to identify the metastable phases formed in the 2014 aluminum alloy. The effect of alumina particle additions on the precipitation, growth and thermal stability of the metastable phases in the 2014 aluminum alloy and MMC were studied. Results were used to characterize the effect of the alumina reinforcement on the aging kinetics of the 2014 aluminum alloy matrix.

EFFECTS OF CENTRIFUGAL INSTABILITIES ON LAMINAR/TURBULENT TRANSITION IN CURVED CHANNELS WITH 40 TO 1 ASPECT RATIOS

Michael R. Kendall-Lieutenant, United States Navy
B.S., University of the State of New York, 1985
Master of Science in Mechanical Engineering-June 1991
Mechanical Engineer-June 1991
Advisor: Phillip M. Ligrani-Department of Mechanical Engineering

Dean vortices in curved channels with 40 to 1 aspect ratios were measured and studied over the range of Dean numbers from 50 to 450. At low Dean numbers (<50) the flow is fully laminar. At higher Dean numbers, the development of vortex pairs as the primary instability was a function of Dean number and the angle of curvature. Higher Dean numbers required less curvature to produce the vortices. At Dean numbers from 75 to 200, secondary instabilities developed in the form of vortex pair undulations, vortex pair twisting, and in the form of events where vortex pairs appear and disappear. These secondary instabilities are also a function of Dean number and curvature. Twisting leads to increases in longitudinal fluctuating intensities, particularly in the upwash region from the concave wall, which are especially significant at Dean numbers above 150. Fluctuation increases eventually lead to fully turbulent conditions and depend on location in the spanwise/radial plane relative to a vortex pair structure, where upwash regions from the concave wall are the most unstable. Fully turbulent flow develops at Dean numbers greater than about 400.

USE OF HOPFIELD NETWORKS FOR SYSTEM IDENTIFICATION AND FAILURE DETECTION IN AUTONOMOUS UNDERWATER VEHICLES

Alan M. Marsilio-Lieutenant, United States Coast Guard
B.S., Electrical Engineering, U.S. Coast Guard Academy, 1983
Master of Science in Mechanical Engineering-September 1991
Advisor: Anthony J. Healey-Department of Mechanical Engineering

In the early 1980s John J. Hopfield developed a recurrent network based on a model of biological neurons. In his model, each neuron accepts inputs from all other neurons in the network, modifies each input with a weight and converts their sum to an output via the non-linear sigmoid transfer function. This output is then fed back to each of the input paths where the input signals are updated before the next summation. It has been proposed that this network can be successfully applied to the problem of system parameter identification where the weights are functions of the system states and the network, after being allowed to process a continuous block of system states, is guaranteed to converge to the system parameters. This thesis explores the concepts of network stability and solution existence for a time-invariant system. It is shown that the network will converge as expected provided the steady-state solution falls within the range of values of the sigmoid transfer function. Experimentation with the network when not all system states are measurable revealed that knowledge of the actual system parameters is necessary to obtain convergence because of large error between the actual and estimated system states, showing that minimization of this error must take place before the network is integrated. Finally, it is shown that as system parameters vary, the Hopfield network will track the parameter changes provided the system remains persistently excited by the input.

STUDIES OF INTERMETALLIC GROWTH IN CU-SOLDER SYSTEMS AND WETTABILITY AT SOLID-LIQUID INTERFACES

Raymond W. Martin-Lieutenant, United States Coast Guard
B.S., U.S. Coast Guard Academy, 1984
Master of Science in Mechanical Engineering-September 1991
Advisor: Indranath Dutta-Department of Mechanical Engineering

The metallurgical bond formed between tin-lead solder and the copper substrate is characterized by the formation of an intermetallic compound layer. The growth of the intermetallic layer is the result of competing mechanisms, growth of the intermetallic at the intermetallic/copper interface and its dissolution at the intermetallic/liquid solder interface. These were studied by determining the dissolution rates of the copper and the intermetallic compound. An experimental apparatus for the immersion-emersion tensiometric method, which can be used to determine immersion and emersion contact angles and surface tension, was set up and tested. This technique offers several advantages over the conventional sessile drop and tensiometric methods, and can be utilized to study wettability at solid-liquid interfaces.

NUMERICAL FIELD MODEL SIMULATION OF FULL-SCALE FIRE TESTS IN A CLOSED SPHERICAL/CYLINDRICAL VESSEL USING ADVANCED COMPUTER GRAPHICS TECHNIQUES

Timothy G. McCarthy-Lieutenant, United States Navy
B.S.M.E., University of Rochester, 1984
Master of Science in Mechanical Engineering-September 1991
Advisor: Matthew D. Kelleher-Department of Mechanical Engineering

Personnel and equipment casualties, caused by shipboard fires have adversely affected overall readiness of the U.S. Navy for centuries. Understanding the phenomena of fire in enclosed spaces, such as those found on surface ships and submarines, will greatly enhance the Navy's ability to combat or prevent them. This computer model was developed for use in conjunction with Fire-1, an experimental fire chamber test facility at the Naval Research Laboratory in Washington, D.C. It is a three-dimensional finite difference model which includes the phenomena of conduction, turbulence, global pressure correction, surface radiation and strong buoyancy flows. Given specific data on heat release, it predicts velocities, temperatures, pressures, densities and viscosities throughout its geometry. It has been reasonably validated by comparison with experiments in Fire-1. Advanced graphics techniques, such as color contouring and three-dimensional vector field plotting, have been applied to make output data more informative. This model, if easily modified to more specific geometries, may become a useful tool for naval architects in the design of the fire safe ship.

DYNAMIC PERFORMANCE OF SMALL DIAMETER TUNNEL THRUSTERS

Michael B. McLean-Lieutenant, United States Navy
B.C.E., Auburn University, 1982
Master of Science in Mechanical Engineering-March 1991
Advisor: Anthony J. Healey-Department of Mechanical Engineering

The transient response of a small tunnel thruster is studied for step changes in applied voltage to the thruster motor. Previous work on positioning Remotely Operated Vehicles with a ducted propeller had shown that lags in the thruster response caused limit cycling in the vehicle's behavior. These experiments have shown that the influence of the fluid inertia in the tunnel is significant and changes the lagging response to a leading reponse with a large transient peak following the step input. It is conjectured that such thrusters will enhance vehicle stability.

A STUDY OF THE MICROSTRUCTURAL BASIS FOR THE STRENGTH AND TOUGHNESS PROPERTIES OF WATER-QUENCHED AND AIR-COOLED HSLA-100, HSLA-100 WITH INCREASED COPPER, AND A ULCB STEEL

Thomas Campion Mohr-Lieutenant, United States Navy
B.S., United States Naval Academy, 1985
Master of Science in Mechanical Engineering-September 1991
Advisor: Alan G. Fox-Department of Mechanical Engineering

The microstructural basis for strength of the water-quenched and air-cooled HSLA-100, HSLA-100 with increased copper, and a ULCB steel was investigated by conducting an inclusion study and characterizing the microstructure of each of the steels. For the inclusion study, the SEM was used to examine a large number of fields and determine inclusion morphology while the EDX was used to determine inclusion composition. The microstructure of both the water-quenched and air-cooled steels was characterized using the optical microscope, SEM, and TEM. The HSLA-100 with increased copper steel was adequately calcium treated and aluminum deoxidized as evidenced by the low sulfur content, few MnS stringers, and lack of large oxide arrays. The ULCB steel was not calcium treated or Al-killed; nor was it thermo-mechanically processed as shown by the lack of lipped, broken, or elongated stringers. Both MnS and oxide inclusions were present, and consequently ladle metallurgy would have to be used before the ULCB steel was hot-worked. The microstructural basis for the strength of the as-quenced HSLA-100, HSLA-100 with increased copper, and ULCB steels is the transformation product packet size, small lath width, and high dislocation density. The as-quenched increased copper steel also contained -copper precipitates which added to its high level of strength and toughness. The as-quenched ULCB steel did not reach the desired strength level because its transformation product packet size was too large; approximately the same size as the prior-austenite grains. Thermo-mechanical processing of the steel would result in a finer packet size. Air cooling of the HSLA-100 and HSLA-100 with increased copper steels introduced a significant amount of pro-eutectoid ferrite to their microstructures which would result in a lower level of strength. Air-cooling of the ULCB steel reduced the transformation product packet size by half. The finer packet size as a result of air cooling could alleviate the large expense incurred by water-quenching steel plate immediately following the final hot-rolling pass.

TRANSITION PHENOMENA IN A STRAIGHT CHANNEL WITH A 40 TO 1 ASPECT RATIO WITH AND WITHOUT IMPOSED PULSATIONS PART I: NEAR-WALL AND CENTRAL REGION PROFILES

Darrell S. Morrow-Lieutenant, United States Navy
B.S., Texas A&M University, 1985
Master of Science in Mechanical Engineering-March 1991
Advisor: Phillip M. Ligrani-Department of Mechanical Engineering

A channel with a rectangular cross-section, 40 to 1 aspect ratio (height is 0.0127m), and 4.27m test section (336 channel heights) is used to study the effects of imposed pulsations on transitional flow phenomena. Periodic velocity variations are produced in the test section using a single rotating vane located in the flow downstream of the test section. Flows with Reynolds numbers (Re) ranging from 1100 to 3600 are studied at Stoke numbers of 4.08 and 5.79 and Strouhal numbers from 0.02 to 0.122 by imposing pulsations at 1Hz and at 2 HZ. Time-averaged velocity profiles both within and outside of the Stokes layer are unaffected by the imposed pulsations at frequencies of 1 and 2 Hz for the entire range of Reynolds numbers studied. Logitudinal turbulence intensity profiles show a local maxima at both the channel centerline for Reynolds numbers from 1250 to 1550. This is evidence of a center mode of instability. Longitudinal turbulence intensity profiles show a local maxima at both the channel centerline and y/d of 0.85 for Reynolds number from 1710 to 2300. As the Reynolds number increases from 2350 to 3400 local maxima of longitudinal turbulence intensity occur only at y/d of 0.9. Normalized profiles of longitudinal trubulence intensity are the same with and without pulsations for all Reynolds numbers 2400 and 2450. Longitudinal turbulence intensity profiles at a Reynolds number of 2400 show that magnitudes near the channel centerline are reduced at Stokes number of 5.79 (2Hz pulsations) as compared to without pulsations. At Reynolds number of 2450 the magnitude of longitudinal turbulence intensity near the channel centerline are reduced at Stokes numbers of 4.08 and 5.79 (1 Hz and 2 Hz pulsations).

THREE DIMENSIONAL PURSUIT GUIDANCE AND CONTROL OF SUBMERSIBLE VEHICLES

Agelos G. Papasotiriou-Lieutenant, Hellenic Navy
B.S. in Naval Engineering, NPS, 1991
Master of Science in Mechanical Engineering-September 1991
Advisor: Fotis A. Papoulias-Department of Mechanical Engineering

A pure pursuit guidance law is combined with a heading autopilot to provide accurate path keeping of submersible vehicles. The scheme is implemented and analyzed in both the horizontal and vertical planes. A complete stability analysis is performed in order to evaluate regions of stable vehicle operations. Numerical integrations support the analytic predictions. Two distinct stability boundaries are established. In the first, the vehicle loss of stability is accompanied by the generation of oscillatory motions around the commanded path. In the second, loss of stability occurs with linearly increasing path deviation. The horizontal and vertical plane schemes are combined with a propulsion control law in order to achieve path tracking of a general commanded route composed of several straight line segments in three dimensional space.

FULL POSE AND PARTIAL POSE CALIBRATION OF A SIX DEGREE OF FREEDOM ROBOT MANIPULATOR ARM

Scott Alton Potter-Lieutenant, United States Navy
B.E., Vanderbilt University, 1986
Master of Science in Mechanical Engineering-September 1991
Advisor: Morris R. Driels-Department of Mechanical Engineering

A six degree of freedom robot manipulator arm, a PUMA 560, is calibrated using full pose and partial pose methods in order to improve the accuracy of the manipulator arm. The theory applicable to modeling of mechanisms is introduced. A thirty parameter kinematic model is developed for use in the full pose calibration method and a twenty-six parameter kinematic model is developed for the partial pose calibration. A simulation study is performed to determine the applicability and feasibility of each model. Experimental pose measurements are performed using each method to obtain data with which to perform an actual calibration of the manipulator and compare with the predicted results. The effects of noise in each measurement system employed and in the manipulator's joint position encoders are discussed. The measurement systems employed are examined in detail and a comparison between the two is performed.

NUMERICAL EXPERIMENTS IN UNSTEADY FLOWS THROUGH THE USE OF FULL NAVIER-STOKES EQUATIONS

Christopher J. Putzig-Lieutenant, United States Navy
B.S., University of Idaho, 1983
Master of Science in Mechanical Engineering-June 1991
Mechanical Engineer-June 1991
Advisor: Turgut Sarpkaya-Department of Mechanical Engineering

The numerical simulations of impulsively started flow, non-impulsively started flow, sinusoidally-oscillating flow, and, finally, co-existing flow (with mean and oscillatory components) past a circular cylinder have been investigated in great detail through the use of several compact schemes with the Navier-Stokes vorticity/stream function formulation for various Reynolds numbers, frequency parameters,, and ambient flow/oscillating flow combinations using VAX-3520 and NASA's Supercomputers. Extensive sensitivity analysis has been performed to delineate the effects of time step, outer boundary nodal points on the cylinder, and the use of higher order polynomials in the calculation of the gradient of wall vorticity. The results have been compared with those obtained by others, whenever available, and with those obtained experimentally. In many cases the predicted wake region, vorticity and pressure distributions, and the time-variation of the force coefficients have shown excellent agreement with those obtained experimentally.

SLIDING MODE CONTROL OF MOTIONS OF TOWED SHIPS

Arthur K. Samora-Lieutenant, United States Navy
B.S., United States Naval Academy, 1984
Master of Science in Mechanical Engineering-September 1991
Advisor: Fotis Papoulias-Department of Mechanical Engineering

A control system based on sliding mode control and the linear quadratic regulator is designed to stabilize the straight line motions of towed vessels. The control technique is through athwartship movement of the towline attachment point on the towed vessel. Control design is based on the linearized sway and yaw equations of motion. Numerical simulations for both the linearized and the nonlinear system are performed and demonstrate the added robustness of the control technique employed.

EFFECT OF THERMAL RESIDUAL STRESSES ON THE STRESS-STRAIN BEHAVIOR OF METAL-MATRIX COMPOSITES

Daniel M. Seigenthaler-Lieutenant, United States Navy
B.S., United States Naval Academy
Master of Science in Mechanical Engineering-June 1991
Advisor: Indranath Dutta-Department of Mechanical Engineering

A phenomenological and parametric study was conducted to assess the effect of thermal residual stresses on the stress-strain response of a discontinuous fiber-reinforced metal-matrix composite in tensile and compressive loading. The material chosen for this investigation was the SiC-whisker reinforce Al 6061. The difference between composite flow behavior in tension and compression, as well as the effects of volume fraction, fiber aspect ratio and fiber spacing were analyzed within the framework of axisymmetric finite-element models to determine the overall constituative response of the composite and to solve for local field quantities in the fiber and the matrix. The composite was modeled as a periodic array of cylindrical fibers with perfect interfacial bonding and complete fiber alignment with the tensile/compressive axis. It was found that the presence of residual stresses affected the stress-strain behavior of the composite by influencing the load transfer characteristics between the matrix and the fiber as well as the initiation and growth of the plastic deformation in the matrix. The results of the study indicated that a significant strength differential exists between tensile and compressive loading and that this effect diminishes with increasing volume fraction. The results also indicated that composite stiffness, yield strength and work-hardening rate increase with increasing volume fraction and fiber aspect ratio and that the variation in fiber spacing has a relatively small effect in tension and a large effect in compression due to the presence of residual stresses.

STUDY OF TRANSITION PHENOMENA IN A STRAIGHT CHANNEL WITH 40 TO 1 ASPECT RATIO WITH AND WITHOUT IMPOSED PULSATIONS PART TWO: REYNOLDS NUMBER SURVEYS

Bradley Joseph Smith-Lieutenant, United States Navy
B.S.CH.E., Wayne State University, 1983
Master of Science in Mechanical Engineering-March 1991
Advisors: Phillip M. Ligrani & Chelakara Subramanian
Department of Mechanical Engineering

A channel with rectangular cross-section, 40 to 1 aspect ratio (height is 0.0127m) and 4.27m test section length (336 channel lengths) is used to study the effect of imposed pulsations on laminar, transitional, and turbulent flow phenomena. Periodic velocity variations are produced in the test section using a single rotating van located in the flow downstream of the test section. Survey data for Y/d of 0.50, 0.85, and 0.90 show how normalized average velocity and turbulence intensity data vary with Reynolds number for Reynold numbers ranging from 1100 to 3400 at Stokes numbers of 4.08 and 5.79 and Strouhal numbers for 0.033 to 0.121. These conditions are prodcuced from pulsations imposed at 1 Hz and 2 Hz to show how transition develops both with and without imposed pulsations. Intermittency variations increase from near zero to one as Reynolds number changes from 1450 to 2100 for Y/d=0.90, 0.85, and 0.50. Time-averaged magnitudes of the normalized longitudinal turbulence intensity increase significantly as Re changes for 1450 to 3100at Y/d=0.90. A maxima is reached near Re=2400. Afterwards these data show a decrease and level off in the turbulent region. At Y/d=0.85, the same trend in normalized longitudinal turbulence intensity appear with a maxima appearing near Re=2300. For the center of the channel (Y/d=0.50), the maxima appears near Re=2000. The normalized longitudinal turbulence intensity level in the turbulent region increaes with Y/d. Of particular interest are conditions where the normalized longitudinal turbulence intensity is greater near the center of the channel than near the walls. This occurs for Reynolds numbers of 1500 to 2500. Spectra show evidence of intermittency and drastic increases in fluctuating energy starting at Re=1500 and continuing to Re=1700.

NUCLEATE POOL BOILING OF R-114 AND R-114/OIL MIXTURES FROM SINGLE ENHANCED TUBES

Dean C. Sugiyama-Lieutenant, United States Navy
B.A., University of California of Berkeley, 1985
Master of Science in Mechanical Engineering-September 1991
Advisor: Paul J. Marto-Department of Mechanical Engineering

Nucleate pool boiling heat transfer is an integral part of any vapor-compression refrigeration cycle. With a view to improving overall cycle efficiency, the heat transfer performance in the evaporator can be improved by using enhanced boiling surfaces. This thesis looks at the pool boiling characteristics of R-114 (presently used in large shipboard AC systems) from 10 enhanced single copper tubes and compares performance with a smooth copper tube. Since small amounts of oil escape into the refrigerant as it passes through the compressor of a refrigeration system, tests have also been conducted with up to 10% (by weight) of a miscible oil to see what effect this may have on overall evaporator performance.

ORIENTATION GUIDANCE AND CONTROL FOR MARINE VEHICLES IN THE HORIZONTAL PLANE

Prouttichai Suwandee-Lieutenant Commander, Royal Thai Navy
B.S., Royal Thai Navy Academy, Thailand, 1991
Master of Science in Mechanical Engineering-June 1991
Advisor: Fotis A. Papoulias-Department of Mechanical Engineering

A pure pursuit guidance law and a heading autopilot are coupled in order to provide path control of submersibles or surface ships in the horizontal plane. Proper design of the combined scheme allows for accurate path keeping during straight line motion. The simulation results are extended to cover cases of step changes in the desired path. The scheme provides a viable alternative to cross track error autopilot.

COMPLIANCE OF A ROBOTIC FINGER JOINT

Yavuz Turkgenci-First Lieutenant, Turkish Army
B.S., Turkish Army Academy, Ankara, 1984
Master of Science in Mechanical Engineering-June 1991
Advisor: Morris R. Driels-Department of Mechanical Engineering

Adaptive compliance control of a robotic single joint was studied to control the amount of torque applied on an object by an end effector, which as actuated by an electric motor through a gearbox. For this reason, an adaptive control system was designed. Variation in stiffness and compliance was observed by simulating the system with *MATRIX* package program. After observing theoretical variation of the stiffness and the compliance, experiments were done to observe and prove the stiffness control theory. The proved theory was then applied to a prototype robotic finger joint actuated by a small DC motor.

A POWDER X-RAY DIFFRACTION STUDY OF TWO ALUMINUM-LITHIUM BASED ALLOYS

Te-Kang Wang-Captain, Republic of China Army
B.S., Chung Cheng Institute of Technology, 1984
Master of Science in Mechanical Engineering-March 1991
Advisor: Alan G. Fox-Department of Mechanical Engineering

The microstructures of solution treated, quenched and aged Al-2.5 wt. % Li and Al-2.0 wt % Mg-1.03 wt. % Cu alloys were studied by powder X-ray diffraction. The as-quenched alloys showed extensive X-ray line broadening due to particle size effects and the intensity measurements indicated a significant amount ordering in the as-quenched state. These results were interpreted using a 'spinodal ordering' model which suggests that Al-based alloys order during quenching and then spinodally decompose into regions of order and disorder so that the final microstructure comprises small ordered regions (size ~ 40nm) in a disordered matrix. Studies on the aged Al-2.5 wt. % Li alloy indicated that after initial short-time aging, the δ' particle growth follows Ostwald ripening kinetics in agreement with previous work. Studies on the aged quaternary alloy indicated that T1 and S phases grow at the expense of δ' in this system so that δ' precipitates are not a dominant strengthening mechanism in this alloy.

THE EFFECTS OF SHIPBOARD STEERING MACHINERY DYNAMICS ON RUDDER ROLL STABILIZATION SYSTEMS

Michael W. Wendel-Lieutenant, United States Navy
B.S., Villanova University, 1984
Master of Science in Mechanical Engineering-September 1991
Advisor: Louis V. Schmidt-Aeronautical Engineering

The surface ship rolling motion equation is modeled as a second order system, with a natural frequency of $w_n = 0.4$/ sec and a dimensionless damping ratio of $\zeta = 0.08$. The model is subjected to a random forcing function, which has a Gaussian probability distribution and can be considered as "white noise", and placed into State-Space form. State variable feedback of roll rate is applied and the system discretized to match digital control. Roll angle time histories are developed for a range of feedback gains and compared. Additionally, steering machinery dynamics are modeled by a first order system and time constants varied to determine the effects of rudder dynamics on the feedback system.

COMPARISON OF UNCONSTRAINED AND CONSTRAINED CALIBRATION METHODS

Michael J. Wiegand-Lieutenant, United States Navy
B.S., Ag. Eng., Michigan State University, 1983
Master of Science in Mechanical Engineering-June 1991
Advisor: Morris R. Driels-Department of Mechanical Engineering

The idea of using a passive end point motion constraint to calibrate robot manipulators is of particular interest because no measurement equipment is required. The accuracy attained using this method is compared to the accuracy attained by an unconstrained calibration using computer simulated measurements. A kinematic model is established for each configuration using the Denavit-Hartenberg methodology. The kinematic equations are formulated and are used in the computer simulated calibration to determine the actual kinematic parameters of the manipulator. The results are discussed in terms of the effect of measurement noise and the number of experimental observations on the accuracy of parameter identification.

SHIP ROLL MODE INFORMATION EXTRACTED FROM SEA TRIAL DATA

Mickie Kevin Wiser-Lieutenant, United States Navy
B.S., The Citadel
Master of Science in Mechanical Engineering-September 1991
Advisor: Louis V. Schmidt-Department of Aeronautics and Astronautics

Random Decrement (RANDEC) Analysis was applied to time histories of roll motion for the Spruance class destroyer. The data was generated from sea trials conducted on a ship in 1987. The RANDEC process was applied to obtain estimates of roll-resonance modal damping and frequencies due to ship motion excitation by random-natured hydrodynamic forces and moments. Prior to applying the RANDEC technique to ship data, a numerical algorithm was developed and validated using reference data sets with known dynamic traits approaching that expected of the ship.

MASTER OF SCIENCE
IN
METEOROLOGY

PRECIPITATION ANALYSES USING SSM/I MEASUREMENTS FOR SELECTED ERICA CYCLONES

Bayani J. Almario Jr.-Captain, United States Air Force
B.S., San Jose State University, 1982
Master of Science in Meteorology-June 1991
Advisor: Carlyle H. Wash-Department of Meteorology

A recently developed SSM/I exponential rain algorithm is evaluated using passive microwave data from ERICA IOPs 2, 3, 4, and 5. Resulting SSM/I rain analyses were first compared with aircraft radar and coastal radar data. SSM/I rain analyses in IOPs 2, 3, and 4 were then used with GOES enhanced IR imagery to determine ERICA cyclones' synoptic rain structure. The SSM/I rain analysis in IOP 5 agreed well with the aircraft radar and coastal radar observations. Maximum SSM/I rain rate areas coincided with the radar intensity observations, but SSM/I rain rates were somewhat less than inferred by the radar. SSM/I rain rate analyses clearly delineate the liquid precipitation patterns within the IOP 2, 3, and 4 cyclones. The SSM/I rain rate data shows promise to significantly improve analysis of precipitation over the ocean, where conventional data is notably sparse.

MULTISPECTRAL ANALYSIS OF NIGHTTIME LOW CLOUDS OVER THE OCEAN

James D. Dykes-Captain, United States Air Force
B.A., California State University, Sacramento, 1985
Master of Science in Meteorology-March 1991
Advisor: Carlyle H. Wash-Department of Meteorology

Multispectral imagery is used for the analysis of nighttime low clouds whose cloud top temperatures are similar to that of the ocean surface. At night AVHRR channel 3 (3.7mm) and channel 4 (10.8mm) brightness temperature differences distinguish the presence of low stratus and fog from the ocean surface improving upon the channel 4 analysis alone. However, the effect of moisture attenuation in channel 4 offsets this temperature difference and impact thresholds which determine low cloud extent. Radiative transfer simulations using different moisture profiles helped to determine threshold adjustment. This thesis uses one of two sets of thresholds depending on moisture extent in an enhancement scheme to discriminate clear areas, and scattered, broken and overcast clouds on different summertime imagery cases over the ocean. Two cases are illustrated thoroughly and the technique was also applied to eight other cases. Results agreed for the most part with surface observations and visible GOES from the previous day. The multi-channel technique improved most or all deficiencies of the single channel analysis in all the cases except one where only some deficiencies of the single channel analysis in all the cases except one where only some deficiencies were improved. The color enhancement provides a clear, qualitative picture of nighttime low cloud.

MESOSCALE VERTICAL STRUCTURE OF AN EXPLOSIVE OCEANIC CYCLONE

Elizabeth B. Gardner-Captain, United States Air Force
B.S., Florida State University, Tallahassee, 1985
Master of Science in Meteorology-June 1991
Advisor: Wendell A. Nuss-Department of Meteorology

The mesoscale vertical structure of an explosively deepening oceanic cyclone on 19-20 January 1989 during the Experiment on Rapidly Intensifying Cyclones over the Atlantic (ERICA) was studied. Hand analyses of height, temperature, and dewpoint, and cross-sections of Θ and Θ_e were prepared using aircraft and sounding data through the warm-frontal region in order to document the vertical structure. The results showed that the initial disturbance formed under a region of strong upper-level confluence between a southern jet streak and an approaching upper-level short-wave from the north-west. Upper-level frontogenesis associated with the confluent flow was strong enough to produce tropopause folding and stratospheric extrusion as low as 700 mb about 750 km upstream from the surface low prior to rapid deepening. The mesoscale analyses during the initial occlusion phase showed the upper-level temperature and moisture patterns spiraling around the low center with strong warm air advection occurring under a pocket of cold air aloft, producing significant convective instability. The cross-sections of Θ_e throughout the rapid deepening period showed unstable conditions, which suggests that moist potential instability in the warm frontal region was a factor in the rapid development of this storm.

A PROTOTYPE CLIMATE INFORMATION SYSTEM

Terry K. Jarrett-Department of the Navy
B.S., San Jose State University, 1978
Master of Science in Meteorology-June 1991
Advisor: Carlyle H. Wash-Department of Meteorology

A prototype Climate Information System (CIS) is developed to manage and display climatic data as part of the Navy's Tactical Environmental Support System (TESS). The CIS reduces the time and effort required to locate, ingest, and analyze climatic data. The CIS remedies accessibility problems of existing climatologies by using a Data Base Management System (DBMS) to manage on-line data sets. The CIS computer graphics improve data comprehensibility by remapping data to common projections. The CIS design rationale and implementation methodology are documented. The climatic data requirements for TESS are defined. The CIS capabilities are demonstrated with sample data sets which meet some of these requirements. The CIS design allows additional data sets to be added as needed.

MASTER OF SCIENCE
IN
METEOROLOGY
AND
PHYSICAL OCEANOGRAPHY

MESOSCALE VARIABILITY OF THE CARIBBEAN SEA FROM GEOSAT

Carlos Alberto Andrade-Lieutenant Commander, Colombian Navy
B.S., Colombian Naval Academy, 1985
Master of Science in Meteorology and Physical Oceanography-March 1991
Advisors: Jeffrey A. Nystuen & Carlyle Wash-Department of Meteorology

Two years of GEOSAT Exact Repeat Mission (ERM) altimetry and wind speed measurements in the Caribbean Sea are used to determine the sea surface height mesoscale variability and to characterize the wind speed field during 1987-88. The alongtrack sea surface anomalies are determined using alongtrack derivatives for the estimation of the mean sea surface height and a least square fit is used to remove the orbital error. Biased points near land were removed and high frequency noise was filtered by using a 70 km spatial running mean. Contours of sea surface height anomalies made by every ERM period detected the formation and evolution of two anticyclonic eddies formed during the "non-windy" tropical season, one each year, with a height signature that reached + 30 cm. No eddies related to the Caribbean Current were apparent during the other seasons. A quasi-permanent cyclonic eddy was detected near the San Andres Archipelago, confirming model predictions. Seasonal wind speed derived from GEOSAT data agrees with previous studies in the area. The relaxation of the wind after the windy season and the strong meridional wind gradient in the center of the Caribbean coincide with the formation of the anticyclones. This suggests that the wind field influences eddy formation. Anomalies in the averaged wind field were produced by strong synoptic events (hurricanes) which are biased due to the 17 day sampling character of the GEOSAT data.

A NUMERICAL STUDY OF THE EFFECTS OF WIND FORCING ON THE CHILEAN CURRENT SYSTEM

Jeffrey L. Bacon-Lieutenant Commander, United States Navy
B.A., University of New Mexico, 1979
Master of Science in Meteorology and Physical Oceanography-March 1991
Advisor: Mary L. Batteen-Department of Oceanography

A high-resolution, multi-level, primitive equation ocean model is used to examine the response of an idealized, flat-bottomed, eastern boundary oceanic regime of a beta-plane to both steady and daily-varying climatological wind forcing. The area of study is a coastal region within the Chile Current Systems from 22°S to 24°S. When steady wind forcing is used, an equatorward surface current and poleward flowing undercurrent develop. Eddies are also generated, with initial formation in the poleward end of the domain. When daily-varying wind forcing is used, there is large spatial variability in the oceanic response. A relatively weak poleward flowing undercurrent appears, first in the poleward part of the domain. An equatorward surface current also develops and intensifies during the upwelling season. Eddies are generated and develop farther poleward in the domain than in the first experiment. The eddies are largest in the equatorward end of the domain. The eddy motion is closely tied to seasonal influences, with cyclonic (divergent) eddies traversing towards areas of higher dynamic heights when there are divergent wind fields present, and vice versa. In addition to the currents and eddies, upwelling and cold filaments are evident in both experiments.

THE EFFECT OF LATENT HEAT RELEASE ON THE ERICA IOP-5 CYCLONE

Frank W. Baker-Lieutenant, United States Navy
B.A., Pennsylvania State University, 1983
Master of Science in Meteorology and Physical Oceanography-September 1991
Advisor: Patricia M. Pauley-Department of Meteorology

The effect of latent heat release on the development of a rapidly deepening extratropical cyclone that occurred during Intensive Observation Period (IOP)5 (18-20 January 1989) of the Experiment on Rapidly Deepening Cyclones over the Atlantic (ERICA) is examined using a diagnostic height tendency equation. Data consist of Nested Grid Model (NGM) forecasts executed with and without latent heating feedback. With holding latent heat release significantly decreased the intensity of not only the surface cyclone, but its associated 500 mb trough/ridge system as well. Propagation speed differed only slightly between the two forecasts, allowing the differences in intensification to be explored through height tendency differences between the two forecasts. Model results show that at 500 mb, latent heat release affects the height tendencies primarily through indirect means, chiefly by enhancing vorticity advection. Differential thermal advection and vertical advection of static stability tended to offset each other, as did vertical advection of vorticity and tilting effects. A height anomaly due to latent heat release was located downstream of the 500 mb trough and served as a focus for forcing differences associated with latent heating.

SEASONAL WIND AND OCEAN THERMAL FORCING INFLUENCES ON THE GENERATION OF THE LEEUWIN CURRENT AND ITS EDDIES

Eric Judson Bayler-Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1980
Master of Science in Meteorology and Physical Oceanography-September 1991
Advisor: Mary L. Batteen-Department of Oceanography

A high-resolution, multi-level, primitive equation ocean model is used to examine the response of an idealized, flat-bottomed, eastern boundary oceanic regime on a beta-plane to constant ocean thermal and wind forcing by annual mean and seasonal mean climatologies. The focus of the study is the Leeuwin Current along the coastal region, from 20° S to 35° S, off Western Australia. The annual mean ocean thermal forcing is sufficient to produce a poleward surface coastal current and an equatorward undercurrent. Seasonal variation of the ocean thermal forcing provides little enhancement to the current structure, although the seasonal variation does enhance eddy generation during the periods of stronger thermal gradient. Wind forcing by annual mean climatology significantly inhibits the poleward coastal flow, but does not eliminate it. Seasonal wind forcing generates a strong seasonal signal in the poleward coastal flow, but never dominates over the pressure gradient forcing. The combination of wind and thermal cycles allows the formation of the North West Shelf waters and, subsequently, triggers the release of poleward flowing North West Shelf waters. This additional forcing produces a strong surge in poleward flow during the austral autumn. A nonlinear feedback mechanism acts to extend the duration of this flow through the austral winter.

SIMULATION OF ATMOSPHERIC FRONTOGENESIS WITH A SEMI-LAGRANGIAN NUMERICAL MODEL

Ricardo Carvalho de Almeida-Lieutenant Commander, Brazilian Navy
B.S., Brazilian Naval Academy, 1979
Master of Science in Meteorology and Physical Oceanography-September 1991
Advisor: Roger T. Williams-Department of Meteorology

Is this study a numerical model based on the hydrostatic Boussinesq equations is used to simulate atmospheric frontogenesis driven by an irrotational non-divergent deformation wind field. The equations are numerically integrated by using the semi-Lagrangian technique associated with two different time schemes: explicit and semi-implicit. Both schemes produce realistic fronts after approximately 40 hours of model integration. The semi-Lagrangian semi-implicit scheme is more successful in handling the sharp gradients associated with the front. Also, the semi-Lagrangian semi-implicit equations are integrated with time steps as long as 3600 sec. producing solutions with relatively small errors. This indicates that this numerical scheme is appropriate for use in mesoscale regional models.

AN EVALUATION OF THE NAVAL OCEANIC VERTICAL AEROSOL MODEL DURING KEY90

Thomas H. Cecere-Lieutenant, United States Navy
B.S., State University of New York at Stony Brook, 1982
Master of Science in Meteorology and Physical Oceanography-June 1991
Advisor: Kenneth L. Davidson-Department of Meteorology

An experiment was conducted in the Florida Keys from 2-19 July 1990 to test the performance of the Naval Oceanic Vertical Aerosol Model (NOVAM) in a weak-convective regime. Meteorological data collected by aircraft and boat was used to generate the surface and vertical profile information files required by NOVAM. Using this information, NOVAM predicts the aerosol extinction (km^{-1}) for a vertical cross-section of the atmosphere. Aircraft-observed aerosol extinction profiles were also obtained. Comparisons between observed and NOVAM aerosol extinction profiles revealed major deviations above the cloud top. From the surface to the top of the cloud layer, NOVAM generally did an excellent job in predicting profile shape, with the magnitude of aerosol extinction tied to the extinction matched at the surface. In a few cases, observed extinction increased more rapidly than NOVAM predicted extinction from the surface to the base of the cloud layer. This is attributed to rain scavenging associated with thunderstorm activity in the area. Comparison between different aerosol extinction profiles revealed much spatial and temporal variation that was verified by Lidar profiles of atmospheric structure. Thunderstorm activity, multiple cloud-layers, and the spatial variation in the atmospheric structure have led to a hypothesis that deep-convection was responsible for the major differences between observed and predicted aerosol extinction profiles. If this is the case, a simple modification to the weak-convective model may be made to apply to a deep-convection model.

SATELLITE IMAGE DISPLAY AND PROCESSING WITH MICROCOMPUTERS: A PROOF-OF-CONCEPT FOR THE NAVY OCEANOGRAPHIC DATA DISTRIBUTION SYSTEM (NODDS)

Don T. Conlee-Lieutenant, United States Navy
B.S., Northeast Louisiana University, 1983
Master of Science in Meteorology and Physical Oceanography-June 1991
Advisor: Carlyle H. Wash-Department of Meteorology

The capabilities of small, primarily single-user computers have increased to the point where serious attention to the use of these systems as image display and processing stations is warranted. The addition of satellite display and processing to the existing Navy Oceanographic Data Distribution Systems (NODDS) can represent significant enhancement to the forecasting mission of Naval Oceanography Command Detachments and Facilities. This thesis outlines and demonstrates an approach to adding image functions to NODDS. Software has been written to display Defense Meteorological Satellite Program (DMSP) visual and infrared images within the NODDS software environment. Routines have also been developed to provide enhancement of the imagery. The requirements for communicating the imagery are addressed and supported by the testing of image transfer times. Finally, plans for system improvement and operational implementation are discussed.

INTEGRATED MICROWAVE AND INFRARED PRECIPITATION ANALYSES

Lisa E. Frailey-Lieutenant, United States Navy
B.S., Pennsylvania State University, 1982
Master of Science in Meteorology and Physical Oceanography-September 1991
Advisor: Carlyle H. Wash-Department of Meteorology

GOES infrared (IR) data is intercompared with rain analyses from the SSM/I exponential rain algorithm for the purpose of determining thresholds and statistics from IR imagery which delineate oceanic rain area. Data from ERICA cyclogenesis cases were evaluated. Discriminant analysis was performed using IR mean cloud top temperature, standard deviation and kurtosis as discriminating variables. Resulting functions separated rain from no-rain areas with average Probability of Detection (POD) and Percentage Error (ERR) scores of 0.68 and 0.30 for development data (0.62 and 0.37 for validation data). The scheme demonstrated little skill in discriminating rain categories beyond rain/no-rain. An IR threshold scheme was used to delineate rain/no-rain areas by optimizing a set of evaluation statistics. Optimal thresholds attained a predetermined POD level of 0.60 while minimizing percent misclassification error and SSM/I - IR rain area difference. The scheme yielded average POD and ERR scores of 0.64 and 0.38 with IR thresholds from 229 to 232 K. Results for both the discriminant analysis and optimal threshold schemes compare favorably with previous studies. The use of the SSM/I rain analyses with geostationary imagery allow reliable, frequent, large scale analysis of oceanic precipitation.

MESOSCALE SURFACE ANALYSIS OF THE ERICA IOP-5 CYCLONE

Susan N. Greer-Lieutenant, United States Navy
B.S., University of Miami, 1981
Master of Science in Meteorology and Physical Oceanography-June 1991
Advisor: Wendell A. Nuss-Department of Meteorology

The mesoscale surface structure of an explosively deepening storm that developed during Intensive Observation Period (IOP) 5 (18-20 January 1989) of the Experiment on Rapidly Deepening Cyclones over the Atlantic (ERICA) was examined to determine the influence of surface forcing on explosive cyclogenesis. Aircraft, buoy and ship observations were converted to a 20 km gridded data set in order to generate objective analyses of the surface pressure and temperature fields comparable to the best hand analyses. The Brown-Liu boundary layer model was then used to calculate surface sensible heat fluxes from the gridded data sets. These analyses showed that the most significant feature that distinguished the IOP-5 storm from a typical nonexplosive storm was the region of sustained positive heat fluxes that occurred east of the low center. This feature, combined with substantial warm advection and conditions of moist symmetric neutrality in the baroclinic zone of the warm front, supports destabilization of the boundary layer and enhanced low-level baroclinicity. Thus, the positive heat fluxes fuel the convective transport of heat and moisture to the upper atmosphere and enhance the sensible and condensation heating that contribute to explosive cylcogenesis.

TROPICAL CYCLONE MOTION DUE TO ENVIRONMENTAL INTERACTIONS REPRESENTED BY EMPIRICAL ORTHOGONAL FUNCTIONS OF THE VORTICITY FIELDS

Mark J. Gunzelman-Lieutenant, United States Navy
B.S., Florida State University, 1979
Master of Science in Meteorology and Oceanography-June 1991
Advisor: Russell L. Elsberry-Department of Meteorology

Tropical cyclone motion influenced by adjacent synoptic features is examined with relative vorticity fields at 700, 400 and 250 mb computed from operationally-analyzed wind fields. When an empirical orthogonal function (EOF) method is used to map the vorticity onto the spatial grids, a smoother but more dependable depiction of the vorticity dynamics is provided than by the original fields. The effect of five processes that contribute to motion relative to the steering flow during periods of interaction with adjacent circulations are evaluated for their contributions to binary rotation and to changing the separation distance between the interacting circulations. This vorticity dynamics approach indicates tropical cyclones interact with various features at different levels. The Fujiwhara effect is most evident with stronger interaction events. Only the convergence effect of one tropical cyclone circulation on another tropical cyclone can explain the cases with decreasing separations. By contrast, the advection by the tropical cyclone circulation of the vorticity gradient of the other cyclone could not explain the decreasing separations. The Beta effect depends on the orientation of two interacting systems of different sizes, but the environmental vorticity gradient is not just due to earth vorticity in these interacting cases. The effects of environmental shear strongly depend on the orientation of the ITCZ and the geographical orientation of the two cyclones.

METEROLOGICAL FEATURES DURING PHASE I OF THE COORDINATED EASTERN ARCTIC EXPERIMENT (CEAREX) FOR 17 SEPTEMBER 1988 TO 7 JANUARY 1989

Stephanie W. Hamilton-Lieutenant, United States Navy
B.S., Old Dominion University, 1980
Master of Science in Meteorology and Physical Oceanography-March 1991
Advisors: Kenneth L. Davidson & Carlyle H. Wash-Department of Meteorology

The synoptic and mesoscale meterological conditions were analyzed for Phase I of the Coordinated Eastern Arctic Experiment (CAREX) for 17 September 1988 to 7 January 1989. Meteorological observations from a research ship (R/V Polarbjoern), an array of drifting buoys and satellite imagery from DMSP and NOAA satellites were the primary tools for analysis. Several short periods of high cyclone activity followed by long periods of high pressure dominated the weather pattern in the eastern Arctic Ocean from Greenland to Novaya Zemlya for this period. Two case studies are presented. An infrequent cyclogenesis event that formed within a strong baroclinic zone over Arctic pack ice was observed in a "baroclinic leaf" on satellite imagery. Ship and drifting buoy observations provided critical insight to the location and intensity of the "leaf's" subsequent vertical development to the surface. In the second study, a boundary layer front was observed in the East Greenland Sea by satellite imagery. The front then moved northeast into Fram Strait and a polar low formed at the northern end of the front. The event lasted less than 24 h and would not have been observed except through satellite imagery.

ACOUSTIC TOMOGRAPHY IN THE GREENLAND SEA

John E. Joseph-Lieutenant, United States Navy
M.S., Radford University, 1979
B.A., Virginia Polytechnic Institute and State University, 1976
Master of Science in Physical Oceanography and Meteorology-June 1991
Advisors: Ching-Sang Chiu & Jeffrey A. Nystuen-Department of Oceanography

As part of the international Greenland Sea Project, Woods Hole Oceanographic Institute and Scripps Institution of Oceanography deployed a six transceiver ocean acoustic tomography array to monitor ocean ventilation and circulation over the 1988-89 winter cooling season. A stochastic inverse method computer code which attains a solution by minimizing mean square error is used to perform inversions of the Greenland Sea tomography data. A computer simulated ocean is used to evaluate various aspects of system performance. We first consider the advantages and problems associated with using a ray theory based algorithm to establish the forward problem for the Greenland Sea tomography array. Next, we made two adjustments to our inversion code and discuss the effects on system performance. The first adjustment allows for layers of different thicknesses in the inverse solution to increase the density of estimates in regions of interest. The second adjustment allows the estimator to expect variability of the unknown field to decrease exponentially with depth. Our results show the ray theory based algorithm is an adequate method of modeling ray paths in the Greenland Sea, but has limitations. Reliability of ray paths degrades as launch angles become shallower and if strong gradients and rapidly changing gradients in sound speed are present in the vicinity of the transceiver elements. We also find varying the thickness of layers in the solution allows us to examine the more variable upper ocean in greater detail without increasing computational effort. However, this adjustment alone has the undesirable side effect of shifting system resolution towards the lower ocean. This shift in resolution is offset by informing the estimator about the vertical variability distribution of the unknown field. This *a priori* knowledge is parameterized by the covariance function of the unknown field. Uncertainty in knowing the true variability distribution affects model performance. The inverse solution is more sensitive to underestimating than overestimating the true value of folding depth. The model is also more sensitive to both underestimation and overestimation at small true folding depths. A set of Greenland Sea data between one transceiver pair was processed by Woods Hole Oceanographic Institute. Although only three groups of eigenrays are involved, initial inversion results indicate the estimator detects seasonal changes and synoptic scale events occurring at time scales greater than 20 days, however, solutions show wide fluctuations at time scales shorter than 20 days.

CHARACTERISTICS OF UPPER-LEVEL AND BOUNDARY LAYER FORCING IN WESTERN PACIFIC CYCLONES

Adam A. Kippes-Lieutenant Commander, United States Navy
B.S., University of Minnesota
Master of Science in Meteorology and Physical Oceanography-September 1991
Advisor: Wendall A. Nuss-Department of Meteorology

A study of the characteristics of upper-level and boundary layer forcing in Western Pacific cyclones is conducted. Data for this study consists of twenty-seven cyclones identified during the months of February and March 1986 and 1987. The cyclones were stratified into three separate classes of weak, moderate and intense cyclones based on observed deepening rates. Each class of cyclone was examined to determine general characteristics of the upper-level and boundary layer forcing. A representative cyclone from each class was chosen and a detailed examination of the upper-level and boundary layer forcing was conducted. Results indicate that during rapid deepening coupling between the upper-level forcing and forcing in the boundary layer occurred only in the moderate and intense cases and was the result of strong baroclinic forcing aloft in these cyclones.

WATER VAPOR INFLUENCE ON SATELLITE-MEASURED AEROSOL CHARACTERISTICS

Timothy Patrick Mahony-Lieutenant, United States Navy
B.S., United States Naval Academy, 1983
Master of Science in Meteorology and Physical Oceanography-March 1991
Advisor: Philip A. Durkee-Department of Meteorology

This study demonstrates the significance of water vapor's influence on satellite-retrieved aerosol characteristics using NOAA's AVHRR. An improvement to optical depth and Aerosol Particle Size Index (S^{12}) estimations derived from channels 1 (0.63 μm) and 2 (0.86 μm) is made through knowledge of column water vapor derived from channels 4 (10.8 μm) and 5 (12.0 μm). A 2.0 gm cm^{-2} column water vapor produces a 5% increase in S_{12}. This results in a 15% error in the variable scattering phase function $P(\Theta)$ and retrieved aerosol optical depth (δa). The error introduced by water vapor is quantified through use of the LOWTRAN7 atmospheric propagation model to be applied as a reformulated parameterization of ($P\Theta$).

A DIAGNOSTIC STUDY OF THE VOLOCITY STRUCTURE OF A MEANDERING JET IN THE CALIFORNIA CURRENT SYSTEM USING A PRIMITIVE EQUATION MODEL

James R. Mallette, Jr.-Lieutenant, United States Navy
B.S., University of Florida, 1978
Master of Science in Meteorology and Physical Oceanography-June 1991
Advisor: Robert L. Haney-Department of Meteorology

A high resolution 20-level, primitive equation model is initialized using sigma-Θ (σ_Θ) data acquired during a Coastal Transition Zone (CTZ) cruise from 6 to 12 July 1988 near Point Arena, California for the purpose of diagnosing the three-dimensional dynamically balanced flow field for the region. The major feature in the region during the cruise period was a strong meandering jet which flowed equatorward and offshore, oriented in a northeast to southwest direction. A density diagnostic version of the model, in which the σ_Θ is held constant during the 72 hour integration time, is compared with a robust diagnostic version of the model, in which the σ_Θ field is allowed to adjust dynamically within the constraints of a damping time scale. The density diagnostic version of the model produces vertical velocities which are an order of magnitude larger than vertical velocities calculated from bio-optical data collected in the same location and at the same time as the CTZ cruise. The robust diagnostic version produced vertical velocities within the range of vertical velocities calculated from the bio-optical data. The horizontal pattern of vertical velocity from the robust diagnostic version also compared well with patterns seen in trough/ridge systems in the Gulf Stream. In particular, there is horizontal convergence and downwelling all along the offshore directed part of the meandering jet. Vertical cross-section comparisons between model velocity data and ADCP velocity data collected during the cruise revealed differences which may be caused by factors neglected by the model (e.g. bottom topography, wind forcing, and heat fluxes).

AMBIENT SOUND IN THE OCEAN INDUCED BY HEAVY PRECIPITATION AND THE SUBSEQUENT PREDICTABILITY OF RAINFALL RATE

Charles C. McGlothin, Jr.-Lieutenant, United States Navy
B.S., Mississippi State University, 1982
Master of Science in Physical Oceanography and Meteorology-June 1991
Advisor: Jeffrey A. Nystuen-Department of Oceanography

An experiment by the Naval Postgraduate School and the National Data Buoy Center was performed in the Gulf of Mexico to characterize the underwater sound generated by heavy precipitation and to determine if rainfall rates of heavy precipitation can be measured using underwater sound. During this stage of the experiment, twenty-two data sets were recorded with rainfall rates up to 340 mm/hr. For a given rainfall rate, it is found that sound levels from heavy convective precipitation are higher at the beginning of the storm and when the rainfall rate is increasing than at the end of the storm event or when the rainfall rates are decreasing. This may be due to changes in the drop size distribution during the life cycle of the storm or to variations in the temperature difference between the raindrop and the ocean surface. Very heavy rainfall (rate>150 mm/hr) generates near surface bubble layers or bubble clouds which attenuate sound energy at higher frequencies (>15 kHz). The distinctive 15 kHz peak in the sound spectrum for light rain is absent during heavy rain suggesting that the sound production mechanism previously identified for small drops (0.8-1.1 mm in diameter) is suppressed by heavy rain even though those small drops are undoubtedly present during heavy rainfall rates. These data show a very high correlation between underwater sound level and the logarithm of the rainfall rate except when high wind speeds (>10 m/s) and high rainfall rates (> 150 mm/hr are present. An empirical rainfall rate algorithm for convective precipitation is proposed suggesting that sound energy is directly proportional to rainfall rate, however any empirical algorithm which does not adjust for changing storm characteristics should be used with caution.

DETERMINATION OF NEAR-SURFACE VELOCITY FIELDS IN THE CTZ USING COMBINED ALTIMETRIC AND INVERSE MODELLING TECHNIQUES

Douglas Michael Taggart-Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1979
Master of Science in Meteorology and Physical Oceanography-March 1991
Advisors: Steven R. Ramp & Newell Garfield-Department of Oceanography

An inverse model involving AVHRR imagery and the heat equation with dynamical constraints on the divergence, kinetic energy and vorticity of the solutions was used by Kelly (1989) to produce velocity fields that were in good agreement with Acoustic Doppler Current Profiler (ADCP) data. Dynamic heights derived from GEOSAT radar altimeter data have also been used to determine near-surface geostrophic currents. Synthetic GEOSAT-derived velocity data was generated from ADCP data collected as part of the Coastal Transition Zone (CTZ) Field Program. The inverse model was run with AVHRR imagery that was coincident to the CTZ Field Program ADCP data and the synthetic velocity data was added as an additional constraint on the model's solution. The resulting velocity solutions were much improved over those given by the inverse model alone. Refinement of this method involving a combination of different data sources should improve efforts to determine near-surface velocities of the ocean entirely by remote means.

A DIAGNOSTIC STUDY OF RAPIDLY DEVELOPING CYCLONES USING SURFACE-BASED Q VECTORS

David W. Titley-Lieutenant Commander, United States Navy
B.S., The Pennsylvania States University, 1980
Master of Science in Meteorology and Physical Oceanography-June 1991
Advisor: Wendell A. Nuss-Department of Meteorology

Accurate short-term (0-6h) forecasts of rapid cyclogenesis are important to both civilian and military maritime interests. Because upper-air observations over the ocean are sparse, the relatively plentiful surface synoptic data must be used for diagnostic analysis, Surface pressure and temperature data for two Intensive Observation Periods (IOPs) that occurred during the Experiment on Rapidly Intensifying Cyclones over the Atlantic (ERICA) are objectively analyzed and Q vectors--a measure of the low-level ageostrophic flow required to restore geostrophic balance--are calculated. Areas of Q vector convergence, which imply upward vertical motion, were compared to satellite imagery and to the future 3-h and 6-h pressure tendencies. When the storms were intensifying most rapidly, satellite imagery showed cold-topped stratiform clouds over areas of Q vector convergence. Areas of strong Q vector convergence (divergence) showed significant (95% confidence level) pressure falls (rises) 3 h and 6 h in the future. Surface Q vectors are shown to have qualitative value in short-range forecasts of the location of the storm, but do not forecast storm intensity. The surface Q vector interpretations are less useful near landmasses, as the surface temperature field becomes less representative of the mean tropospheric temperature.

OPTICAL EFFECTS ON OCEAN MIXED LAYER DYNAMICS

Jonathan W. White-Lieutenant, United States Navy
B.S., Florida Institute of Technology, 1981
Master of Science in Meteorology and Physical Oceanography-June 1991
Advisor: Roland W. Garwood-Department of Oceanography

Improvements to the specification of ocean optical characteristics in mixed layer dynamics are explored. The effects of reflection (albedo), refraction and attenuation of solar radiation on mixed layer dynamics are examined. Parameterization schemes are developed to characterize the attenuation of individual spectral components of total solar radiation and the refraction of direct solar radiation. The effect of these parameterization schemes on mixed layer processes is evaluated analytically and numerically. A one-dimensional mixed layer model is used to examine the sensitivity of predicted mixed layer thermal structure to individual parameterizations. The thermal structure differences that result over long and short periods using the different parameterizations shows that the accuracy of mixed layer predictions is significantly affected by the method used to describe the penetration of solar radiation into the ocean.

MASTER OF ARTS/SCIENCE
IN
NATIONAL SECURITY AFFAIRS

RESPONDING TO THE THREAT FROM THIRD WORLD AIR DEFENSE SYSTEMS: A COMPARISON OF U.S. POLICY OPTIONS

Glen Charles Ackermann-Lieutenant, United States Navy
B.S., Old Dominion University, 1982
Master of Arts in National Security Affairs-December, 1990
Advisor: Edward J. Laurance-Department of National Security Affairs

This thesis examines the proliferation of advanced air defense weapons in certain Third World regions and the implications these transfers may have on United States Naval forces operating in and around these waters. It assesses the extent of proliferation, and examines the capability of selected nations in regions where the U.S Navy operates on a regular basis. It also examines motives and trends behind the import and export of air defense weapons and the implications proliferation will have on the four naval missions, sea control, strategic sealift, power projection, and strategic deterrence. Three options are put forth that address possible "adjustments" of U.S. policy to counter the effect of air defense weapons proliferation. The options considered are, the military response, controlling the threat through arms control, and changing the national interest. Finally, the question--is the U.S. willing to overcome the problems created by air defense weapons proliferation in the Third World?--is addressed.

POTENTIAL THREATS TO SPANISH SECURITY: IMPLICATIONS FOR THE UNITED STATES AND NATO

Tamara Kaye Adams-Captain, United States Air Force
B.A., Brigham Young University, 1982
Master of Arts in National Security Affairs-December 1990
Advisor: Frank M. Teti-Department of National Security Affairs

Thirteen years ago, Spain held its first democratic elections since 1936. Prior to those elections, held in June 1977, Spain spent almost forty years under the dictatorship of Generalissimo Francisco Franco, who established an authoritarian regime in Spain following the Spanish Civil War (1936-1939). Upon Franco's death in November 1975, Prince Juan Carlos de Borbon was crowned as King of Spain in accordance with Franco's 1957 announcement that the monarchy (abolished in 1931) would be restored after his death. Amidst problems ranging from inflation and unemployment to internal friction and, often, opposition from rightist elements, King Juan Carlos eased the Spanish nationstate through the transition into a democracy and, undaunted by an attempted coup by military rightists in 1981, supported what might then have been considered a fragile democracy. Now, nine years later, the entire region of Eastern Europe is in a state of transition, not totally unlike the transition Spain undertook over a decade ago. Thus, it seems particularly appropriate to examine the Spanish experience. The purpose of this study is to examine the security aspects of that experience. As such, it will address both internal security issues such as separatist movements, especially the Basque terrorist organization (ETA), and external security issues such as those posed by Gibraltar, Ceuta, Melilla, and, in spite of the tendency to dismiss it as irrelevant to Spanish security, the Soviet Union. In addition, as the title suggests, this study will address how Spain's security posture can be expected to affect the United States and NATO, particularly as Spain finds a place within the context of a rapidly changing New Europe.

OPPORTUNITY IN DANGER: MANSTEIN'S EAST FRONT STRATEGY FROM 19 NOV 1942 TO 18 MAR 1943

Steven B. Bolstad-Lieutenant, United States Navy
B.S., George Mason University, 1982
Master of Science in National Security Affairs-June 1991
Advisor: Russel H.S. Stolfi-Department of National Security Affairs

In the 1990s the United States Armed Forces will be asked by its leaders to do more with less. This represents a significant turn from the policies of the last decade. During World War Two the German Army operated effectively under similar policy constraints. There are many lessons in strategic planning that can be learned from Field Marshal Erich von Manstein's operations during the Winter of 1942-43. He was able to grasp tremendous opportunity amid extreme strategic danger. He decisively changed the strategic situation on the Eastern Front over a four month period. This thesis addresses the following questions. What factors enabled him to operate so effectively? What hindered him? What decisions did he make, when and why? How might leaders today make similar decisions under similar circumstances and be as successful? The answers to these questions will be of great value to the United States Armed Forces as they restructure themselves for the 1990s.

NAVAL ARMS CONTROL: A POST-COLD WAR REAPPRAISAL

Paul Curtis Brown-Lieutenant, United States Navy
B.S., United States Naval Academy, 1985
Master of Arts in National Security Affairs-June 1991
Advisor: James J. Tritten-Department of National Security Affairs

Examines the field of naval arms control in the post-Cold War world. Author postulates that fundamental changes in the geo-strategic environment require the development of new criteria to evaluate alternative security policies for the future. Introduces a cognitive flow chart for post-Cold War security decision making which depicts naval arms control as a FIFTH ORDER question, which awaits consensus answers for higher order political decisions. A "snapshot" of U.S. participation in naval arms control is presented which highlights the fact that the U.S. Navy does not receive enough credit for the vast amount of naval arms control already underway. Recommends that future naval arms control not be undertaken by negotiated treaty. Evaluates naval arms control alternatives based upon their potential applicability of President Bush's new national security strategy and likely congressional tests for the strategy. Concludes that a unique opportunity now exists to synthesize international naval arms control policy with the critical domestic priorities of the American agenda. RECOMMENDS A NEW REGIME OF NAVAL CSBMs BE ADOPTED NOW (CONSISTING OF JUNIOR OFFICER EXCHANGES AND INCREASED NAVAL PARTICIPATION IN ENVIRONMENTAL PROTECTION AND HUMANITARIAN RELIEF EFFORTS). Postulates that this arms control philosophy will best serve the American public and will also enhance the Navy's political capital for future resource allocation decisions.

NARCOTICS & NATIONAL SECURITY: REFINING THE MILITARY OPTION

Thomas J. Chassee-Lieutenant, United States Navy
B.A., Michigan State University, 1982
Master of Arts in National Security Affairs-December 1990
and
Michael M. Cobb-Lieutenant, United States Navy
B.S., Vanderbilt University, 1984
Master of Arts in National Security Affairs-December 1990
Advisor: David Winterford-Department of National Security Affairs

A comprehensive study of the "Drug War" with particular emphasis on the increased role of the U.S. Military. Application of military force should be based on an understanding of the political, social and economic impact of Andean narcotrafficking. This thesis addresses these issues, evaluates current anti-narcotic strategies, and defines the most prudent use of military resources. Initially, the thesis highlights the Latin American drug and its impact on political instability, guerrilla, insurgencies, corruption and respective economies. Based on this foundation, the "supply" and "demand" strategies of the United States are presented and evaluated. Finally the thesis proposes limited usage of U.S. air and naval assets in support of law enforcement agencies, while minimizing exposure of in-country U.S. ground forces.

NARCOTICS & NATIONAL SECURITY: REFINING THE MILITARY OPTION

Michael M. Cobb-Lieutenant, United States Navy
B.S., Vanderbilt University, 1984
Master of Arts in National Security Affairs-December 1990
and
Thomas J. Chassee-Lieutenant, United States Navy
B.A., Michigan State University, 1982
Master of Arts in National Security Affairs-December 1990
Advisor: David Winterford-Department of National Security Affairs

A comprehensive study of the "Drug War" with particular emphasis on the increased role of the U.S. Military. Application of military force should be based on an understanding of the political, social and economic impact of Andean narcotrafficking. This thesis addresses these issues, evaluates current anti-narcotic strategies, and defines the most prudent use of military resources. Initially, the thesis highlights the Latin American drug and its impact on political instability, guerrilla, insurgencies, corruption and respective economies. Based on this foundation, the "supply" and "demand" strategies of the United States are presented and evaluated. Finally the thesis proposes limited usage of U.S. air and naval assets in support of law enforcement agencies, while minimizing exposure of in-country U.S. ground forces.

THE UNITED STATES AND BRAZIL: A NAVAL PARTNERSHIP FOR THE TWENTY-FIRST CENTURY?

Harold Henry Collins-Lieutenant Commander, United States Navy
B.S., North Carolina State University, 1979
Master of Arts in National Security Affairs-March 1991
Advisor: Scott D. Tollefson-Department of National Security Affairs

This thesis explores the prospects for a U.S./Brazilian Naval partnership for the twenty-first century. It examines the viability of existing multilateral agreements between the United States and Latin American countries for maritime defense of the South Atlantic. It argues that the existing agreements are outdated and ineffective, primarily due to a reduction in cold war threat. With a naval capability ranked among the highest in the third world, and historical naval ties to the United States from both World Wars, the Brazilian Navy offers the possibility to assume a greater role in western defense. As a possible means to cultivate this beneficial relationship, a shift in emphasis from the current posture of U.S./Latin American multilateral hemispheric defense, to a focused bilateral U.S./Brazilian Naval partnership is suggested. The thesis also suggests that national security threats to the hemisphere have changed to terrorism, narco-trafficking, the spread of high technology weapons, and the rise of ethnic tensions. These threats affect both the United States and Brazil, and could lead to closer cooperation in U.S./Brazilian Naval relations.

EVALUATING THE MILITARY POTENTIAL OF A DEVELOPING NATION'S SPACE PROGRAM: A CASE STUDY OF BRAZIL

Michael Joseph Collins-Lieutenant, United States Navy
B.S., United States Naval Academy, 1984
Master of Arts in National Security Affairs-September 1991
Advisor: Scott D. Tollefson-Department of National Security Affairs

This thesis examines how and why a developing nation may use its civilian space program to acquire ballistic missiles. Using a single case study of Brazil, this analysis looks for universal patterns in space program development and for how Third World nations use their civilian space programs for military purposes. This thesis analyzes the relationship between space and missile development, the Missile Technology control Regime, reasons for building missiles (political, economic, national security, geopolitical, need for technology), Brazilian civil-military relations, and various technologies and space systems. It identifies the critical technologies required for a successful space program; identifies the critical industries that are missing in Brazil and the technologies that it must import; highlights indicators of military intentions of a civilian space program; and evaluates how the generalizations developed throughout the thesis may be applied to other nations.

GORBACHEV, THE GENERALS, AND THE 'TURN TO THE RIGHT'

Michael J. Corrigan-Lieutenant, United States Navy
B.A., Middlebury College, 1983
Master of Arts in National Security Affairs-June 1991
Advisor: Mikhail Tsypkin-Department of National Security Affairs

This thesis attempts to gauge the effects, on Soviet-Western relations and East European stability, of the conservative turn taken by Soviet President Mikhail Gorbachev in late 1990, early 1991. The signs of this move include: the repression in the Baltics, foreign Minister Schevardnadze's resignation, the removal of other reformist leaders from Gorbachev's retinue, and the growth of military influence. While apparently being negative for prospects of continued good relations and stability, this conservative turn was taken as a result of internal political dynamics and not specifically as a reaction against the West or against East European developments. Gorbachev, the 'new thinkers', and the foreign policy conservatives are involved in a power struggle. The conservatives, the generals, have gained influence and are now in a position to slow down but not derail the 'new thinking' diplomacy. The 'Turn to the Right' signals an end to the dramatic breakthrough diplomacy of 1989 and 1990 but is not a harbinger of a return to old relations.

INDIA AND THE PERSIAN GULF CRISIS: FROM GLOBAL IDEALISM TO REGIONAL REALITIES

Tito Prem Dua-Lieutenant, United States Navy
B.S., United States Naval Academy, 1984
Master of Arts in National Security Affairs-June 1991
Advisor: Ralph H. Magnus-Department of National Security Affairs

India has for decades professed a desire to participate in the international system as a global power. However, India's surprisingly equivocal reaction to the 1990 Gulf Crisis and subsequent military conflict did not reflect these aspirations. This thesis examines Indian foreign policy focussing on (a) changing Indian regional concerns, (b) factors which have prevented India from achieving predominance in South Asia, and (c) India's reactions to the Gulf War. This analysis indicates an apparent shift in Indian priorities from global aspirations to regional and domestic issues. The thesis suggests a careful review of a seeming U.S. "tilt" towards India--despite what appears to be a change in India's policies towards improving relations in South Asia and deteriorating U.S.-Pakistan relations--given India's past willingness to exercise both military and economic force in South Asia to achieve her goals.

JAPANESE TECHNOLOGY AND U.S. NATIONAL SECURITY

Robert Joseph Dukat-Captain, United States Air Force
B.A., LeMoyne College. 1985
Master of Arts in National Security Affairs-December 1990
Advisor: Edward A. Olsen-Department of National Security Affairs

The United States relationship with Japan has evolved considerably since World War II. Japan, once defeated and occupied by the United States, now assails U.S. global economic and technological leadership. This thesis examines the effect Japanese technology has upon U.S. national security. Japanese technology has become a critical element of many U.S. defense weapons systems. A supply disruption could harm military readiness. Moreover, a decline in U.S. technological innovation, production, and sales, could severely harm U.S. global commitments and foreign policy. This rivalry is placing strains upon U.S.-Japanese relations. Debate has arisen in the United States about how these perceived problems should be handled. Some advocate letting the free market solve the problem while others propose managed trade solutions. The United States also needs to reevaluate its entire policy with Japan and the Asia-Pacific region, in light of a changing world environment and increasing U.S. financial difficulties.

DEFENCE PROCUREMENT IN THE UNITED KINGDOM: WHICH WAY WILL IT GO?

Kaye Michelle Emerson-Lieutenant, United States Navy
B.A., University of Nebraska, 1983
Master of Arts in National Security Affairs-December 1990
Advisor: E.J. Laurance-Department of National Security Affairs

Three case studies were examined (Westand, NATO Frigate Replacement-90, and European Fighter Aircraft) which involved defence procurement decision-making from 1985 to the present by the government of the United Kingdom. These cases involved three different outcomes in terms of national/multinational production: 1) national, 2) UK/US, 3) UK/Europe and 4) UK/Europe and U.S. Each case examined the technical, economic, socio-political and military variables in an attempt to explain and generalize about the future of defence procurement in the United Kingdom. The case studies resulted in the findings that technological, economic and political considerations were of utmost importance in determining whether the United Kingdom chose to produce a weapon system with the United States and/or Europe.

THE GROWTH OF THE JAPANESE ECONOMY: CHALLENGES TO AMERICAN NATIONAL SECURITY

Dale Thomas Frankenberger-Lieutenant Commander, United States Navy
B.A., San Diego State University, 1977
Master of Arts in National Security Affairs-September 1991
Advisor: Claude A. Buss-Department of National Security Affairs

As the Japanese economy has grown more powerful over the last two decades, there has been an increasing number of influential Americans who have voiced the fear that sharp economic competition from Japan is beginning to threaten the health of the U.S. economy. There is a wide-spread perception that Japan is a "neo-mercantilist" nation which engages in predatory and unfair trade practices. Japan-bashers maintain that the Japanese believe that there is little distinction between economic security and national security and that their mercantilist approach to doing business threatens American national security by weakening critical elements of the U.S. economy. By examining the extent and the nature of the Japanese economic presence in the world marketplace, this thesis will show that this Japanese economic challenge poses no real danger to American economic interests except in one critical area -- the development and control of high technology.

THE SUPREME SOVIET AND SOVIET DEFENSE POLICY

Thomas A. Fries-Captain, United States Air Force
B.A., St. John's University, 1984
Master of Science in National Security Affairs-June 1991
Advisor: Mikhail Tsypkin-Department of National Security Affairs

This thesis examines the potential role of the Supreme Soviet and its committee for Questions of Defense and State Security (KOGB) in the formation of Soviet Defense Policy. Important events leading to the creation of the new Supreme Soviet and opening-session debates on the appointment of the USSR Defense Minister and release of students from service in the Armed Forces are reviewed. The role of the KOGB in determining soviet defense spending and military reform are also examined. The thesis concludes with an examination of the problems facing the KOGB, and points out that significant military reform will likely emerge from the Supreme Soviet should positive trends in soviet political reform continue.

STRATEGY AND LOGISTICS FOR THE NEW WORLD ORDER
Cory Ward Gildersleeve-Lieutenant, Supply Corps, United States Navy
B.A., Yale University, 1973
Master of Arts in National Security Affairs-December 1990
Master of Science in Management-December 1990
Advisors: Dan Trietsche-Department of Administrative Sciences &
Richard M. Brown-Department of National Security Affairs

This is an interdisciplinary analysis of the post-Cold War world to determine the optimal strategy to attain the national interests of the United States, and the requisite logistic structure to support that strategy. The optimal solution is found to be a strategy based on multinational defense centered on a permanent force of United Nations garrison port complexes. This multilateral force would be augmented by as small a national defense force as necessary to ensure national security. The thesis endeavors to reconnect the cultural and philosophical past of the United States with is immediate future. National interests are identified through examination of American Pragmatism and the philosophies of John Locke and Jean-Jacques Rousseau. To determine the current status of common defense based upon the Foreign Military Sales systems, an analysis of current data is accomplished. Future threats to the United States are examined with special emphasis on nuclear terrorism. The ability of Islamic nations in North Africa and the Middle East to mine significant quantities of uranium is demonstrated. The grave political as well as ongoing environmental consequences of this recent capability are discussed in detail.

A DEMOCRATIC CALL TO ARMS:
PUBLIC OPINION AND INTERVENTION POLICY
Carl Royce Graham-Lieutenant, United States Navy
B.S., Montana State University, 1984
Master of Arts in National Security Affairs-June 1991
Advisor: Edward J. Laurance-Department of National Security Affairs

This thesis explores the role of public opinion in intervention policy. It addresses the question of whether public opinion should be a consideration in intervention policy, whether the past public opinion of support has made a difference in intervention policy, and how public attitudes towards intervention can best be gauged or predicted. The study introduces three factors with which to gauge public attitudes: fear of escalation, global/regional reaction, and America's liberal value system. The thesis argues that public attitudes towards actual or potential intervention policy can be measured by applying that policy to these three indicators. This argument is tested by applying the three factors to two case studies. The first is in Nicaragua during the 1983-1984 time frame. The second case is the Lebanon intervention from August 1982 through February 1984. In both of these cases, public opinion ultimately had a large impact on whether and for how long intervention was a valid policy option. The three indicators described also mirrored to varying degrees public attitudes towards actual or potential intervention policies. Finally, the role of Congress as a conduit for public opinion in the intervention decision is explored, with particular emphasis on the effects of the War Powers act of 1973.

CURRENT DEVELOPMENTS AND PROSPECTS FOR THE FUTURE: FRENCH SECURITY POLICY IN A CHANGING WORLD

Janice M. Graham-Lieutenant, United States Navy
B.A., University of Kentucky, 1981
Master of Arts in National Security Affairs-June 1991
Advisor: Donald Abenheim-Department of National Security Affairs

This thesis provides an analysis of the effects of recent historical events on the future of French security policy. The end of the Cold War division of Europe, the rebirth of Germany, the growing pressures for major defense cuts, the calls for France to review its nuclear doctrine, abandon its independent policies and rejoin NATO's integrated military structure, and finally, the lessons of the recent Gulf War, are issues that threaten to divide France in a way that has not occurred in several decades. The fundamental question for the decade of the 1990s is how to, or perhaps whether to, preserve the legacy of national independence and grandeur handed down by former President Charles de Gaulle. The thesis concludes that the Gaullist myth of grandeur and independence can no longer be sustained. French security must now be achieved by strengthening ties with NATO, and building a stronger West European defense posture centered around close Franco-German relations.

THE BALTIC: A SEA IN TRANSITION

John Lawrence Green-Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1979
Master of Science in National Security Affairs-September 1991
Advisor: Donald Abenheim-Department of National Security Affairs

The objective of this thesis is to analyze naval developments in the countries abutting the Baltic Sea. Major international security events have radically altered the political landscape surrounding the region. Fundamental changes to the regional security environment are affecting naval building and modernization plans. This region should be of primary concern to the United States political and naval leadership because it comprises one of the world's largest concentrations of naval combatants. The navies deployed in the Baltic Sea are highly capable, and the geographic importance of the region has predicated a unique pattern of naval development. As regional threats to international security emerge, littoral naval warfare will become increasingly difficult to manage. Examination of the Baltic naval balance should provide a useful tool for monitoring national intentions in that region as well as forecasting future littoral naval threats elsewhere.

THE EXPANDING SINO-THAI MILITARY RELATIONSHIP:
IMPLICATIONS FOR U.S. POLICY IN THAILAND
Kenneth S. Harbin-Major, United States Marine Corps
B.A., Virginia Military Institute, 1976
Master of Arts in National Security Affairs-December 1990
Advisor: C.A. Buss-Department of National Security Affairs

Prior to 1987, the U.S. was the major supplier of ground, air and naval weapons, and other military equipment to Thailand. Since 1987, Thailand has turned to the PRC for the purchase of weapons and equipment required for many of its armed forces' modernization and force restructuring programs. In addition to the acquisition of large quantities of ground forces equipment for the Royal Thai Army (RTA), Thailand has also investigated the acquisition of PRC fighter aircraft for the Royal Thai Air Force (RTAF) and is in the process of acquiring six frigates for the Royal Thai Navy (RTN) from the PRC. What are the factors which have caused Thailand to enhance its political-military relations with the PRC and purchase significant amounts of military equipment from the PRC in a relatively short period of time (1987-present)? The objective of this thesis will be to examine the improved and improving Sino-Thai military relationship and analyze the key variables responsible for changing Thai political and military attitudes towards the PRC. The thesis also examines Thai willingness to actively pursue supplier diversification strategies with respect to major arms acquisition contracts. Finally, the thesis will also consider the impact of the Sino-Thai military relationship on current and short term U.S. policy objectives in Thailand. Appendix A provides a timeline of significant regional events occuring between 1949 and 1990.

INDIAN NAVAL DEVELOPMENT:
POWER PROJECTION IN THE INDIAN OCEAN?
Annette M. Haynes-Lieutenant, United States Navy
B.A., University of Wisconsin, Platteville, 1982
Master of Arts in National Security Affairs-December 1990
Advisor: David Winterford-Department of National Security Affairs

This thesis examines the U.S.-India relationship in the context of a world power interacting with the predominant regional power. The growing Indian military's power projection and nuclear weapons capability make the Indian Ocean region a critical area for American foreign policy during the next decade. New Delhi's desire to be a hegemonic power in the region combined with the U.S. military drawdown in reaction to the changing strategic environment could threaten long-term U.S. interests. The United States can no long afford to remain relatively disinterested in the region and must develop a comprehensive policy to promote regional security and stability.

ARMS CONTROL WITH A DEMOCRACY?: NEGOTIATING WITH THE NEW SOVIET UNION

Randall M. Hendrickson-Lieutenant, United States Navy
B.A., Iowa State University, 1983
Master of Arts in National Security Affairs-September 1991
Advisor: Paul N. Stockton-Department of National Security Affairs

This thesis analyzes a variety of aspects concerning arms control with a reformed Soviet Union. Despite the growth of pluralism in the Soviet Union arms control will remain an important policy goal of the United States. Policy-makers need to be aware of both new problems and opportunities which will be created as the Soviet Union transitions into a democracy. This study postulates four possible outcomes of Soviet governmental reform and then examines one in particular with respect to arms control with the Soviets in the future. Besides postulating the end form of Soviet government it looks at inter-democracy relationships with an eye on illuminating the particular idiosyncrasies involved in them. In addition, it analyzes the possibility of learning lessons from the interaction of previous U.S. democracy to democracy. Specifically, the U.S.-Japanese relationship in trade and security is utilized in this comparison. Arms control will still be necessary even if the Soviets are successful in the restructuring of their government. It may become more difficult rather than easier to reach arms control agreements with the new Soviet Union. A restructured Soviet Union must cause decision-makers to rethink their approach to concluding successful arms control agreements.

MEDIA DIPLOMACY: THE NEGOTIATOR'S DILEMMA

Abigail S. Howell-Lieutenant Commander, United States Navy
B.A., Nazareth College of Rochester
Master of Arts in National Security Affairs-December 1990
Advisor: Richard M. Brown, III-Department of National Security Affairs

The concept of Media Diplomacy is examined, focusing on the influence of the media in the realm of international relations in general, and the military negotiator, in particular. Three geopolitical government types are discussed, the United States as representative of a democratic government answerable to a free press; the Union of Soviet Socialist Republics as a state-controlled system in the midst of transition to a liberated press; and a Third World military regime, specifically Brazil from the 1960s to the 1980s, with its development, control and subsequent loss of authority over the press. Each geopolitical area study examines both the official and unofficial practitioners of Media Diplomacy. Offered in direct contrast to the authoritarian military regime is the establishment and development of the U.S. constitutional military. Although the Department of Defense efforts are reviewed, the focus is on the U.S. Navy and its past diplomatic efforts, the military's official and unofficial efforts at media diplomacy are explored. The military negotiator's dilemma in the current Media Diplomacy environment is presented. Four areas which offer the potential for improvement are included: media reform, military public affairs preventive maintenance, limited censorship, and designing an information strategy, as a possible means to resolve the negotiator's dilemma.

THE HUNGARIAN REVOLUTION OF 1989: PERSPECTIVES AND PROSPECTS FOR KOZOTTEUROPA

Ricky L. Keeling-Captain, United States Air Force
B.A., University of Maryland, 1984
Master of Arts in National Security Affairs-June 1991
Advisor: Mikhail Tsypkin-Department of National Security Affairs

The concept of Kozotteuropa (Central Europe) is becoming much more prevalent in literature This paper will deal with the experience of the Hungarian people, how that experience will impact on the idea of Kozotteuropa, and what the prospects for a political entity in the Danubian Basin based on the Kozotteuropa concept are. The paper focuses on Hungary as the key link, and possibly the strongest member, of such a union. The paper will discuss Hungarian history, Hungary's relationship with the superpowers and its neighbors, both past and present, and will propose some policies for the government of the United States to help improve our relations with this small, but important piece of Central Europe.

CUBA'S INVOLVEMENT IN ANGOLA AND ETHIOPIA: A QUESTION OF AUTONOMY IN CUBA'S RELATIONSHIP WITH THE SOVIET UNION

Stephanie S. Kessler-Lieutenant, United States Navy
B.A., University of Florida, 1985
Master of Arts in National Security Affairs-December 1990
Advisor: Scott D. Tollefson-Department of National Security Affairs

This thesis examines Cuban involvement in Angola and Eithopia in light of Cuba's foreign policy and Cuban-Soviet relations. Utilizing the two case studies, it analyzes the degree to which Cuban activities in Africa were Soviet-directed or Soviet-sponsored. The conclusion is that Cuba exhibited substantial relative autonomy in Angola, but limited autonomy in Ethiopia. That conclusion is applied to Cuba in the 1990's, in which the current wave of democracy spreading throughout Eastern Europe and the improved relations between the Soviet Union and the United States have resulted in increased pressures on Cuba's foreign and domestic policies. Four scenarios are poised for Cuba's future. Finally, the thesis discusses whether the levels of autonomy attained in the 1970's can be equalled in the 1990's.

SINO-U.S. ECONOMIC RELATIONS: PROBLEMS AND PERSPECTIVES

Kurt W. King-Lieutenant, United States Navy
B.S., Humboldt State University, 1984
Master of Arts in National Security Affairs-June 1991
Advisor: Claude A. Buss-Department of National Security Affairs

U.S. China economic relations are currently strained as a direct result of the Chinese crackdown of demonstrators in Tiananmen Square on June 4, 1989. However, the brutal suppression of the demonstrators is only one aspect of the overall Sino-U.S. economic relationship. This thesis examines the economic relationship beginning in 1978, when China embarked on its modernization effort. Though China has made many improvements in these efforts their modernization effort does not necessarily coincide with United States' desires. Instead, China is concerned with maintaining its socialist character for the foreseeable future. This thesis examines divergent Sino-U.S. economic relations, and offers some various recommendations for American policy-makers depending on the course that China's leadership decides to take.

MIKHAIL GORBACHEV'S "NEW THINKING": IMPLICATIONS FOR WESTERN SECURITY

Kenneth Larry Knotts, Jr.-Captain, United States Air Force
B.S., United States Air Force Academy, 1983
Master of Science in National Security Affairs-June 1991
Advisor: Mikhail Tsypkin-Department of National Security Affairs

This thesis examines some of the most important policies encompassed within Mikhail Gorbachev's "new thinking." The author explores the economic incentives and shifting Soviet view of international relations which led Gorbachev to introduce his groundbreaking reforms. Primary emphasis is given to an in-depth analysis of the "defensive doctrine" and how the issues surrounding that doctrine will impact upon the future U.S.-Soviet security relationship. Special topics include: increasing evidence of changes under way in the structure of Soviet forces stationed in Eastern Europe; possible future Soviet force deployments inside the USSR, including the construction of "fortified regions," and the evolving U.S.-Soviet relationship in the most important theater of relations between the two countries--Europe. It is the author's contention that the central driving force behind all of Gorbachev's reforms was, and remains, a resuscitation of the Soviet economy. The author concludes that ultimate Soviet objectives under "new thinking" will remain uncertain, and that the only prudent U.S. policy is to bargain in a vigorous but businesslike manner with Gorbachev to further reduce the Soviet threat, while retaining defenses sufficient to react to possible future Kremlin backtracking.

BEYOND ARMAGEDDON: DETERRENCE WITH LESS

Patrick Joseph Kolbas-Lieutenant, United States Navy
B.S., United States Naval Academy, 1984
Master of Arts in National Security Affairs-June 1991
Advisor: Frank M. Teti-Department of National Security Affairs

This thesis examines the implications for nuclear deterrence between the United States and the Soviet Union brought about by the dramatic changes in the strategic environment during the 1980s. Specifically, it examines the potential for a new criteria of deterrence at significantly lower levels of strategic weapons. The analysis indicates that a targeting strategy which emphasizes economic and industrial facilities will deter the Soviet Union. This targeting strategy allows for a reduction to 1500 strategic weapons while maintaining the robustness of nuclear deterrence between the United States and the Soviet Union. Using as its criteria arms race stability, breakout stability, crisis stability, verification, predictability, consequences of war, and the security of friends and allies, this thesis concludes that a force structure comprised of the Trident D-5 Submarine-launched ballistic missile and the B-2 bomber best ensures deterrence both against the Soviet Union and any other nuclear power regardless of changes in their political or ideological orientation. To provide maximum flexibility while negotiating the agreement and to hedge against a breakdown in U.S./Soviet relations prior to implementation, the thesis recommends a modernization program for U.S. strategic forces including funding for the restructured Strategic Defense Initiative which is now named Global Protection Against Limited Strikes.

COMPETING CLAIMS AMONG ARGENTINA, CHILE, AND GREAT BRITAIN IN THE ANTARCTIC: ECONOMIC AND GEOPOLITICAL UNDERCURRENTS

Russell G. Lanker-Lieutenant Commander, United States Navy
B.S., San Jose State University, 1980
Master of Arts in National Security Affairs-June 1991
Advisor: Thomas C. Bruneau-Department of National Security Affairs

The Antarctic continent holds a vast economic potential in both renewable and non-renewable resources. Therefore, the sovereignty of the continent, and in particular the Antarctic peninsula and Weddell Sea areas, has been a key issue between the two Southern Cone nations of Argentina and Chile for hundreds of years. Currently these two nations, along with Great Britain, have overlapping claims in the region. This thesis examines the geopolitical and historical claims of these and other nations, along with the current and potential mechanisms that are designed to regulate the region. It will also evaluate the potential for conflict in the future over the disputed region and examines current U.S. interests. It concludes that the United States should make every effort to maintain the current Antarctic Treaty System.

ENCOURAGING DEMOCRATIC TRANSITIONS: THE PROBLEMATIC IMPACT OF UNITED STATES' INVOLVEMENT

David Brian Lasher-Lieutenant, United States Navy
B.A., Allegheny College, 1983
Master of Arts in National Security Affairs-June 1991
Advisor: Thomas C. Bruneau-Department of National Security Affairs

The purpose of this thesis is to examine what role, if any, the United States can play in encouraging democratic transitions. It is a comparison of some of the different approaches the United States used in its relations with three countries in which it had varying amounts of influence: Chile (some influence), Brazil (relatively little influence), and El Salvador (relatively major influence). The two most fundamental questions it asks are: What would be the best policy for the United States to follow should it decide to encourage a democratic transition in any given country? And assuming a coherent approach, how much of an impact are United States' efforts likely to have? In reference to the first question, this study finds that a bipartisan foreign policy, prudently using the various instruments at its disposal, is the best course for the United States to follow. As for the second question, the United States can have an impact on democratic transitions, but that impact is likely to be quite limited in comparison to the influence of other factors (historical, cultural, social, economic, and political) within that country. As such increased involvement does not necessarily increase the ability of the United States to encourage a democratic transition. It is, in effect, a problematic impact.

MARINE CORPS INTELLIGENCE FOR WAR AS IT REALLY IS

Thomas Edgar Leard-Captain, United States Marine Corps
B.S., University of Pittsburgh, 1982
Master of Arts in National Security Affairs-June 1990
Advisor: Thomas B. Grassey-Department of National Security Affairs

The objective of this thesis is to evaluate the operational intelligence apparatus that exists to support the U.S. Marine Corps' tactical "warfighting" commander. The questions that drive such an analysis are: what are the fundamental uniformities of operations? What are the intelligence requirements for the most likely conflict? What is the intelligence architecture? What are the problems of intelligence support? What are the near-term and long-term remedies for intelligence support in these most likely conflicts? Based on the recurring intelligence requirements of historical antecedents, the thesis focuses on the lack of an integrated and complete intelligence architecture that supports the warfighting commander. This encompasses a lack of operational connectivity of intelligence within the larger command, control, communications, computers, intelligence, and interoperability (C4I2) systems/architecture. One utility of this thesis is in isolating the prevalent, realistic, operational and intelligence requirements for the employment of Marines. Another is in expanding the concept of a Marine Corps intelligence architecture. Optimizing the Marine Corps for its most likely military responses requires focusing intelligence on "war as it really is."

ARBITRARY BUDGET CUTS AND THE U.S. NATIONAL SECURITY POSTURE

Clyde Jackson McCaleb III-Lieutenant Commander, United States Navy
B.S., University of North Alabama, 1979
Master of Arts in National Security Affairs-December 1990
Advisor: Robert E. Looney-Department of National Security Affairs

This thesis examines the problems confronting the decision-makers today as they are forced to make tough budgetary decision affecting the U.S. national security posture. Due to the dramatic changes occurring throughout the world, particularly in Eastern Europe and the Soviet Union, there is growing pressure upon Congress to reduce defense expenditures and realize a "peace dividend." The danger of U.S. national security lies not within the cuts themselves, but rather, within abritrary budget cuts implemented to appease the American public and realize a quick "peace dividend." Both the executive and legislative branches of government must consider the impact of current changes in defense spending on the long-range U.S. defense posture. This first requires a consensus between both branches of government on exactly what the future U.S. defense strategy should be, a dilemma made more difficult due to their political differences. The planning methods used by the Office of Management and Budget and the Department of Defense must become more realistic, and the budgetary perspective and practice of Congress must become more long-range in scope. The U.S. must learn to operate more efficiently with less resources, while maintaining and adequate U.S. national security posture.

PROSPECTS OF UNITED STATES-MEXICAN COOPERATION IN THE WAR ON DRUG TRAFFICKING

Thomas A. Murphy-Lieutenant, United States Navy
B.A., University of Virginia, 1983
Master of Arts in National Security Affairs-December 1990
Advisor: S.D. Tollefson-Department of National Security Affairs

Drug control policy on the Southwest U.S. border requires an exceptional level of cooperation between Mexico and the United States. This thesis examines the formulation and evolution of drug control policies in both countries, and analyzes the mutual interests and the unique constraints facing them. The thesis recommends eight proposals for improving cooperation between Mexico and the United States in the war on drugs, which include: 1. Resisting intervention; 2. Providing economic assistance; 3. Utilizing the Justice department as the lead agency; 4. Imposing strict guidelines for operations in Mexico; 5. Forging consensus multilaterally instead of bilaterally; 6. Sharing intelligence; 7. Developing intermilitary ties; and 8. Improving the coordination of U.S. efforts.

THE IMPACT OF THE INTIFADA ON PALESTINIAN LEADERSHIP DEVELOPMENT

Jeanne Marie Nazimek-Lieutenant, United States Navy
B.S., Illinois State University, 1981
Master of Arts in National Security Affairs-December 1990
Advisor: Ralph Magnus-Department of National Security Affairs

This thesis focuses on the leadership, both internal and external, of the Palestinian people in the occupied territories of Israel, in an effort to determine if any internal political groups exist that are capable of challenging the authority of the Palestinian Liberation Organization (PLO). Background information includes the rise of Palestinian nationalism and the history of politics in the West Bank and Gaza Strip since the 1967 War. The primary factor influencing the current leadership transformations is the Palestinian uprising or intifada, that began in December of 1987 and continues today. The internal leadership of the uprising, including the Unified National Leadership of the Uprising (UNLU), the Islamic fundamentalist groups, and the traditional notables, are all considered as possible challenges to the PLO's leadership. The external PLO leadership, its primary left wing components and their relationship to the intifada, are also presented.

PANAMANIAN POLITICS: THE LEGACY OF TORRIJISMO AND PROSPECTS FOR DEMILITARIZATION

Glenn J. Olarte-Lieutenant, United States Navy
B.A., University of Washington, 1984
Master of Arts in National Security Affairs-June 1991
Advisor: Thomas C. Bruneau-Department of National Security Affairs

This thesis examines Torrijismo's legacy and impact on the Public Force's professionalization and institutionalization in an attempt to ascertain prospects for the successful demilitarization of Panamanian politics. As a result of the 1989 U.S. invasion of Panama, 21 years of military dominance in Panama ended. The Panamanian military and police institution, the Panamanian Defense Force, was dismantled and replaced with a new organization known as the Public Force. Due to its large complement of former PDF members, the Public Force has been faced by civilian suspicion and mistrust. Public Force attempts at professionalization and institutionalization have been opposed for fear that Panama's armed institution will once again intervene in politics. Dissatisfaction with the civilian government, and the increasing political clout of Torrijismo's political party, the Democratic Revolutionary Party, forewarns a new Torrijista, PRD-Public Force, political alliance. Based on this analysis, the author recommends that the United States delegate its mentor role to politically neutral agencies such as the United Nations or the Organization of American States.

THE CHANGING ROLE OF VIETNAM IN SOUTHEAST ASIA: BEYOND THE COLD WAR

Tenise L. Pettigrew-Lieutenant, United States Navy
B.S., Texas A&M University, 1983
Master of Arts in National Security Affairs-June 1991
Advisor: Claude A. Buss-Department of National Security Affairs

This thesis examines the United States relationship with Vietnam in the aftermath of the Vietnam War and the end of the Cold War. Even though Vietnam's path toward progress and growth is hindered by internal and external security concerns, the direction is clear that she wants to be an integral player in the Southeast Asian region. Vietnam's dealings with the two regional major powers, the Soviet Union and the People's Republic of China, are addressed in respect to the historical pasts, the present interests and what the future holds for continued relationships. A Vietnam in which the U.S. has a significant level of involvement and influence as a result of direct relations will help ensure that the Southeast Asian region, with all of its strategic importance, will be more favorably balanced toward U.S. interests.

INDIAN SURFACE COMBATANTS: SEA POWER FOR THE 1990s

Evan R. Pilling-Lieutenant, United States Navy
B.E., University of Mississippi, 1984
Master of Science in National Security Affairs-September, 1991
Advisor: Richard M. Brown, III-Department of National Security Affairs

This thesis examines the developing capabilities of the Indian surface combatant force. The emergence of a powerful Indian Navy is of concern to the United States in view of the strategic importance of the Indian Ocean region and its potentially related effects on Western Pacific maritime security. This study examines the history, current and future capabilities of, and the political and industrial support for the Indian surface combatant fleet. Current and future Indian naval strategy is examined and intelligence indicators are presented to assist in determining the intent behind India's naval expansion. Finally, the implications of a capable Indian surface force for U.S. policy are examined and policy recommendations postulated.

NORDIC NONALIGNMENT/NEUTRALITY POLICIES IN THE 1990s: IMPLICATIONS FOR U.S. SECURITY

Stephen Paul Recca-Lieutenant, United States Navy
B.S., United States Naval Academy, 1983
Master of Arts in National Security Affairs-December 1990
Advisor: Rodney Kennedy-Minott-Department of National Security Affairs

Given that the Cold War has ended, the utility and future form of Finnish and Swedish nonalignment/neutrality policies is open to debate. Nonalignment may continue to be a practical impediment to these countries' involvement in Pan-European political, economic and security organizations such as the European Community and the Conference on Security and Cooperation in Europe. The proximity of Sweden and Finland to the Soviet Union, and in particular to the strategic assets on the Kola Peninsula also will be a factor in future Nordic security decisions. If Sweden and Finland remain outside the collective European framework, the United States will have to recognize the distinct nature of Nordic policy and negotiate bilaterally to ensure continued access to its interests in the High North. This thesis examines the foreign policy challenges facing the Scandinavian neutrals in the 1990s. To that end, four sub-topics are analyzed: the development of neutrality in international law and its impact on modern foreign policy; historical inputs in Swedish and Finnish national interest; regional interests which affect policy decision-making; and, Swedish/Finnish interests in the evolving European order. The concluding sections provide an appraisal of U.S. strategic interests in the region determined from the outlook for neutrality policies in Sweden and Finland.

EXPLAINING SUCCESS AND FAILURE IN COUNTERINSURGENCY

John J. Shea-Lieutenant, United States Navy
B.A., American University, 1983
Master of Arts in National Security Affairs-June 1991
Advisor: Gordon H. McCormick-Department of National Security Affairs

The purpose of this research is to validate the systems model of insurgency and counterinsurgency by examining two case studies in counterinsurgency; the Emergency in Malaya from 1948-1960 and the ongoing war in El Salvador. One of these case studies proved to be a success, and one thus far has proved to be a failure. The paper's proposition is that successful counterinsurgency, as in Malaya, requires that the government view the insurgency as a "system" and attack each of the insurgency's components (inputs, conversion process, and outputs). Conversely, unsuccessful cases of counterinsurgency, such as in El Salvador, are those in which the government focuses exclusively on outputs. This study will attempt to validate this proposition by analyzing the conflicts in Malaya and El Salvador in similar terms using the systems model.

U.S./NATO SEA-BASED NON-STRATEGIC NUCLEAR DETERRENCE: PARADOX OR PITFALL?

Lowell S. Stanton-Lieutenant, United States Navy
B.S., Embry-Riddle Aeronautical University, 1981
Master of Arts in National Security Affairs-September 1991
Advisor: Donald Abenheim-Department of National Security Affairs

This work examines the capacity of U.S./NATO sea-based non-strategic nuclear forces to perform as the principal theater nuclear component of an evolutionary strategic concept for the 1990s. The current trend in NATO towards a certain denuclearization of the Central European states will rapidly place an increased reliance on sea-based theater nuclear weapons to counter Soviet theater nuclear assets deployed in the Western Soviet Union. Although the U.S. Navy's nuclear-capable Tomahawk land attack cruise missile (TLAM/N) remains a potent and flexible nuclear strike asset, it is best suited for heavily defended high value fixed targets. Emphasis on offensive mobility in a future conflict will make carrier-based aircraft a more decisive platform from which to prosecute and destroy high value mobile targets. However, an anlysis of the U.S. Navy's non-strategic nuclear forces reveals substantial deficiencies when compared with those of the Soviet Union. A declining U.S. Navy nuclear stockpile of air-deliverable strike weapons in combination with the lack of a long-range nuclear-capable stealth aircraft weakens the credibility of the aircraft carrier battle group as a nuclear deterrent force.

THE ROOTS OF SOCIAL PROTEST IN THE PHILIPPINES AND THEIR EFFECT ON U.S.-R.P. RELATIONS

William Dale Stephens-Captain, United States Air Force
B.S., Auburn University, 1981
Master of Arts in National Security Affairs-December 1990
Advisor: Claude A. Buss-Department of National Security Affairs

The collapse of communism in Eastern Europe in 1989 and the necessity to establish a new world order has presented a challenge to the United States (U.S.) to reformulate its foreign policy. Future U.S. policy in the Asia Pacific Region will inevitably affect the U.S. relationship with the Republic of the Philippines (R.P.), and this thesis provides a framework for understanding that relationship better. This thesis traces the roots of social unrest in the Philippines and demonstrates how the conflict between the elite and the common people has been the cause of rebellion, revolt, revolution and insurgency from the beginning of the Spanish colonial era until today. It concludes that the "special" relations which have characterized traditional U.S. policy in the Philippines are no longer in the best interests of either the U.S. or the R.P. It recommends that the U.S. withdraw its military forces from the Philippines before the end of the century and substitute directed economic assistance for military assistance as the best method of promoting democracy and contributing to the removal of causes of insurgency in the Philippines.

THE UNITED STATES IN THE FRAMEWORK OF ASEAN SECURITY: POST-COLD WAR PROSPECTS AND ALTERNATIVES

Robert Andrew Stoufer-Lieutenant, United States Navy
B.A., University of Virginia, 1984
Master of Arts in National Security Affairs-June 1991
Advisor: David Winterford-Department of National Security Affairs

The purpose of this thesis is to examine the role of the United States in the framework of ASEAN security in the post-Cold War world. Toward that end, the thesis examines the evolution of U.S. involvement in the political-economic-military development of the states that came together as ASEAN. It then seeks to identify the components of America's security strategy for the region relevant to the post-Cold War environment and, therefore, necessary in developing a New World Order policy for the U.S. position in Southeast Asia. Central arguments include: the U.S. military presence is critical to the region's security; Japanese participation through continued economic penetration with ASEAN is an essential cornerstone of the regional security picture; the potential for regional destabilization may be heightened as a result of declining East-West confrontation; and, ASEAN's inability to act jointly in defense or regional security and stability will necessitate an on-going U.S. military presence in order to safeguard key sea lanes and trans-shipment points.

NATO's OUT-OF-AREA DILEMMA

Susan Lynn Theodorelos-Lieutenant, United States Navy
B.A., California State University, Sacramento, 1980
Master of Arts in National Security Affairs-December 1990
Advisor: Donald Abenhiem-Department of National Security Affairs

NATO has a legitimate right to project force beyond the geographical boundaries of the NATO alliance. That NATO has been unwilling or unable to do so since 1949 results from a combination of factors relating to disagreements between the members over the geographical scope of the alliance, shifts in allied foreign policies and inter-allied tensions brought on by the Cold War. Iraq's invasion of Kuwait moved NATO's out-of-area problem from a subordinate problem to the primary threat facing the alliance. Historically, the Alliance felt that responses to out-of-area security threats should be dealt with on a unilateral basis, even when the Alliance has agreed that their collective vital interests are threatened. The dilemma for NATO is the lack of a unified approach to the out-of-area problem. NATO's boundaries are boundaries of obligation and not boundaries of confinement. Through a review of the language of the treaty and problems inherent in alliance relationships, this thesis will explore the differing perceptions of alliance members regarding the scope of the alliance and why NATO has survived for 40 years yet been unable to deal with the out-of-area problem.

THE EDUCATION AND DEVELOPMENT OF STRATEGIC PLANNERS IN THE NAVY

Michael R. Weiss-Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1979
M.S., Troy State University, 1989
Master of Arts in National Security Affairs-June 1991
Advisor: R. Mitchell Brown, III-Department of National Security Affairs

This thesis examines the graduate level education and professional military education programs available to U.S. Navy officers who are designated as, or seek to become, Strategic Planners. The programs are reviewed and suggestions are given for interweaving education with billets to provide the career path necessary to expose naval officers to the environment in which the modern strategist must operate. The utilization of officers is also investigated through the results of a survey sent to 449 naval officers with both educational and experience-based Strategic Planning subspecialty codes. Their opinions on the preparation they received, plus their recommendations for improvement are provided.

THE BALTIC QUESTION AS IT RELATES TO EUROPEAN SECURITY

Steven Allen White-Lieutenant, United States Navy
B.A., University of Minnesota, Duluth, 1981
Master of Arts in National Security Affairs-December 1990
Advisor: Mikhail Tsypkin-Department of National Security Affairs

This thesis examines the reemerging "Baltic Question" and its implications for European security. Relatively neglected for decades, the issue dramatically recaptured international attention on 11 March 1990, when Lithuania declared its independence from the Soviet Union, and then gained momentum from the subsequent moves toward secession by Estonia and Latvia. This thesis argues that the security of Europe and stability of the Baltic states are closely intertwined and that, therefore, this drive for independence demands careful attention by those who are constructing a post-Cold War security paradigm for Eurpoe. To show that the three states are an important component in the European security equation, the thesis examines both the historical (12th-20th Centuries) connection, and that of the post-World War II era. With this discussion as background, it investigates alternate courses that the future might take, and assesses the effect each would have on the security of Europe, the three Baltic states, and the Soviet Union.

THE HIDDEN DIMENSION OF STRATEGIC PLANNING: EXPLORATIONS IN THE FORMATION OF PERSPECTIVES

Paul Michael Whitfield-Lieutenant, United States Navy
B.A., University of New Mexico, 1985
Master of Arts in National Security Affairs-September 1991
Advisor: Frank Teti-Department of National Security Affairs

Perspectives are an extremely important factor in political decisions. The study of decision-making is often approached in a segmented manner with social scientists each believing their discipline is the correct approach. This thesis asserts that the study of decision-making must focus on how perspectives are formed and be interdisciplinary. Each discipline should be incorporated to discover how various factors influence the decision-making process. Perspectives are often confused with beliefs or ideas. This thesis defines perspectives as a subjective approach to an objective reality. A large portion of various sections in the thesis is devoted to examining concepts of subjective reality. It explores some of the possible interrelationships of perceptual influences with the intent of better understanding the decision-making process. The thesis presents several models which help explain the processes involved in forming perspectives and making decisions.

ANTARCTIC TREATY 1991: A U.S. POSITION

Karen D. Willis-Lieutenant, United States Navy
B.A., San Diego State University, 1979
M.A., Webster University, 1988
Master of Arts in National Security Affairs-December 1990
Advisor: R. Mitchell Brown, III-Department of National Security Affairs

The Antarctic Treaty of 1959, ratified in 1961, is subject to review in 1991. This thesis presents a negotiating position for the United States in the event the Treaty is reviewed. To do so, it examines important aspects of the review process, presenting a broad view of the issues, parties, and strategies facing the United States in these negotiations. In addition, major issues which have evolved over the past 30 years within the prameters of the Antarctic Treaty System are explored, as well as areas of potential future conflict. The positions of those countries within and those outside the Antarctic Treaty System are identified in order to anticipate areas of conflict and consensus during the negotiation process. Additionally, some planning implications are explored which highlight operational support areas of concern. The thesis concludes that it is in the United States' interest for the Antarctic Treaty to continue in its present form and presents a negotiating strategy to achieve that end.

THE U.S. MARITIME STRATEGY IN THE NORTH ATLANTIC AND NORWEGIAN SEA: AN EVOLVING STRATEGY IN NEED OF REASSESSMENT

Jimmy Clifford Woodard-Lieutenant Commander, United States Navy
B.S., Appalachian State University, 1979
Master of Arts in National Security Affairs-June 1991
Advisor: Rodney Kennedy-Minott-Department of National Security Affairs

This thesis examines the evolution, and theoretical basis of the United States' maritime strategy in the North Atlantic and what is referred to as "NATO's Northern Flank." The strategy associated with past Secretary of the Navy, John Lehman, is no longer considered applicable in the context of today's East-West relationship and is in need of reassessment. The paper then assesses the current, post Cold War situation and looks at future security interests the United States may have in the region. Additionally, the security and defense capabilities of our allies in the region are examined. Given the United States will remain closely linked with European security issues, by examining the successes and failures of past strategies and the strengths and weaknesses of our allies, one will be better able to develop a new strategy.

MASTER OF SCIENCE
IN
OPERATIONS RESEARCH

PROBABILITY MODELS FOR DEFENSE AGAINST MISSILE ATTACKS

Rui Almeida-Lieutenant, Portuguese Navy
B.S., Portuguese Naval Academy, 1983
Master of Science in Operations Research-September 1991
Advisor: Donald P. Gaver-Department of Operations Research

Three probability models for defense against mass missile attacks are developed. Each model corresponds to a different level of information. Different strategies are made possible by the information available. The first strategy, Invisible Kill, assigns equal times to the destruction of each missile that is selected for attention. The second, a Threshold strategy, assigns a maximum threshold time to the same task. The last, based on Perfect Task Information, engages missiles in ascending order of their destruction times; the order being assumed known in advance. The Expectation of the number of missiles killed is the Measure of Effectiveness used to evaluate the models. Numerical results are analyzed through simulation. Different strategies are compared showing the effects of information in defense effectiveness.

METHODOLOGIES FOR THE HIGH RESOLUTION MODELING OF MINEFIELD DYNAMICS

Alan A. Anderson-Major, United States Army
B.S., United States Military Academy
Master of Science in Operations Research-September 1991
Advisor: Samuel Parry-Department of Operations Research

Land mines are a continuing threat to the mobility required by the modern army. Efforts to develop solutions for the problems presented by mines are hampered by a lack of useful, realistic, high resolution models. To assist in developing the needed modeling capabilities, several methodologies are proposed. Methodologies for modeling vehicle navigation error, mine encounters, plow displacement of mines, bypassing obstructions and the presence of overwatching direct fires are developed and explained. These methodologies are then implemented using SIMSCRIPT and SIMGRAPHICS into a minefield breaching model. The model can be run in a graphics mode, allowing a visual validation of the model algorithms. The problem of plow width versus breaching force casualty rates is examined as an example of the potential utility of the model.

COST ESTIMATION OF CONTRACTOR PROVIDED SUPPLY SUPPORT FOR AVIATION SIMULATORS

Edward Milton Biggers-Commander, United States Navy
B.B.A., The University of Texas at Austin, 1969
Master of Science in Operations Research-June 1991
Advisor: Dan C. Boger-Department of Operations Research

This study develops cost estimating relationships (CER) to estimate the cost of supply support for the maintenance of aircraft simulators. These CER's will be used in the Contractor Operation and Maintenance of Simulators (COMS) environment. The analysis techniques used to develop and validate these relationships include linear regression (simple and multiple), analysis of univariate distributions, simulation modeling, and linear optimization modeling. The regression analysis concludes that no useful CER is present in the cost elements represented by the sample of data gathered from actual simulator operations. There is, however, a useful CER present in another smaller set of data derived from the successful bids of eight contractors. These submissions were for maintenance with and without supply support. A simulation model was constructed to provide an independent cost estimates for use with the maintenance CER developed above. Analysis of univariate distributions was used to transform maintenance data from an operational simulator suite for use in the verification of the simulation model. Finally, an optimization model formulation is recommended for further investigation to determine the best mix of contractor-provided and Navy-provided spare parts to complete the optimization of Navy expenditures for supply support for aviation simulators.

A MODELING STRATEGY FOR LARGE-SCALE OPTIMIZATION BASED ON ANALYSIS AND VISUALIZATION PRINCIPLES

Cheryl Ann Bither-Captain, United States Army
B.A., University of Washington, 1981
Master of Science in Operations Research-September 1991
and
Julie Anne Dougherty-Lieutenant, United States Navy
B.S., Villanova University, 1984
Master of Science in Operations Research-September 1991
Advisor: Gordon H. Bradley-Department of Operations Research

A modeling strategy for the validation and analysis of large-scale optimization models is defined and demonstrated. The strategy is based on nine principles of analysis and eight principles of visualization that are applied in a user controlled hierarchical structure which is customized to a particular optimization problem. For each model a set of analytic tools, such as spreadsheets and graphs, is structured to validate and verify data and analyze the mode and its results. These tools can be quickly recreated with data from subsequent runs of the model and sensitivity analysis conducted and comparisons made. As a demonstration the strategy is applied to PHOENIX, a large-scale U.S. Army helicopter force planning model. The strategy incorporates available technology using commercially prepared software and a computer workstation. The application of techniques such as hypertext, data access and backward compatibility enhance the ease of use and effectiveness of this approach.

SECOND ORDER APPROXIMATION FOR VARIANCE OF SEP

Arthur Frederick Brock-Lieutenant, United States Navy
B.S., Oregon State University, 1986
Master of Science in Operations Research-September 1991
Advisor: Lyn R. Whitaker-Department of Operations Research

A method for the computation of confidence intervals for circular error probability (CEP) based on first order variance estimates was introduced in 1966. It was later found that under certain conditions the resulting confidence intervals for CEP were smaller than expected. As a result a second order variance estimate method was developed, at the Johns Hopkins University Applied Physics Laboratory, which greatly improved the accuracy of the confidence intervals for CEP. The purpose of this thesis is to develop and test procedures for the 3-dimensional case to obtain a second order estimate for variance of spherical error probability (SEP).

U.S. ARMY'S DELAYED ENTRY PROGRAM: ATTRITION MODELING

Daniel C. Buning-Captain, United States Army
B.S., United States Military Academy, 1982
Master of Science in Operations Research-September 1991
Advisor: Donald R. Barr-Department of Mathematics

The United States Recruiting Command (USAREC) utilizes the Delayed Entry Program (DEP) as the foundation for their management of the continuous flow of recruits into the training base. Though there are many benefit of the DEP, a major shortcoming is that some DEP members do not enlist, becoming DEP losses. This is costly in terms of valuable resources such as lost recruiter time, and the potential for training seats being unfilled. Any effort which assists in reducing DEP loss would be a valuable contribution. This research models individual level DEP loss using multivariate dichotomous logistic regression. Explanatory variables used were individual, demographic, and USAREC policy in nature. Modeling efforts used data that were easily accessible to USAREC to ensure ease of potential future use. Univariate analysis was conducted on candidate explanatory variables prior to model building. The model was built using forward and backward stepwise logistic regression. Final model refinement included scaling of interval variables and the addition of one interaction term. Using statistical tests, the model as a whole was determined to exhibit some lack of fit. Closer analysis indicated that the model does perform well across many levels of estimated probability of DEP loss. Using USAREC's red, amber, green DEP loss risk classification system, the model appears to have significant predictive powers. The model also performed well using this classification system for a validation data set. It is concluded that this fitted model could prove useful in supplementing the field experience of the recruiter in predicting DEP loss risk of individual recruits.

SHIPBOARD ELECTRICAL CONSUMPTION PROFILE ANALYSIS

William G. Castaneda-Lieutenant, United States Navy
B.S., United States Naval Academy, 1984
Master of Science in Operations Research-September 1991
Advisor: Harold J. Larson-Department of Operations Research

Department of Navy energy consumption reduction goals have been established for afloat commands and shore installations in order to keep pace with the ever increasing demand and high cost of energy resources. This study examines electrical power consumption data for various Pacific Fleet ships berthed at Naval Station, San Diego, California during the period 1 January 1990 - 19 June 1991, in an effort to construct daily ship consumption profiles from averaged data. These daily profiles are compared for ships of the same class by means of graphical and statistical analysis in order to determine how well daily class profiles will be able to accurately estimate consumption and subsequent costs. Utility savings examples are also discussed with use of these profiles. Class and individual ship daily profiles are constructed from the analysis for the purpose of being useful as a budget forecasting tool for the U.S. Pacific Fleet Comptroller and also as means to examine ways to efficiently use electricity in the future.

THE FIDELITY ENHANCEMENT PROCESS

Charles A. Chase, VII-Captain, United States Army
B.S., United States Military Academy, 1982
Master of Science in Operations Research-September 1991
Advisor: William G. Kemple-Department of Operations Research

This study addresses the issues concerning the upgrade and reuse of computer simulation models and presents a comprehensive methodology - The Fidelity Enhancement Process - for conducting a model upgrade. Recent advances in software technology - specifically object-oriented programming and open architecture system development - have made this process feasible and provide unprecedented opportunities for model reuse. The Fidelity Enhancement Process was developed and applied to the Marine Corps Communication Architecture Analysis Model (MCCAAM) during its upgrade. MCCAAM simulates Marine Air Ground Task force (MAGTF) single-channel communications architectures. MCCAAM was modified to evaluate architecture performance under different allocations of next-generation radios to units in the MAGTF, where the performance of an allocation was tactically driven.

NAVAL GUNFIRE SUPPORT: AN EXPANDABLE, OBJECT-ORIENTED, PROCESS-BASED SIMULATION

Richard Lee Darden-Lieutenant, United States Navy
B.E.E., Georgia Institute of Technology, 1984
Master of Science in Operations Research-September 1991
Advisor: Michael P. Bailey-Department of Operations Research

This thesis documents the design and implementation of a simulation of Naval Gunfire Support (NGFS) in a modern, object-oriented, process-based simulation language called MODSIM II by CACI Corporation of La Jolla, California. The main intent of the simulation is to build a model that will allow the Naval Weapons Support Center, of Crane, Indiana, to explore the effects of the individual component reliability of gun and shell components on the overall performance of the Naval Gunfire Support system. The choice of the language MODSIM II was made to evaluate the capabilities of an object-oriented, process-based simulation language. The model is an expansion of a similar model written in FORTRAN and the problems and solutions encountered in moving from that linear programming language to an object-oriented one are also documented. Additionally, the ease with which the simulation can be enhanced and upgraded is addressed, as the facility to do this is greatly affected by the model's object-orientation. Finally, the suitability of the use of a desktop computer, specifically an IBM PC compatible, as a platform for the development and the execution of large simulations is explored.

A MODELING STRATEGY FOR LARGE-SCALE OPTIMIZATION BASED ON ANALYSIS AND VISUALIZATION PRINCIPLES

Julie Anne Dougherty-Lieutenant, United States Navy
B.S., Villanova University, 1984
Master of Science in Operations Research-September 1991
and
Cheryl Ann Bither-Captain, United States Army
B.A., University of Washington, 1981
Master of Science in Operations Research-September 1991
Advisor: Gordon H. Bradley-Department of Operations

A modeling strategy for the validation and analysis of large-scale optimization models is defined and demonstrated. The strategy is based on nine principles of analysis and eight principles of visualization that are applied in a user controlled hierarchical structure which is customized to a particular optimization problem. For each model a set of analytic tools, such as spreadsheets and graphs, is structured to validate and verify data and analyze the mode and its results. These tools can be quickly recreated with data from subsequent runs of the model and sensitivity analysis conducted and comparisons made. As a demonstration the strategy is applied to PHOENIX, a large-scale U.S. Army helicopter force planning model. The strategy incorporates available technology using commercially prepared software and a computer workstation. The application of techniques such as hypertext, data access and backward compatibility enhance the ease of use and effectiveness of this approach.

COMPARISON OF TANK ENGAGEMENT RANGES FROM AN OPERATIONAL FIELD TEST TO THE JANUS(A) COMBAT MODEL

Allen C. East-Captain, United States Army
B.S., United States Military Academy, 1981
Master of Science in Operations Research-September 1991
Advisor: Donald R. Barr-Department of Mathematics

The purpose of this thesis is to analyze the feasibility of accrediting the Janus(A) combat model for the post-test modeling phase of an Army concept called Model-Test-Model. Specifically, tank engagement ranges collected from an operational field test are compared to similar ranges generated by simulation of the test in the Janus(A) combat model. An automated process is developed to convert position location data from the field test into Janus(A) format so that the simulation replicates the vehicles and routes used in the test. Means and distributions of tank engagement ranges are studied. The important conclusion of this thesis is that Janus(A) generates engagement ranges longer than those observed in the operational field test. Additionally, collection of test data must be improved for Janus(A) to be accredited for engagement range analysis of field tests.

A SENSITIVITY ANALYSIS OF THE JANUS(A) COMBAT SIMULATION THAT SUPPORTS THE USE OF JANUS(A) IN ARMY TRAINING

Michael W. Feil-Captain, United States Army
B.S., United States Military Academy, 1981
Master of Science in Operations Research-June 1991
Advisor: Donald R. Barr-Department of Mathematics

This thesis records the method, results, and recommendations stemming from a sensitivity analysis performed on the output of the Janus(A) combat simulation. The analysis was based on a previous National Training Center (NTC) force-on-force (MILES instrumented) battle that was qualified as a Janus(A) scenario by TRAC-Monterey. The method involved four modifications to the qualified scenario and the use of a factorial experimental design. The factorial design was used to determine the presence of relationships between the levels of four main effects (battle parameters) and two response variables (Measures Of Performance). The thesis concluded that Janus(A) output can demonstrate a statistically significant sensitivity, and that Janus(A) sensitivity is a function of the chosen response variable and the levels of each main effect. Interactions among three of the four battle parameters were also statistically significant. It is recommended that examination of sensitivity analyses of Janus(A) be continued and a post-NTC rotation training similar to the one described in the thesis be pursued.

ANALYSIS OF THE FIELD ARTILLERY BATTALION ORGANIZATION USING A MARKOV CHAIN

Matthew Arthur Finlon-Major, United States Marine Corps
B.S., University of Washington, 1979
Master of Science in Operations Research-September 1991
Advisor: Samuel H. Parry-Department of Operations Research

This thesis develops a model for comparing Marine Corps field artillery battalion organizations. It specifically examines the 3X8 and 4X6 direct support battalions. The status of the battalions are represented as continuous time, finite state, semi-Markov chains. The primary measure of effectiveness (MOE) for comparing the two structures is the long-run expectation of the number of guns in position. A set of APL programs manipulates the transition probability matrices and mean sojourn times. It then returns the long-run equilibrium probabilities and mean recurrence times for the states. Sensitivity analysis is conducted to explore the effects of changes in the transition probabilities and sojourn times.

A FORCE STRUCTURE DESIGN MODEL

Charles V. Fletcher-Captain, United States Army
B.S., Tennessee Technological University, 1980
Master of Science in Operations Research-September 1991
Advisor: Sam Parry-Department of Operations Research

This thesis describes a systematic force structure design methodology that uses force effectiveness, risk, and cost to design and compare force structures. The requirements for military force are determined by predicting the future military situation in terms of conflict probabilities. These requirements for military force are used to design a balanced force structure. The balance of the force structure is measured by force effectiveness attributes. The thesis uses relaxed mixed integer programming to optimally fill the force requirements by providing a balanced force structure with currently available forces.

CORRELATIONAL ANALYSIS OF SURVEY AND MODEL-GENERATED WORKLOAD VALUES

James Joseph Galvin, Jr.-Captain, United States Army
B.S., United States Military Academy, 1983
Master of Science in Operations Research-September 1991
Advisor: Judith H. Lind-Department of Operations Research

This study examines the accuracy of an Army helicopter pilot workload measuring model called the Task Loading Model. The model is a submodel of the Army-NASA Aircrew/Aircraft Integration Program's Man-Machine Integration Design and Analysis System. The model's workload level output was correlated with the subjective workload measurements of several groups of pilots evaluating a variety of flight tasks. Seventy-one Army aviators completed surveys requiring scaled ratings and paired comparisons of workload related to common flight tasks conducted during typical missions. Their responses were examined for internal consistency and pooling by means of nonparametric tests. Aviator-supplied data was found to be robust and reliable. Pooled response data was correlated with model-generated data to determine the accuracy of the model. Results of this study show that the Task Loading Model is presently inadequate, but displays promising trends and should be further refined.

KHAFJI: A COMBAT SIMULATION

Malcolm W. Garland-Captain, United States Army
B.S., University of North Carolina at Greensboro, 1981
Master of Science in Operations Research-September 1991
Advisor: Samuel Parry-Department of Operations Research

This thesis presents a high resolution, discrete event driven combat simulation. This model was developed to facilitate the analysis of tactical options available to a small unit (company/platoon) commander using artillery and multiple lanes in overcoming a minefield obstacle. KHAFJI is a high fidelity combat simulation written in SIMSCRIPT II.5 with SIMGRAPHICS I. Employing user input parameters which define a minefield scenario, the model generates output which enables the user to compare various tactical options available to a maneuver commander in crossing a minefield. By using menu driven input screens, the user has a choice of multiple crossing lanes, size of crossing force, distribution of forces upon crossing lanes, multiple mine belts, and use of indirect fires against the minefield. Using SIMGRAPHICS I software, KHAFJI displays the minefield and the unit as it crosses the minefield. KHAFJI depicts each mine, each member of the crossing unit, and each impacting artillery round. The graphics provided by KHAFJI allows the user to see the crossing as it unfolds, thereby, reinforcing user confidence in the resultant data. When running multiple replications, graphics can be turned off to speed processing. An example of the type of analysis that can be performed with KHAFJI is presented in Chapter IV.

SIGNATURE VERIFICATION FOR ACCESS CONTROL

Susan Carol Geshan-Lieutenant, United States Navy
B.S., Purdue University, 1986
Master of Science in Operations Research-September 1991
Advisor: Gary K. Poock-Department of Operations Research

Access control to sensitive information is a vital concern for Department of Defense agencies. Current methods employed to control access are vulnerable to unauthorized users and frequently inadequate. The use of biometric access control devices, such as signature verification systems, may represent a solution to the access control problem. This thesis looked at two dynamic signature verification systems and compared their performance in general as well as under the different operating conditions of lined and unlined paper and morning and afternoon use. The two signature verification systems were the CIC system and the Sign/On system. Additionally, the thesis compared the CIC system under both sets of operating conditions using an inking stylus pen and a non-inking stylus pen. The experimental results indicated there was no significant difference between the CIC system using an inking stylus pen and the Sign/On system and that both systems had Type I error rates of less than 3% and Type II error rates of less than 1%. The results also indicated that the operating conditions test did not favor either system.

A SINGLE-COMMODITY MINE TRANSSHIPMENT PROBLEM

Tammy L. Glaser-Lieutenant, United States Navy
B.S., United States Naval Academy, 1985
Master of Science in Operations Research-September 1991
Advisor: R. Kevin Wood-Department of Operations Research

The Fleet Commanders-in-Chief often request recommendations from Commander, Mine Warfare Command, on schedules for naval mine transshipment. This thesis develops and implements a model, Scheduler for Mini Transshipment (SUMIT), that generates optimal schedules for transporting mines of a single type to suitable staging sites and for laying mines in mine fields. The model considers the number of available air, land and sea assets such as military aircraft, trucks, submarines and ships in finding optimal schedules for mine transshipment. SUMIT is designed to solve problems for scenarios in a limited region of the world that last several days and is based on inter-connected, time-expanded mine and mode networks. SUMIT is written in the General Algebraic Modeling System (GAMS) and is a mixed integer linear program in which all integer variables are binary. Ten realistic test problems are solved to demonstrate the viability of SUMIT and to compare the relative efficiencies of two model variants. One variant is on average 87% faster than the other.

COMPARING COMBAT MODELS USING ANALYTICAL SURROGATES

John Ross Green-Captain, United States Army
B.S., Siena College, 1981
Masters of Science in Operations Research-June 1991
Masters of Science in Applied Mathematics-June 1991
Advisor: Donald R. Barr-Department of Mathematics

The widespread availability of inexpensive high-speed computers has led to the development of complex, detailed, technical models of combat. These high resolution computer simulations and wargames are touted by their proponents as low-cost alternatives to extensive, high-cost field training exercises for the training of combat leaders. The validity of these simulations as models of combat, and thus as useful training tools is unproven. Direct comparison of simulations with field training exercises is often frustrated by the inherent complexities in each, and the shortage of quality data from field exercises. This thesis examines the feasibility of comparing these systems indirectly through the use of surrogate analytical models. A simple discrete time stochastic surrogate model is examined. Techniques for using the surrogate model to compare battle data are studied using simulated data from a simple combat model. Areas for further research are discussed.

BASIC COMPUTER MODELS FOR MANPOWER PLANNING

Ahmet E. Gurdal-Lieutenant Junior Grade, Turkish Navy
B.S., Turkish Naval Academy, Istanbul, 1985
Master of Science in Operations Research-March 1991
Advisor: Paul R. Milch-Department of Operations Research

The computerized manpower planning models in this thesis are designed to be used in conjunction with a course in the Manpower, Personnel and Training Analysis (MPTA) curriculum at the Naval Postgraduate School. The purpose of these models is to introduce students to some of the basic manpower modeling ideas. The models included here were written in the APL (A Programming Language) programming language and include a Markov Chain model, a model to compute attrition rates from both cohort and census data, a vacancy chain model and a career patterns model. The programs run on IBM-compatible microcomputers using DOS (Version 2.1 or later), STSC's APL*PLUS System for the PC (Version 9.0 or later) and STSC's STAGRAPHICS (Statistical Graphics System) (Version 4.0 or later). The latter software is needed only for a graphical comparison within the attrition rate model. A user's manual for each model is included in the appendices.

AN ANALYSIS OF LIGHT INFANTRY EFFECTIVENESS IN MID-TO-HIGH INTENSITY CONFLICT DELIBERATE ATTACK MISSIONS

Steven J. Hutchison-Captain, United States Army
B.S., United States Military Academy, 1982
Master of Science in Operations Research-June 1991
Advisor: Michael P. Bailey-Department of Operations Research

This thesis documents a simulation study of light infantry operations in mid-to-high intensity conflict. An initial data analysis is performed using deliberate attack missions conducted at the U.S. Army National Training Center (NTC) and compares the measures of effectiveness (MOE) of fully modernized heavy forces to the effectiveness of heavy forces operating with an attached light infantry battalion. This analysis includes development of a light infantry attack simulation which employs object oriented programming in MODSIM II. The simulation models light infantry operations in the NTC environment and is used to explore alternative tactical employment techniques designed to enhance unit performance on the AirLand Battlefield. This thesis also describes the tank and mechanized infantry task force, the light infantry task force, the heavy/light rotation concept, the deliberate attack mission, and the NTC environment and data collection capabilities. The simulation models an infantry attack against opposing forces in fixed, fortified positions. The model is a high resolution simulation which builds object code from infantry platoon level through battalion. The simulation depicts unit movements, attrition to indirect fires, and target engagements. The positioning of enemy forces is extracted from actual battlefield positions during an NTC deliberate attack mission. The simulation replicates close operations in which the light force mission is to gain an initial penetration of enemy barriers and pass the heavy force forward to continue the attack. The simulation study explores the use of light forces in alternative tactical scenarios.

MATHEMATICAL MODEL OF A MARINE CORPS AMPHIBIOUS LANDING USING INTELLIGENCE ESTIMATES

Catherine Ann Johnson-Captain, United States Marine Corps
B.S., University of Southern California, 1984
Master of Science in Operations Research-September 1991
Advisor: William Walsh-Department of Operations Research

This thesis develops a model to assist in the intelligence gathering and operational analysis of an amphibious landing assault. It utilizes major intelligence considerations of the Intelligence Preparation of the Battlefield (IPB) process to aid the force commander in decisions required prior to the assault. The algorithm for the model is written in the FORTRAN programming language. Input into the model involves the weather, terrain, seastate, and resistance the force can expect to encounter during each phase of the assault, along with the troop requirement to meet the objective. The FORTRAN program uses the input data to produce a transshipment network which will be optimized and solved by the General Algebraic Modeling System (GAMS). Output from GAMS is the number of Marines to be assigned to each assault objective. A typical amphibious landing network is set up in the thesis and output is analyzed in an effort to demonstrate the usefulness of thesis decision-making tool.

LOAD SHARING IN ANTI-AIR WARFARE COORDINATION: CRITERIA AND A SIMULATION TEST PLAN

Stephen Hume Kelly-Lieutenant, United States Navy
B.S., Marquette University, 1984
Master of Science in Operations Research-September 1991
Advisor: Glenn F. Lindsay-Department of Operations Research

This thesis addresses coordination between ships of a force in anti-air warfare. In support of the need for effective coordination, two coordination schemes are presented. One is based on earliest intercept time and is a candidate for future use. Here, the ship with the earliest projected intercept time is directed to engage the attacker. The second scheme introduces a load sharing feature wherein current magazine inventories are considered. In line with broad goals of AAW coordination, several measures of effectiveness to compare the schemes are introduced and particular attention is given to the utility of these measures of effectiveness. Potential simulation scenarios and input parameters for a comparison of the two schemes are then presented along with some specific suggestions for statistical analysis of the results. The thesis concludes with final remarks about load sharing, measures of effectiveness, and testing procedures.

THE ECONOMIC CHOICE OF THE TRANSPORATION ROUTES FOR LOGISTICS MATERIALS

Sook Han Kim-Captain, Republic of Korea Army
B.S., Korea Military Academy, 1985
Master of Science in Operations Research-March 1991
Advisor: Richard E. Rosenthal-Department of Operations Research

Light Vehicle Battalions are used to transport logistic materials from supply depots to combat units, on orders from high level logistics command. This thesis develops a linear programming model to determine which LVB should take which routes, how much materials it should carry, and within what specific time it should travel to minimize transportation and storage costs. The linear programming model is derived from a peacetime scenario where each combat unit's demand varies seasonally. We report computational experience on a realistic problem using GAMS (the General Algebraic Modeling System).

SENSITIVITY ANALYSIS OF THE MODERN NAVAL COMBAT MODEL

Aristomenis P. Lalis-Lieutenant Commander, Hellenic Navy
B.S., Hellenic Naval Academy, 1977
Master of Science in Operations Research-September 1991
Advisors: Maurice D. Weir Department of Mathematics &
Wayne P. Hughes-Department of Operations Research

This thesis describes, extends, and explores the validity of Hatzopoulos Naval Combat Model of modern surface warship missile engagements. An extensive sensitivity analysis is conducted to determine how the model's output is affected by changes in force alertness and scouting effectiveness. The approach taken is to analyze the sensitivity of combat (missile exchange) results first through the use of ratios, and second by examining partial derivatives. Two ratios are developed. The first is a ratio of remaining staying power after the exchange of salvoes. The second is a fractional exchange ratio, which compares the fraction of combat power remaining on the two sides after an exchange. The robustness of the fractional exchange ratio as an indicator of success in naval salvo warfare is demonstrated.

OPTIMAL ROUTING OF MIILTARY CONVOYS THROUGH A ROAD NETWORK

Dong Keun Lee-Major, Republic of Korea Army
B.S., Korea Military Academy, 1982
Master of Science in Operations Research-March 1991
Advisor: R. Kevin Wood-Department of Operations Research

To wage a successful campaign, military units and material must be in position by the designated time. This thesis models the problem of moving military units and material in convoys through a road network as mathematical programming models. In particular, tow models, linear and integer, are investigated. Both models belong to the class of multicommodity, dynamic transshipment network problem. Based on protoypic GAMS implementations, they provide essentially the same answer. However, the linear model is easier to construct, takes less time to solve and allows for more flexible convoy routing.

A WARTIME SUSTAINABILITY MODEL FOR A SMALL COUNTRY

Hung Heng Lim-Major, (Notational), Singapore Army
B.S., University of Manchester (U.K.), 1984
Master of Science in Operations Research-March 1991
Advisors: M.B. Kline & Alan W. McMasters-Department of Administrative Sciences

The transient behavior of a generic military capability under wartime environment was analyzed and, under certain assumptions, a Wartime Sustainability Model (WSM) was developed analytically using various stochastic and inventory techniques. A simulation of the WSM was also developed to incorporate variations for repair policies such as repair prioritization and limited repair capability. These variations are extremely difficult to model analytically. The adequacy of these two models was verified using a numerical example. Finally, the feasibility of using OPUS-8, a steady-state spares optimization model developed by Systecon AB, Stockholm Sweden, as an approximation to the analytical version of the WSM for the case of no repair capability was also investigated.

OPTIMIZING SHIP AIR-DEFENSE EVALUATION MODEL USING SIMULATION AND INDUCTIVE LEARNING

Chang-yun Lo-Commander, Republic of China Navy
B.S., Chinese Naval Academy, 1978
Master of Science in Operations Research-March 1991
Advisor: Yuh-jeng Lee-Department of Computer Science

This thesis presents an effective method to integrate simulation modeling with inductive learning to analyze ship air-defense combat scenarios. By combining the use of inductive learning with simulation, we are able to discover rules in a ship air-defense evaluation model about the optimal weapon assignments that we might not be aware of or could not express clearly. This approach can also perform sensitivity analysis in identifying variables that are critical for certain weapon operations. In addition, results obtained from inductive learning, as represented in the format of decision trees, are easy for a human user to understand, maintain, and adopt for other use.

MODELLING STRATEGIC STRIKES AGAINST TRANSPORTATION NETWORKS

Kok-Hua Loh-Lieutenant Colonel, Republic of Singapore Air Force
B.S., University of Manchester, United Kingdom
Master of Science in Operations Research-September 1991
Advisor: R. Kevin Wood-Department of Operations Research

This thesis presents deterministic and probabilistic models for the analysis of strategic strikes against transportation networks. The deterministic models use integer programming to solve problems on single and multicommodity networks. The aims of a network interdictor are (a) to minimize the maximum network flow with a fixed amount of interdiction resources, or (b) to minimize the total effort and mission turnaround time if given sufficient resources to stop the flow completely. In the case of a multicommodity network, the interdictor also aims to utilize minimum resources to achieve a disconnecting set which severs the paths connecting all sources to their respective sinks. In the probabilistic model, arc capacity is not a factor and the objective of a single interdictor is to minimize the probability of infiltration by a single evader through a network while the objective of the evader is just the opposite.

OPTIMAL ASSIGNMENT OF MARINE RECRUITS TO OCCUPATIONAL TRAINING

Wolfgang Franz Maskos-Major, German Army
Dipl. Math., University of Cologne (GE), 1978
Master of Science in Operations Research-March 1991
Advisor: Richard E. Rosenthal-Department of Operations Research

This thesis presents a computer based multiobjective optimization model to help Manpower Management Enlisted Assignment Branch at Headquarters Marine Corps to assign Marine recruits to occupational training. The model is a zero-one integer program. It is solved in two phases: In phase one an elasticized linear program with relaxed integrality constraints is solved to calculate the optimal fill of the training classes. These optimal values are used to compute integer lower and upper bounds on the fill of the classes for a network model which is solved in phase two, yielding an integer solution. The model is implemented in GAMS. It was tested with real data of 461 recruits and 65 training classes on a mainframe computer and on 386/486 based Personal Computers.

A METHODOLOGY FOR CAPTURING AND ANALYZING DATA FROM TECHNOLOGY BASE SEMINAR WARGAMES

Jeffrey T. Miles-Captain, United States Army
B.S., United States Military Academy, 1980
Master of Science in Operations Research-September 1991
Advisors: Samuel H. Parry-Department of Operations Research &
Kenneth A. Solomon-Rand Corporation

This thesis provides a structured methodology for obtaining, evaluating, and portraying to a decision maker, the opinions of players of Technology Base Seminar Wargames (TBSW). The thesis then demonstrates the methodology by applying the events of the Fire Support Technology Base Seminar Wargame held in May 1991. Specifically, the evaluation team developed six surveys, each survey capturing opinions using the categorical judgments technique. The subject of each of the surveys comes from characteristics and systems within six major Fire Support areas of interest, target acquisition, weapons and munitions, command and control, support and sustainment, fundamental principles of future combat, and technologies and systems. These areas of interest were provided by the United States Field Artillery School and United States Army Laboratories Command, co-sponsors of the TBSW. These surveys were administered at the Fire Support TBSW in May 1991. The results are calculated using a scaling method and are displayed in a manner that illustrates the strength of preference for each of the characteristics and systems, the interval between each characteristic of system, and the category in which they fall. Using these easily readable, graphical results, the decision maker can now use the findings of TBSWs, a previously unattainable task.

OPTIMIZATION MODELS FOR SYNCHRONIZATION PLANNING

Christopher Morey-Captain, United States Army
B.S., United States Military Academy, 1982
Master of Science in Operations Research-September 1991
Advisor: Siriphong Lawphongpanich-Department of Operations Research

Planning for the synchronization of activities on the battlefield for an Army battalion task force requires detailed planning for movement of subordinate units, allocation of personnel and assets to tasks, and many other activities to ensure that maximum damage is inflicted on an enemy force. Currently, this synchronization planning is done manually by task force staff officers, primarily the operations officer. The process is time consuming and most often results in a plan which is feasible, but not necessarily optimal. Two optimization models are developed to aid in the synchronization of task force activities. One of the models determines the feasibility of a course of action to aid the operations officer in developing a maneuver plan. The second model aids the engineer officer in allocating engineer assets to maximize the combat value of tasks. When implemented on computers, these models are flexible in that they allow for changes to be affected quickly. Hence, more alternatives can be considered in a short period.

THE SOCIAL DISCOUNT RATE: SOME IMPLICATIONS OF THE BUDGET-CONSTRAINED OPPORTUNITY COST APPROACH

Kok Chuan Ng-Ministry of Defence, Singapore
B. Eng., National University of Singapore, 1985
Master of Science in Operations Research-March 1991
Advisors: Dan C. Boger-Department of Operations Research &
Katsuaki Terasawa-Department of Administrative Sciences

The social discount rate is an important issue in the cost-benefit analysis for selecting public projects. However there has been no general consensus as to the appropriate value of the social rate of discount for public investment. In 1987, Quirk and Terasawa proposed using the opportunity cost rate of return as an alternative approach to the choosing of the social discount rate in a fixed-budget scenario. Essentially, the appropriate value of the government rate of discount is the highest rate of return available from the portfolio of the unfunded government projects. In this study, the characteristics of the discount rates is explored in the context of choosing an efficient portfolio of benefits of the projects are treated as variables and are to be endogenously determined by optimizing the overall discounted benefits. It is assumed that the costs and benefits of projects are known and continuous functions of force size, unit system maintenance, and operational support. A mathematical model is used to represent the relationship between the benefit and cost of various projects. The Karesh-Kuhn-Tucker (KKT) convexity conditions are assumed for these so-called diminishing-return projects. In addition, two-year constant-returns-to-scale projects with fixed rates of return are introduced as reference projects such that their rates of return can be used directly as the discount rates under the concept of the opportunity cost rate of return. The discounted present values (DPV) of the net benefits of both the optimal and non-optimal portfolios are found to be in agreement with those expected under the concept of the opportunity cost rate of return.

DESIGN AND IMPLEMENTATION OF A TOOLBOX OF MODULARIZED C PROGRAMS TO CONSTRUCT, ANALYZE AND TEST NETWORK OPTIMIZATION ALGORITHMS

Homero Fernandes Oliveira-Major, Brazilian Air Force
B.S., Brazilian Air Force Academy, 1978
Master of Science in Operations Research-September 1991
Advisor: Gordon Bradley-Department of Operations Research

A portable computer system to construct, test and analyze algorithms for large-scale network and graph problems was designed and partially implemented. The system provides an analyst with high-level easy-to-use constructs to specify network and graph algorithms. It produces efficient computer implementations of the algorithms, and constructs large scale unstructured and structured random network problems to test and analyze the algorithms. The system is written in the computer language C and has been tested on personal computers and workstations. The present implementation includes algorithms for graph coloring, minimum spanning tree and shortest path problems and some tools to analyze the results.

PYROTECHNIC DEVICE RELIABILITY

Altan Ozkil-First Lieutenant, Turkish Army
B.S., Turkish Army Academy, Ankara, 1986
Master of Science in Operations Research-March 1991
Advisor: Lyn R. Whitaker-Department of Operations Research

The Naval Weapons Support Center is planning to implement a bonus system to improve the reliability of pyrotechnic devices. The measure of effectiveness that they wish to use to determine how to award bonuses is the reliability of pyrotechnic devices. The data available to estimate this reliability is based on the current sampling inspection plan in which devices are tested in different environments. The models which include both dependence and independence assumptions between the outcomes of these tests are implemented and estimates of overall reliability along with 95% lower confidence bounds are found by bootstrapping. Using these estimates, models for making the decision to award bonuses are discussed and studied using Monte Carlo simulation.

THE OPTIMAL FORCE MIX AND ALLOCATION OF FIRES FOR THE FUTURE FIELD ARTILLERY

John Mann Page-Captain, United States Army
B.S., United States Military Academy, 1982
Master of Science in Operations Research-September 1991
Advisors: William J. Walsh & William J. Caldwell-Department of Operations Research

The new Army warfighting doctrine, AirLand Operations, is designed for the army of the 1990s, a smaller army, but one which will be faced with global responsibilities. These responsibilities will range from fighting wars and regional conflicts, to conducting various peacetime operations in support of allies in the realm of Low Intensity Conflict. Our success under AirLand Operations will largely depend upon the ability of the Field Artillery to disrupt enemy C3 elements, and destroy troop formations from extended ranges early in the battle. The Artillery School (USAFAS) is currently developing several advanced systems to accomplish this mission. The focus of this thesis is the Artillery Attack Model (AAM). The AAM is a GAMS Mixed Integer Linear Programming model developed to assist USAFAS determine the Minimum Cost Weapon/Munition Mix and Allocation of Fires to targets in order to meet the commander's kill criteria on the future battlefield.

CREW TRAINING AND THE RELIABILITY OF A BATTALION FIRE SUPPORT SYSTEM

Rae Yoon Park-Major, Republic of Korea Army
B.S., Korea Military Academy, 1982
Master of Science in Operations Research-March 1991
Advisor: James D. Esary-Department of Operations Research

A method for incorporating crew training level into an analysis of the system reliability of a field artillery battalion fire support system is developed. The crew of an equipment can be regarded as a component acting in series with the equipment, which itself has a hardware reliability. By using a transformation of the training level, as measured by a score on a qualification test, into a crew component reliability, overall fire support system reliability can be computed, and the effect of training predicted. The decision maker (commander) can use the result as reference in evaluating unit combat ability and in managing unit training and equipment maintenance.

COMPARISON OF JANUS AND FIELD TEST AIRCRAFT DETECTION RANGES FOR THE LINE-OF-SIGHT FORWARD HEAVY SYSTEM

Eugene Pacelli Paulo-Captain, United States Army
B.S., United States Military Academy, 1981
Master of Science in Operations Research-September 1991
Advisor: Donald Barr-Department of Mathematics

The purpose of this thesis is to analyze the feasibility of accrediting the Janus combat simulation for use with an Army concept called Model-Test-Model. Aircraft detection ranges from an operational field test are compared to similar ranges generated by the Janus combat simulation. Means and distributions of detection ranges for both helicopter and fixed-wing aircraft are studied. Methods of collecting detection data in field tests and representing aircraft in Janus must be improved for Janus to be accredited for aircraft detection range analysis of field tests.

A COMPARISON OF THREE NUMERICAL METHODS FOR UPDATING REGRESSIONS

Grigorios J. Raptis-Lieutenant Commander, Hellenic Navy
B.S., Hellenic Naval Academy, 1976
B.S., The Technical University of Athens, 1989
Master of Science in Operations Research-September 1991
Advisors: Dan C. Boger-Department of Operations Research &
William B. Gragg-Department of Mathematics

Three numerical procedures are presented for updating regressions. All three methods are based on QR factorization, but after that they use different philosophies to update the regression coefficients. Elden's algorithm updates using only the triangular matrix R. This procedure does not use orthogonal transformations, but it uses hyperbolic rotations. The modified Gram-Schmidt QR process is used by Gragg-Leveque-Trangenstein's method where the matrix with orthonormal columns is stored and updated. Chan's algorithm computes a column permutation II and QR factorization of a matrix A such that a rank deficiency of A will be revealed. Although the three methods are based on different ideas and can be used on different purposes their comparison shows that Chan's algorithm is the only accurate one in the rank deficient case, and Gragg-Leveque-Trangenstein's method is the cheapest and the most stable.

DEVELOPMENT OF AUTOMATED ASSIGNMENT MODEL FOR SAILORS IN PAKISTAN NAVY

Khan Hasham Bin Siddique-Lieutenant Commander, Pakistan Navy
B.S., Pakistan Naval Academy, 1981
Master of Science in Operations Research-March 1991
Advisor: Alexander J. Callahan-Department of Operations Research

Automated Assignment Model for Sailors (AAMS) is an automated model for the assignment of sailors to billets in the Pakistan Navy. The model will be used in an integrated allocation process. AAMS is a personnel assignment decision support system. It takes into account the personnel attributes such as trade, rate (skill level), current duty station area, date of availability for assignment and individual preference for next duty stations. It has a preprocessor (Fortran program), which compares the personnel attributes with those of job vacancies and develops cost coefficients for various policy criteria. These coefficients are governed by the eligibility rules and the degree of mismatch. A non preemptive technique employed to solve the network formulation using the GAMS solver. The optimal criteria is based on minimizing the total cost incurred due to mismatches in rates, trades, time of availability, failure to meet personnel preferences and permanent change of station costs.

OPTIMAL MAINTENANCE POLICIES APPLICABLE TO REPAIRABLE SYSTEMS ONBOARD SHIPS

Sukhdev Singh-Lieutenant Commander, Royal Malaysian Navy
B.S., (Eng) Hons., Royal Naval Engineering College, Manadon, England, 1980
Master of Science in Operations Research-March 1991
Advisor: Donald P. Gaver-Department of Operations Research

Maintenance, a key element of Integrated Logistics Support, plays a very vital role throughout an equipment/system planned life-cycle. Maintenance costs contribute a major portion of the life cycle costs of an equipment or system. Past historical records have shown that the cost associated with system maintenance is immense and usually takes up a large portion of the annual operating expenditure. Besides the cost, sound maintenance efforts contribute to better operational availability and reliability of a system. Therefore, the objective is to attain the proper balance of operations between performance and effectiveness, and logistics support, which largely includes maintenance, spares requirements, and the available budget. Adequated maintenance is essential to ensure the effective and economical support of an equipment or system. Therefore there is a need to design optimal maintenance policies to maximize appropriate measures of system effectiveness. These can be either to minimize operational and maintenance costs, to improve overall system reliability or to maximize operational availability. In this thesis, various maintenance scenarios are examined and the corresponding optimal maintenance actions are planned to take place at intervals chosen so as to maximize an appropriate measure of effectivness. Preventive maintenance policies are also planned so that the overall reliability of the system is always kept above a specific minimum reliability level, while either keeping the cost per unit time to a minimum or maximizing the operational availability, subject to cost constraints.

. . A MODEL OF AN INTEGRATED AIR DEFENSE SYSTEM (IADS) FOR THE TACOPS PROGRAM

Bryan F. Smith-Civilian, U.S. Department of Defense
B.S.E.E., University of Washington, 1973
Master of Science in Operations Research-September 1991
Advisor: William J. Walsh-Department of Operations Research

The author develops a model and computer code for some of the functions of an Integrated Air Defense System (IADS). These are combined with an existing FORTRAN program, called TACOPS, which is used by the Naval Weapons Center (NWC). The functions and attributes of an IADS such as target detection, track data processing, target position and accuracy estimation, target assignment, information relay to other units and information relay delays are described. Shortcomings of the fire control and coordination capabilities of TACOPS are described. Using the IADS model, the results against a sample engagement are compared to the original TACOPS. Documentation of the code is provided to allow future operators the ability to refine and/or restructure the algorithms as needed. Selection criteria for picking a Measurement Of Effectiveness (MOE) are presented.

EFFECTS OF NON-NORMAL OUTLIER-PRONE ERROR DISTRIBUTION ON KALMAN FILTER TRACK

Jose Batista de Souza Neto-Lieutenant, Brazilian Navy
B.S., Brazilian Naval Academy, 1979
Master of Science in Operations Research-September 1991
Advisor: Donald P. Gaver-Department of Operations Research

This report is about the effects of non-normality on the efficiency of the Kalman filter, particularly when the distribution of measurement errors is still symmetric but the tails are extended, which means that the observations are outlier-prone.

A LINEAR PROGRAMMING BASED DECISION SUPPORT AID FOR NAVY ENLISTED STRENGTH PLANNING

Philip D. Rodgers-Lieutenant, United States Navy
B.S., University of Illinois, 1982
Master of Science in Operations Research-June 1991
Advisor: Richard E. Rosenthal-Department of Operations Research

A multi-objective linear program (MOLP) using goal programming is developed as a decision support aid in determining optimal levels of those areas of Navy enlisted strength planning which are subject centralized management control. Over a multi-year period these decisions include monthly inventories in each paygrade, monthly total inventories, monthly advancements in the top six paygrades, and monthly recruiting goals. The model incorporates the various budgetary, Congressional, and internal Navy force structure constraints inherent in the strength planning process while minimizing deviations from desired inventory goals, ensuring inventory stability, and determining optimal recruiting goals.

NETWORK INTERDICTION MODELS

Robert Louis Steinrauf-Captain, United States Army
B.S., United States Military Academy, 1982
Master of Science in Operations Research-September 1991
Advisor: R. Kevin Wood-Department of Operations Research

Two mathematical programs are developed which determine strategies to interdict a network using limited resources. The first model identifies a set of arcs whose interdiction minimizes the maximum flow through the network, constrained by the available resources. The solution is a set of segments to interdict and a set of segments which are not interdicted, but determine the maximum flow in the interdicted network. The second model identifies a set of arcs whose interdiction isolates a targeted demand node and a maximum number of contiguous nodes about this specified node. This model is developed to take into account that the exact location of the demand node may not be known with certainty. The models are applied to a sample network that is similar to a river and road network in Bolivia where counter-narcotic interdiction operations are being conducted to stop the flow of precursor chemicals needed to manufacture cocaine. Insights drawn from the models' solutions are discussed.

OPTIMIZATION OF THE UNITED STATES COAST GUARD FORCE STRUCTURE

John Edward Tomko-Lieutenant, United States Coast Guard
B.S., United States Coast Guard Academy, 1984
Master of Science in Operations Research-September 1991
Advisor: Siriphong Lawphongpanich-Department of Operations Research

The United States Coast Guard area and district commands are assigned platforms to accomplish required missions. As the nature and profile of the missions change over time, the platforms must be reallocated to better satisfy the new mission needs. The problem of reallocating existing platforms and, perhaps, acquiring new ones is referred to as the force structure problem. This problem is complex because of the multi-mission capability of the platforms, and the difficulty in quantifying projected mission requirements and platform suitability in meeting these requirements. In this thesis, methods for quantifying the mission requirements and platform suitability are proposed. Using these methods, a linear integer optimization model to allocate platforms is developed. Additionally, a FORTRAN based interface is implemented to facilitate the utilization of the model. Included in this interface are basic functions of a database system to aid the users in maintaining and updating model data. To demonstrate the use of the system, a realistic sample problem was extracted from Fiscal Year 1989 operational and administrative data. Outputs for the problem are given and analyzed.

ANALYSIS OF THE RELATIONSHIP BETWEEN DEMAND AND CARCASS RETURNS AT THE NAVY SHIPS' PARTS CONTROL CENTER

Robert Bruce Vassian-Lieutenant Commander, United States Navy
B.S., Pennsylvania State University, 1976
Master of Science in Operations Research-September 1991
Advisors: Lyn R. Whitaker & David B. Wadsworth-Department of Operations Research

This thesis examines the nature of the repairable part demand-carcass return relationship at the Navy Ships' Parts Control Center and proposes an alternate forecasting method for predicting the number of carcasses arriving at the Depot Overhaul Points in the coming quarter. The analysis begins with graphical and correlation review of the variables and then uses regression, and exponential smoothing to model carcass returns. These methods are compared to the model currently in use by an analysis of the forecasts errors. The comparison suggests that the exponential smoothing model results in the most accurate forecasts. The thesis concludes with some recommendations for model implementation.

IMPLEMENTATION AND ANALYSIS OF A SMART SUBMARINE IN THE ACTIVE SONOBUOY MODEL

Michael Shawn Wells-Lieutenant, United States Navy
B.S., United States Naval Academy, 1986
Master of Science in Operations Research-September 1991
Advisor: William J. Walsh-Department of Operations Research

The Active Sonobuoy Model simulates a single aircraft attempting to detect and maintain contact on a single submarine. The submarine executes a pre-determined sequence of maneuvers upon counter-detection of the active sonobuoys. Under present methodology these maneuvers are not situation dependent, and do not provide an accurate depiction of reality. The purpose of this thesis is to improve the level of reality of the Active Sonobuoy Model through the implementation of a set of situation dependent maneuver rules for the submarine. This "smart" submarine is then compared to the previously existing "dumb" submarine through the use of hypothesis testing under two measures of effectiveness. The results show that the "smart" submarine provides a more difficult target for the aircraft to detect and sustain contact with than the "dumb" submarine.

OBJECT-ORIENTED MODELLING AND ANALYSIS OF A MARINE CORPS COMMUNICATIONS ARCHITECTURE

Michael Brooks West-Captain, United States Marine Corps
B.S., The Pennsylvania State University, 1985
Master of Science in Operations Research-September 1991
Advisor: Michael P. Bailey-Department of Operations Research

The Marine Corps Communications Architecture Analysis Model (MCCAAM) presented in this thesis gives Marine Corps decision makers, analysts, and communications officers the ability to quantify the effectiveness of alternative tactical radio system configurations within a given Marine Air-Ground Task Force (MAGTF) environment. The Marine Corps will be fielding the SINCGARS frequency-hopping radio system during the next five years. During the transition period, there will be units that will employ both the conventional fixed-frequency radios and the SINCGARS radios in the same area at the same time. Marine Corps decision makers and communications officers can use MCCAAM performance results to determine where best to allocate the new frequency hoping radios, as they become available, in order to maximize the overall frequency-modulated communications performance of a given MAGTF. Using a unique traffic workload paradigm to generate realistic message traffic, this object-oriented simulation model assesses the overall performance of a given architecture with a specified mix of fixed-frequency and frequency-hopping radios through a penalty accrual process and through aggregating traditional communications measures of effectiveness. The results of system performance rankings and associated sensitivity trade-off analyses provide the analyst with a powerful and easy-to-use decision making aid.

APPROXIMATE CONFIDENCE LIMIT PROCEDURES FOR COMPLEX SYSTEMS

Kah-Chee Yee-Operations Analyst, MINDEF-SINGAPORE
B.Eng.(Mech), National University of Singapore, 1987
Master of Science in Operations Research-September 1991
Advisor: Walter M. Woods-Department of Operations Research

Lower confidence limit estimation procedures for the reliability of several systems are developed and their accuracies evaluated using computer simulation. The procedures use test data on components of the system which can have failure times with either *exponential* or *Weibull* distributions or both. Testing scenarios for the components can be truncated by number of failures or by planned test times. Although the evaluation effort was focussed on *series* systems in this thesis, the procedures readily apply to other systems as described in the thesis. The evaluations demonstrate the procedures to be quite accurate when sufficient component testing is performed. Two FORTRAN computer programs were written to perform the evaluaiton. They are annotated in Users' Guides and can be used to determine the accuracy of these approximate lower confidence limit procedures for a given specific system and associated set of input parameters.

MASTER OF SCIENCE
IN
PHYSICAL OCEANOGRAPHY

A NUMERICAL STUDY OF TIME-DEPENDENT WIND FORCING OFF THE WEST COAST OF PORTUGAL, 1987-1988

Stephen L. Buss-Lieutenant, United States Navy
B.S., United States Naval Academy, 1982
Master of Science in Physical Oceanography-June 1991
Advisor: Mary L. Batteen-Department of Oceanography

A process-oriented numerical study of time-dependent wind forcing is conducted using a ten-layer, ß-plane, primitive equation ocean model to provide insight into mesoscale eddy generation and duration off the west coast of Portugal from 1987 to 1988. The wind forcing used was derived from synoptic surface pressure analyses off Lisbon, Portugal. Results obtained show that eddies generated during the coastal upwelling season (generally occurring during the spring and summer) decay during the winter. Only cyclonic eddies form during the 1987 and 1988 upwelling seasons. The eddies are generated through a combination of barotropic and baroclinic instability mechanisms. Since the wind forcing of the five-month-long 1987 upwelling season generates larger and stronger eddies than the wind forcing of the seven-month-long 1988 upwelling season, eddy characteristics appear to be more influenced by the characteristics (e.g., intensity, duration and frequency of occurrence) of the wind forcing than by the total length of the upwelling season. This study affirms the importance of wind stress forcing to the overall surface circulation and eddy generation in the coastal ocean regime off the west coast of Portugal.

A FEASIBILITY STUDY OF OCEAN ACOUSTIC TOMOGRAPHY IN THE BARENTS SEA

John Mark Emblidge-Lieutenant, United States Navy
B.A., Alfred University, 1984
Master of Science in Physical Oceanography-September 1991
Advisors: Ching-Sang Chiu & Robert H. Bourke-Department of Oceanography &
James H. Miller-Department of Electrical and Computer Engineering

The purpose of this thesis is to explore the feasibility of conducting vertical array ocean acoustic tomography in the Barents Sea. This effort is in support of the Barents Sea Acoustic Tomography Transmission Test experiment to be carried out in the summer of 1992 by NPS and Woods Hole Oceanographic Institution (WHOI). This study is conducted in two stages: a literature search and a computer simulation of acoustic ray propagation in the Barents Sea. The literature search gathered oceanographic, geophysical, and climatological data on the Barents Sea. These data were used to form a picture of the oceanographic conditions expected to exist in the Barents Sea in August and to estimate the acoustic bottom, surface and scattering losses that the tomographic signal could be subjected to. Also the noise levels in the Barents Sea were determined from these data. The computer simulation of tomographic transmission in the Barents Sea was conducted using HARPO (Hamiltonian Acoustic Ray tracing Program for the Ocean). This program provided raytraces for acoustic rays launched between 0° and 25° from one of the three planned sources to the receiver array. This analysis determined that tomography in the Barents Sea is possible, and that the planned source level of the sources will be large enough to overcome the environmental losses.

MONITORING OF GLOBAL ACOUSTIC TRANSMISSIONS: SIGNAL PROCESSING AND PRELIMINARY DATA ANALYSIS

Gary Russell Frogner-Lieutenant, United States Navy
B.S.E., University of Washington, 1981
Master of Science in Physical Oceanography-September 1991
Advisors: James H. Miller-Department of Electrical and Computer Engineering &
Ching-Sang Chiu-Department of Oceanography

A great deal of controversy exists concerning the possible global warming trend which may occur as a result of a documented increase in atmospheric "greenhouse" gasses. The 1991 Heard Island Feasibility Experiment tested the feasibility of using transmissions of acoustic energy through the major ocean basins of the world to monitor spatially averaged global temperature trends. The thesis documents the Naval Postgraduate Schools reception of the phase encoded signal transmitted from the Southern Indian Ocean, development of real-time signal processing software, and preliminary data analysis. Data, received from a 32-channel vertical array suspended in the deep sound channel off the coast of Monterey, California, was processed using real-time capable software. Data processing to reduce noise, determine SNR, and remove the m-sequence coding was found to be quite sensitive to Doppler frequency shifts. Although the SNR of the raw data was only about -27.5 dB for individual hydrophones, the transmitted signal was detected in both the frequency and time domains. However, the maximum processed signal peak in the time domain had an SNR of only +9 dB which provides inadequate arrival time resolution for use in a long term global temperature monitoring project.

A STUDY ON HYDROGRAPHIC CONDITIONS AND SALT BUDGET CALCULATION FOR THE GULF OF FARALLONES WITH THE DATA COLLECTED IN AUGUST 1990

Erhan Gezgin-Lieutenant Junior Grade, Turkish Navy
B.S., Turkish Naval Academy
Master of Science in Physical Oceanography-March 1991
Advisor: Curtis A. Collins-Department of Oceanography

The circulation pattern observed in the Gulf of Farallones on 5-10 August 1990 was a cyclonic system of flow. Water entered the Gulf from south of the Farallon Islands and left the Gulf between Pt. Reyes and the Farallon Islands. This pattern is confirmed by a satellite image which indicates a tongue of warm water penetrating into the Gulf from offshore as well as the increasing salinity and density along a shallow salinity minimum in this area. This cyclonic flow was also observed by previous current meter moorings in and near the Gulf. Note that this circulation would provide a return flow to balance offshore flow which has been observed at Pt. Reyes.

CHARACTERIZATION OF THE CLOCK IN A NEW INEXPENSIVE GPS RECEIVER: THE MAGNAVOX MX4200

Manuel Pardo-Lieutenant Commander, Spanish Navy
B.S., Spanish Naval Academy, 1975
Master of Science in Physical Oceanography-September 1991
Advisor: James R. Clynch-Department of Oceanography

A new generation of inexpensive GPS receivers is emerging, which utilize temperature compensated crystal oscillators (TCXO) as clocks. The MX4200 has been chosen as a representative sample of this emerging technology receiver. A detailed discussion on the receiver architecture and its implications in the measurement process is given. Experiments on the sensitivity of its clock to environmental effects, as well as the duration of the transient regime are described. One limitation to the use of these receivers in geodetic applications is the stability of its clock. The noise in the receiver clock has been characterized by the Allan variance for sampling intervals up to 4000 seconds. The implication of the noise levels for short time intervals on the applicability of the receiver to high precision work is examined.

COMPUTATION OF ACOUSTIC NORMAL MODES IN THE OCEAN USING ASYMPTOTIC EXPANSION METHODS

Fernando M. M. Pinentel-Lieutenant, Portuguese Navy
Master of Science in Physical Oceanography-September 1991
Advisor: Ching-Sang Chiu-Department of Oceanography

In this thesis, the use of the Wentzel-Kramers-Brilllouin (WKB) Theory to obtain the solution to the Helmholtz Equation governing the acoustic normal modes is examined. Specifically, uniformly valid WKB solutions for four classes of acoustic normal modes in the ocean are derived and the accuracy of the WKB approximation is tested against some exact solutions. It is found that this inherently high frequency technique has an appreciable accuracy even at a frequency of 1 Hz. A product of this thesis is a computer program that solves for the WKB modes for an arbitrary sound speed profile.

BOTTOM TRAPPED WAVES AT TIDAL FREQUENCIES OFF POINT SUR, CALIFORNIA

Stephen L. Sielbeck-Lieutenant Commander, United States Coast Guard
B.S., United States Coast Guard Academy, 1979
Master of Science in Physical Oceanography-September 1991
Advisors: Steven R. Ramp & Leslie K. Rosenfeld-Department of Oceanography

Current meter data were collected from moorings on the 800 and 1800 m isobaths on the continental slope off Point Sur, California at 100, 350, and 500 m depth and at 1000 m depth on the 1800 m isobath. Complex demodulation and spectral techniques were used to study the distribution of tidal energy at the diurnal and semidiurnal frequencies, and to study the size, rotation and orientation of the tidal current ellipses. At mooring P2 (800 m) the observed diurnal energy increased with depth for each of the 17 months of data analyzed, and the semidiurnal energy likewise increased with depth for 14 of the 17 months. The observations were studied using the theory of bottom trapped waves in a rotating stratified fluid (Rines, 1970). Bottom trapping is expected at the diurnal and semidiurnal frequencies whenever the critical trapping frequency $w_c = N \sin x \sin \phi$ exceeds 1/24 and 1/12 hours^{-1} respectively, where N = the Brunt-Vaisala frequency, x the bottom slope, and ϕ is a measure of the angle the wavenumber vector makes with the gradient of topography. Theoretical energy decay curves matched the observed energy levels at P2 very well, indicating that the enhancement of energy with depth was likely due to the presence of bottom trapped waves. No bottom trapping was observed at P3 (1800 m) because the deepest current meters were positioned too far above the sea floor to detect bottom trapped energy, and because the density gradients near the sea floor were weaker than at site P2 and kept w_c below the tidal frequencies.

AN ANALYSIS OF HYDROGRAPHIC DATA COLLECTED OFF POINT SUR, CALIFORNIA IN JUNE 1990

Georgios Th. Tziagidis-Lieutenant, Hellenic Navy
B.S., Hellenic Naval Academy
Master of Science in Physical Oceanography-September 1991
Advisor: Newell Garfield-Department of Oceanography

The data collected in June 1990 from the *R/V Point Sur* are used to study the California Undercurrent and California Current in the area off Point Sur. The area of study is a coastal region starting 3 km off Point Sur and extending westward 102 km. At that distance the orientation of the line of the stations changes to southwest, extending to 228 km offshore. The cruise took place from 16-22 of June under upwelling favorable weather conditions. The results of this study help illustrate the great variability of the currents in the area. In June 1990 the California Undercurrent exists, is strong (max speed 36 cm/sec), is confined to the first 65 km from the shore, and carries equatorial type waters northward in depths less than 650 dbars. The estimated transport is 2.9 Sv. The California Current is broad, slower than the Undercurrent (max speed 28 cm/sec), shallower and carries Subarctic North Pacific waters. The coastal upwelling looks strong starting from the depth of 100 dbars, and contributes to the inshore coastal jet which it is observed in the first 8 km from the shore and in the upper 20 dbars. Unlike previous analyses based on CalCOFI data, the Undercurrent appears robust in June. Its strong surface and subsurface signature had not previously been reported for this month. This may in part be due to the determination made in this thesis that 700 dbar is a more appropriate reference level than either 500 or 1000 dbar.

CLOUD EFFECTS ON OCEAN MIXED LAYER IN THE NORTHEAST PACIFIC OCEAN

Pao-Kun Wu-Lieutenant Commander, Chinese Navy
B.S., Chinese Naval Academy, 1979
Master of Science in Physical Oceanography-June 1991
Advisors: Pecheng Chu & Roland W. Garwood-Department of Oceanography

This study was conducted to examine the effect of clouds on the ocean mixed layer, both short-term and seasonal. It utilized data collected at Ocean Station Papa in the northeast Pacific. Two numerical modeling simulations were performed (i.e. with variable cloud and with variable precipitation). The results for the variable cloud simulation indicated that the downward surface buoyancy flux and longer daylight period in summer may induce a significant albedo effect of cloud on ocean mixed layer. The upward surface buoyancy flux and longer night period in winter will result in a pronounced greenhouse effect of cloud on ocean mixed layer. The results of variable precipitation simulation showed that the mixed layer is most sensitive to precipitation between October and March. Model prediction are verified using data at Ocean Station Papa for monthly and yearly mean values of cloud cover and precipitation. The comparison between model prediction and observations show that the mean values of observed MLD ($\bar{H}$ =60.9m) are much deeper than model-predicted values ($\bar{H}$ =36.5m).

MASTER OF SCIENCE
IN
PHYSICS

EFFECTS OF HIGH ENERGY ELECTRON IRRADIATION ON A $YBa_2Cu_3O_{7-}$ HIGH TEMPERATURE SUPERCONDUCTOR

Sean M. Connors-Lieutenant, United States Navy
B.S., United States Naval Academy, 1986
Master of Science in Physics-September 1991
Advisor: Xavier K. Maruyama-Department of Physics

High quality, single crystalline, high-temperature superconductors ($YBa_2Cu_3O_{7-\delta}$) were irradiated with 88.5 and 92.0 MeV electrons at various fluences to a maximum of 2.5 +/-0.5x10^{18} electrons/cm^2. The samples were manufactured at the Texas Center for Superconductivity at the University of Houston and this experiment was in support of a much larger experiment investigating the effects of various irradiations on the critical current. By introducing artificial pinning centers, such as those produced by electron irradiation, in high-temperature superconductors, an applied magnetic flux can be effectively pinned and the current carrying capacity can be increased. By comparing the critical current density enhancement effects to the total atomic displacement damage, it is found that the enhancement depends heavily on the type and energy of radiation and on the beam direction with respect to the crystal. It was also found that a threshold defect-size for effective flux pinning exists. Cascade defects, 10-20 Å and larger, are at least a thousand times more effective than point defects as pinning centers. A critical measurement required for this experiment is the determination of the dose and the electron beam profile incident on the $YBa_2Cu_3O_{7-\delta}$ samples. Methods of monitoring the beam for both real-time and post experimental analysis were developed so that the dose and fluence could easily be determined. Additionally, methods by which the products of the irradiation were identified and their respective activities calculated are also presented. This work may serve as a reference for similar, future experiments requiring a thorough and complete understanding of electron irradiation.

FREE ELECTRON LASER SHORT PULSE SIMULATION AND TWO-MODE SIDEBAND ANALYSIS

Gregory A. Cord-Lieutenant, United States Navy
B.S., University of Arizona, 1982
Master of Science in Physics-June 1991
Advisor: William B. Colson-Department of Physics

The Stanford Free Electron Laser (FEL), like many FELS is driven by extremely short electron pulses which drive equally short optical pulses. Simulations of the Stanford FEL describe the trapped-particle instability leading to sideband frequencies and limit-cycle behavior. Comparisons are made of recent experimental results that show close agreement between the desynchronism curves, optical spectra, and the electron spectra. The second part of this thesis analyzes sideband behavior when two modes are present in an FEL oscillator. Using two-mode wave and pendulum equations derived from Maxwell's and the Lorentz force equations, the gain and phase shift for each initial phase of the two-mode optical field can be determined numerically. Averaging over all initial phases determines the FEL optical performance. In steady-state the presence of the sideband effectively reduces the undulator's length, delaying the onset of saturation. This allows more power to be generated in the optical field than possible with only a single mode.

ARCJET PLUME IONIZATION EFFECTS ON EXPOSED SOLAR ARRAY CONDUCTING SURFACES

Richard William Evert-Lieutenant, United States Navy
B.S., University of Southern California, 1984
Master of Science in Physics-September 1991
Advisor: Richard C. Olsen-Department of Physics

High-efficiency arcjet propulsion will be used in the near future for satellite orbit adjustment and eventually for orbit transfer. Testing is currently being conducted to explore spacecraft interface difficulties with this method of propulsion. This thesis looks at one aspect of this interface. Since most earth orbiting spacecraft use solar arrays for power generation, it is of interest to investigate how exposed, biased conducting surfaces will interact with the slightly ionized plume environment of the arcjet thruster. It was found that with the arcjet thruster mounted 25.4 cm above the solar array, firing along its axis at a 20 degree cant angle, electrical currents were indeed collected. The effect of having a constricted area exposed to the plume was to increase the current density. The electron densities at typical solar array distances were found to be 10^{10}-$10^{12}/m^3$. An estimate of the total power lost for an array in this configuration showed that 0.05% of the overall power is lost due to collected currents.

ENERGY THRESHOLD FOR LASER INDUCED BREAKDOWN ON A METAL SURFACE UNDER HIGH AND ULTRA HIGH VACUUM CONDITIONS

Abdullah Gedik-Captain, Turkish Army
B.S., Turkish Military Academy, 1981
M.S., E.E., Middle East Technical University, 1985
Master of Science in Physics-June 1991
Advisor: Fred R. Schwirzke-Department of Physics

Unipolar arcing is the primary breakdown process when a powerful laser pulse interacts with a target surface. The unipolar arc model assumes that the initial ionization occurs in desorbed gas layers. To check this experimentally a metal surface was illuminated under different vacuum conditions. The experiments were conducted at 10^{-4}, 10^{-6} and 10^{-8} torr vacuum. A neodymium:glass laser of wavelength 1.06 μm in the Q-switched mode was utilized. Type 304, polished, stainless steel plates were used as targets. Results confirmed that higher laser energy was needed to trigger the laser induced breakdown at lower pressures.

THE ONSET OF BREAKDOWN IN A FAST PULSED VACUUM DIODE

Michael P. Hallal, Jr.-Lieutenant, United States Navy
B.S., Tulane University, 1984
Master of Science in Physics-June 1991
Advisor: Fred Schwirzke-Department of Physics

The mechanism by which plasma forms in a fast pulsed vacuum diode is not yet well understood. The most popular model of the phenomenon is the explosive emission model. Current densities required by the explosive emission model are much larger than can be provided by space charge limited currents. This study presents experimental results to support a new model which takes into account the ion current density resulting from ionization processes in front of the cathode surface. It is shown that ion heating of the surface is several orders of magnitude more efficient than Joule heating in exploding a whisker. The treatment of the model for an ideal diode predicts the voltage at which plasma formation begins. It also predicts the time delay between the voltage onset and the onset of plasma formation. The voltage at which the onset of plasma formation occurs and the time delay between the voltage onset and the plasma onset have been experimentally determined in this work. The experimental results compare favorably to the new model.

EMITTANCE MEASUREMENT OF THE NAVAL POSTGRADUATE SCHOOL LINEAR ACCELERATOR USING OPTICAL TRANSITION RADIATION TECHNIQUES

Mark Joseph Hellstern-Lieutenant, United States Navy
B.S., United States Naval Academy, 1983
Master of Science in Physics-September 1991
Advisor: Xavier K. Maruyama-Department of Physics

Using Optical Transition Radiation (OTR) beam diagnostics and Dr. Rule's clear foil interferometer analytic code, the normalized emittance of the Naval Postgraduate School (NPS) Linear Accelerator (linac) has been measured: the normalized horizontal emittance of $97\pi = +/-10\pi$mm-mrad and the normalized vertical emittance of $54\pi +/-8\pi$mm-mrad. The experiment was performed independently twice using a Kapton foil/silicon mirror and a nitrocellulose foil/aluminum mirror Wartski interferometer. The Kapton foil provided an initial measurement of the emittance, and provided lessons learned for the nitrocellulose foil measurement. The emittance measurement of the NPS linac indicate that the value may be too high for most free electron laser applications, but is very useful for radiation effect studies n high temperature superconductors, hardening, beam diagnostics, and for the production of x-rays through novel mechanisms such as transition radiation and parametric x-radiation generation. The beam divergence was determined by comparing theoretically calculated OTR patterns with the experimental data OTR patterns. The clear foil amplitude algorithms in the code have been validated in the nitrocellulose foil analysis. In addition, thin clear foils, which approximate the radiation coherence length in the foil medium, provide high degrees of sensitivity to the foils' index of refraction, indicating that OTR may be used to determine indices of refraction in addition to measuring divergence. The diagnostic capabilities of OTR are proven as applicable to electron accelerators (including free electron lasers).

AN ANALYSIS OF MIDDLE ULTRAVIOLET EMISSIONS OF MOLECULAR NITROGEN AND NITRIC OXIDE AND VACUUM CALIBRATION OF AN ULTRAVIOLET SPECTROGRAPH

Bryan D. Mack-Lieutenant, United States Navy
B.S., Case Western Reserve University, 1981
Master of Science in Physics-June 1991
Advisor: David D. Cleary-Department of Physics

Ultraviolet emissions from the earth's ionosphere in the wavelength range 1850 Å to 2070 Å are analyzed. Specifically, thirteen Lyman-Birge-Hopfield (LBH) band emissions from molecular nitrogen (N_2) and the τ, δ, and ϵ bands of nitric oxide (NO) are modelled with synthetic spectra to determine the atmosphere density of NO. Corrections to the Franck-Condon factors for the LBH emissions and the NO emissions are derived. Column emission rates are determined for N_2 and compared with computer models. Vacuum calibration of the MUSTANG ultraviolet spectrograph is presented.

A STUDY OF THE DIFFRACTION BEHAVIOR AND RESOLUTION CRITERIA FOR PATTERN RECOGNITION FOR A PROPOSED MULTIPLEXED IMAGING TECHNIQUE

Brian Jay Musselman-Lieutenant, United States Coast Guard
B.S., United States Coast Guard Academy, 1984
Master of Science in Physics-September 1991
Advisor: D. Scott Davis-Department of Physics

This project quantifies several aspects of a new multiplexed imaging technique proposed by D.S. Davis. The novel approach of this technique involves the use of encoding masks derived from a basis set of two-dimensional Walsh functions. There were two distinct problems addressed by this thesis research. First, a study of computer simulated diffraction patterns of the photon flux through these encoding masks yielded design constraints to be incorporated into a prototype system. These constraints were expressed in a simple mathematical relation in terms of wavelength, diffraction angle, and spatial frequency. A second problem addressed the minimum spatial resolution required for pattern recognition. The conclusion reached was that the minimum number of resolution elements necessary for pattern recognition is 64 in each direction. This determination also fixed the minimum size of the basis set of two-dimensional Walsh functions required for multiplexing, as well as the number of pixels required to display the image.

HIGH-GAIN, HIGH-POWER FREE ELECTRON LASERS

Jung-Hyun Park-Captain, Republic of Korea Army
B.S., Korea Military Academy, 1985
Master of Science in Physics-June 1991
Advisor: William B. Colson-Department of Physics

The LLNL Paladin FEL experiment is shown to exhibit clear and dramatic effects governed by the electron beam velocity distribution for the first time. The FEL integral equation is used to show that there is significant broadening of the gain spectrum due to the Gaussian velocity distribution, and also shows a plateau in the gain evolution along the undulator due to a triangular-shaped velocity distribution. The gain spectra and power evolution from simple, single-mode simulations are compared to the LLNL ELF experiments. The microwave power evolution along the undulator is compared as well for both the tapered and untapered undulators. In all cases, the agreement is found to be good.

A DESIGN, FABRICATION AND TEST OF A PRECISION POSITIONING SERVO DRIVE FOR A MULTIPLEXED IMAGING SYSTEM

Joseph Patrick Sargent, Jr.-Lieutenant, United States Coast Guard
B.S., United States Coast Guard Academy, 1981
Master of Science in Physics-September 1991
Advisor: D. Scott Davis-Department of Physics

In support of the development of a new initiative in the field of multiplexed image spectroscopy, a high torque, servo system was developed. Utilizing only a low resolution shaft position encoder, the system demonstrated an excellent ability to track a pulse input signal with high precision and stability. Ultimately, this servo system will be incorporated into a new generation of multiplexed imaging and imaging spectroscopy instruments. It will provide those instruments with the capability to accurately rotate into position a sequence of optical image encoding masks and it will tightly control that position, even in the presence of external perturbations. A computer will read the light intensity signals from a sensor and quickly decode the image for viewing and analysis. Further research into this technology should lead to full development of an extremely efficient infrared imaging system, with additional applications to passive surveillance, target signature identification, and airborne infrared astrophysics.

MASTER OF SCIENCE
IN
SYSTEMS ENGINEERING

PERFORMANCE ENHANCEMENT OF THE NPS TRANSIENT ELECTROMAGNETIC SCATTERING LABORATORY

Aldo E. Bresani-Lieutenant, Peruvian Navy
Peruvian Naval Academy, 1983
Master of Science in System Engineering-September 1991
Master of Science in Electrical Engineering-September 1991
Advisor: Michael Morgan-Department of Electrical and Computer Engineering

This thesis describes the performance enhancement of the NPS Transient Electromagnetic Scattering Laboratory (TESL) accomplished by replacing the old HP 8349A microwave preamplifier of the dual amplifier configuration with a new Avantek 13533 5-13 GHz amplifier and optimizing the delay line length for the 1-6 GHz amplifier. New Matlab software was developed to process the signals scattered from canonical and complex targets. This software includes a program to calculate the correct delay line length for either amplifier in future modifications. The updated TESL is shown to provide measurements yielding excellent agreement with theoretically predicted responses of canonical targets demonstrating a significant improvement of the signal to noise ratio as compared with the previous configuration. A target library was created to support research in radar target identification based on natural resonances.

THE DESIGN OF A FLIR SENSOR FOR THE KOREAN ARMY RPV

Byung Gook Choi-Captain, Republic of Korea Army
B.S., Korea Military Academy, 1985
Master of Science in Systems Engineering-September 1991
Advisor: Donald L. Walters-Department of Physics

This thesis considers a forward looking infrared (FLIR) sensor system for the Korean Army mounted in a remotely piloted vehicle such as the Pioneer RPV. Potential missions considered for this system included tactical reconnaissance, surveillance and intelligence gathering, target acquisition and location, artillery fire adjustment and damage assessment. The FLIR system provides high resolution thermal images in the 8-12μm spectral range under day and night conditions, with a real time data link to the control center. Based upon current technology a linescan HgCdTe detector array cooled to 77K was selected that provides a TV compatible video output. In the future, as improvements in quality occur with a corresponding reduction in cost, staring focal plane arrays such as PtSi or InSb should be considered.

VHDL BEHAVIORAL DESCRIPTION OF DISCRETE COSINE TRANSFORM IN IMAGE COMPRESSION

An-Te Deng-Lieutenant Colonel, Republic of China Army
B.S., Chung Cheng Institute of Technology, 1976
Master of Science in Systems Engineering-September 1991
Advisor: Chin-Hwa Lee-Department of Electrical and Computer Engineering

This thesis describes a VHSIC Hardware Description Language (VHDL) simulation of a hardware 8 x 8 Discrete Cosine Transform (DCT) which can be applied to image compression. A Top-Down Design approach is taken in the study, a discussion of DCT theory is presented, along with a description of the 1-D DCT circuit architecture and its simulation in VHDL. Results of the 2-D DCT simulation are included for two simple test patterns and verified by hand calculation, demonstrating the validity of the simulation. Shortcomings found in the simulation are described, together with suggestions for correcting them. In the future, the VHDL description of the 8 x 8 image block 2-D DCT can be further developed into structural and gate-level description, after which hardware circuit implement can occur.

ANALYSIS AND EVALUATION OF PROJECT EVERGREEN DATA

Antonio Gala-Captain, United States Army
B.S., Florida Institute of Technology, 1981
Master of Science in Systems Engineering-September 1991
Advisor: Xavier Maruyama-Department of Physics

Project Evergreen was an experiment conducted to evaluate antenna responses to nanosecond pulses and the capability of broadband equipment to capture them. The two antennas tested were a log periodic antenna modified by Lawrence Livermore National Laboratories and a TEM horn antenna. Analysis of the data collected by the Naval Postgraduate School test site personnel indicated the following: 1. The antenna output response characteristic is different for the log periodic antenna and the TEM horn antenna. 2. The received polarization is a function of the transmitted polarization and the orientation of the receiving site relative to the transmitting site. 3. Signal strength and capture are a function of the polarization alignment of the transmitting and receiving antenna. 4. Pulses on the order of 1 to 10 nanoseconds require bandwidths exceeding 1 Gigahertz (GHz) in the transmitting and receiving equipment. 5. Broadband equipment with minimum bandwidths of 1 GHz are required to adequately capture and process extremely short time duration signals.

PASSIVE DETERMINATION OF TEMPERATURE AND RANGE USING SPECTRAL BAND MEASUREMENTS OF PHOTON EMITTANCE

Shinji Hirakawa-Lieutenant, Japan Maritime Self Defense Force
B.S., The National Defense Academy, Japan, 1983
Master of Science in Systems Engineering-September 1991
Advisor: Ronald J. Pieper-Department of Electrical and Computer Engineering

The established concept of temperature determination from dual spectral band radiometric measurement is analyzed for the case that the measurement device is sensitive to total photon emittance rather than radiant emittance. A temperature dependent ratio of measurements is calculated for two distinct spectral bands using a black body distribution. It is shown that, if the bands are *not self contained*, then there exists a one-to-one correspondence between temperature and ratio. A prototype algorithm is proposed and tested which demonstrates the feasibility of extracting both the temperature and range by using three-distinct spectral band measurements. The model assumes nonhomogeneous, wavelength-dependent atmospheric attenuation. The target and sensor systems each have an arbitrary location in a vertical plane relative to the earth. In the computer simulations, LOWTRAN data was used.

A PROTOTYPE RULE BASED SYSTEM FOR ELECTRONIC WARFARE

Wen-Cheng Hsiung-Lieutenant Commander, Republic of China Navy
B.S., Republic of China Naval Academy, 1980
Master of Science in Systems Engineering-June 1991
Advisor: Yuh-jeng Lee-Department of Computer Science

This thesis examines the feasibility of using an expert systems approach for solving the threat identification problem in the radar signal environment. Such systems onboard ship support the Electronic Warfare Officer (EWO) in decision making. To ascertain feasibility, a rule-based prototype program was developed for a micro-computer system using an expert system shell, CLIPS. The system receives preprocessed sensor inputs, determines which radar signals are present, performs threat target identification, and suggests the best possible electronic counter measure to be taken. The prototype was evaluated to see if it could be used as an electronic warfare (EW) subsystem.

RADAR TARGET IDENTIFICATION BY NATURAL RESONANCES: EVALUATION OF SIGNAL PROCESSING ALGORITHMS

Gregory A. Lazarakos-Lieutenant Junior Grade, Hellenic Navy
B.S., Hellenic Naval Academy, 1983
Master of Science in Systems Engineering-September 1991
Advisor: Michael A. Morgan-Department of Electrical and Computer Engineering

When a radar pulse impinges upon a target, the resultant scattering process can be solved as a linear time-invariant (LTI) system problem. The system has a transfer function with poles and zeros. Previous work has shown that these poles are independent of the exciting waveform and target's aspect, but they are dependent on the target's structure and geometry. This thesis evaluates the resonance estimation performance of two signal processing techniques: the Kumaresan-Tufts algorithm and the Cadzow-Solomon algorithm. Improvements are made to the Cadzow Solomon algorithm. Both algorithms are programmed using MATLAB. Test data used to evaluate these algorithms includes synthetic and integral equation generated signals, with and without additive noise, in addition to new experimental scattering data from a thin wire, aluminum spheres and scale model aircraft.

PERFORMANCE OF FAST FREQUENCY-HOPPED NONCOHERENT MFSK CONVENTIONAL AND SELF-NORMALIZATION RECEIVERS OVER RICIAN- AND RAYLEIGH-FADED CHANNEL WITH PARTIAL-BAND INTERFERENCE

Kang Yeun Lee-Major, Korean Airforce, Korea
B.S.E.E., Korean Airforce Academy
Master of Science in Systems Engineering-September 1991
Advisor: R. Clark Robertson-Department of Electrical and Computer Engineering

An error probability analysis is performed for an *M*-ary orthogonal frequency shift keying (MFSK) receiver employing fast frequency-hopped (FH) spread spectrum waveforms transmitted over a fading channel with partial-band interference. The partial-band interference is modeled as a Gaussian process. Wideband thermal noise is also included in the analysis. Diversity is performed using multiple hops per data bit. Each diversity reception is assumed to fade independently according to a nonselective Rician process. A nonlinear combination procedure referred to as self-normalization combining is employed by the receiver to minimize partial-ban interference effects.

THE MINIMIZATION OF MULTIPLE VALUED LOGIC EXPRESSIONS USING PARALLEL PROCESSORS

Sabri Onur Oral-Lieutenant Junior Grade, Turkish Navy
B.S. Turkish Naval Academy, 1985
Master of Science in Systems Engineering-September 1991
Master of Science in Electrical Engineering-September 1991
Advisor Chyan Yang-Department of Electrical and Computer Engineering

The process of finding an exact minimization for a multiple-valued logic (MVL) expression requires an extensive search and enormous computation time. One of the heuristics to reduce this computation time is the Neighborhood Decoupling (ND) Algorithm by Yang and Wang. This algorithm finds near-optimal solutions for the given MVL expressions. The ND algorithm is an extension of HAMLET (Heuristic Analyzer for Multiple-valued Logic Expressions). The primary goal of this thesis is to reduce the computation time of the ND algorithm by using parallel processors. We developed a parallel version of the ND algorithm and tested it on an iPSC/2 (Intel Parallel Supercomputer). The parallel version of the ND algorithm actually executes in parallel a portion of the ND algorithm known as the clustering factor calculation. The number of nodes needed to run the programs is twice the number of input variables of the expression. The results indicate that the parallel version of ND algorithm halves the computation time compared to the sequential version. A secondary goal of this thesis is to initiate the parallelization of the HAMLET and the study of parallel computers, i.e., iPSC/2. The experiences we obtained with iPSC/2 suggest an alternative algorithm. The ND algorithm searches the first branch of the search tree assuming that the optimum solution will be on that branch. We developed a Multi-branch Concurrent ND (MCND) algorithm which concurrently searches multiple branches, hence increasing the probability of reaching the optimum.

ADAPTIVE DIGITAL NOTCH FILTERING

Kaluri V. Ranga Rao-Scientist 'E', DRDO India
B.S.E.E., M.E.
Master of Science in Systems Engineering-September 1991
Advisors: Michael Soderstrand & Herschel Loomis-Department of Electrical and Computer Engineering

The problem of narrow band interference while transmitting broad-band signals like Direct Sequence Spread Spectrum is a common source of problems in Electronic Warfare. This can occur either due to intentional jamming or due to unavoidable signal sources present in the vicinity of the receiver. Lack of improper information on these narrow band interferers makes it difficult to cancel them. In this thesis the above problem is addressed by using an adaptive notch filtering technique. Before adopting such a technique other methods like the Least Square Estimator and the Maximum Likelihood Estimator were explored. However the Kwan and Martin adaptive notch filter structure was found both relevant and suitable for the problem of interest. The Kwan and Martin method has the difficulty of increasing hardware complexity with number of notches. This makes it difficult to implement in real time. A new algorithm was developed for the purpose of implementing the structure in real-time. This new algorithm offers the same performance at reduced hardware complexity. This algorithm was simulated and the results were presented. A hardware feasibility is discussed by proposing a simple structure based upon existing commercial signal processing chips.

MODELING FOR IMPROVED MINIMUM RESOLVABLE TEMPERATURE DIFFERENCE MEASUREMENTS

Alejandro Ruben Ugarte-Lieutenant, Argentine Navy
Escuela Naval Militar, Argentina, 1980
Master of Science in Systems Engineering-September 1991
Master of Science in Electrical Engineering-September 1991
Advisor: Ron J. Pieper-Department of Electrical and Computer Engineering

The minimum resolvable temperature difference (MRTD) is widely accepted as the parameter that best describes the field performance of a thermal imaging system (TIS). Mathematical modeling that accurately predicts the MRTD has been of major interest to the infrared community over the last 30 years. This work reviews the currently accepted models for predicting the MRTD. Simplifying assumptions used by these models which deal with target spectrum are discussed and tested using specifications taken from a standard forward looking infrared (FLIR) system. In addition new models are proposed and tested. Two of these models are a direct extension of the recently proposed Vortman-Bar-Lev adaptive matched filter. A third model is based on the novel concept that the MRTD curve is predictable from a threshold condition on the visibility, rather than the signal-to-noise ratio, of the system-degraded bar pattern.

THERMISTOR VALIDATION AND PATH RADIANCE EFFECTS IN SHIP THERMAL IMAGE MEASUREMENTS

David S. Wood-Captain, United States Marine Corps
B.S., University of Florida, 1985
Master of Science in Systems Engineering-September 1991
Advisor: Alfred W. Cooper-Department of Physics

Thermal images in the 8 - 12 μm band were taken of the research vessel R/V POINT SUR in the Monterey Bay on 7 may 1991. The images were recorded using the AGA Thermovision 780 with an IBM AT computer using CATS 2.1 software. Corrections for computed transmittance, path length, and emissivity were made to the image files utilizing the locally developed computer program AGACATS. Temperature measurement distributions made with the AGA 780 compared to thermistor measurements of the ship temperatures were found to be extremely close (within one degree) at ranges of one half mile and one mile. PC-TRAN in the radiance mode was than used to compute the path radiance to the ship and compared with the path radiance correction in the AGA 780 algorithm. The AGA measurements varied over the range from twenty-five to seventy-five percent while the LOWTRAN fraction ranges only from seventy-five to eighty-five percent with the biggest discrepancy occurring at the short paths. The predicted path radiance as computed using LOWTRAN 6 did not fall off as much with decreased slant range as the AGA path radiances. This difference may be attributed to problems with either the AGA algorithm or the LOWTRAN code, or with the accuracy of the inputs. A contributing factor may be the time delay of one to one and a half hours between the image data and the radiosonde balloon launch.

MASTER OF SCIENCE
IN
SYSTEMS TECHNOLOGY

THE INFLUENCE OF DISTANCE AND DIRECTION ON GROUND COMBAT STRENGTH

Robert P. Costello-Lieutenant, United States Navy
B.S., University of Notre Dame, 1983
B.A., University of Notre Dame, 1984
Master of Science in Systems Technology-March 1991
Advisor: Wayne P. Hughes-Joint Command, Control, & Communications

This thesis describes the development from theorization to mathematical formulation of a ground combat model which includes the effects of range and orientation of fire and a valuation of mobility. The formulae of the model are then evaluated and expanded through the use of example calculations, which proceed from the most basic case to ever more complex situations. The result is a two-dimensional mapping of combat power in the front of a line opf troops. The model and procedures allow a commander to evaluate tactical options when approaching an enemy, options which include different speeds, different directions and different troop placement. The model provides the foundation for two-sided measurement of the fire effects of attrition and suppression of enemy movement and return fire.

LOW PROBABILITY OF INTERCEPT/LOW PROBABILITY OF DETECTION (LPI/LPD) COMMUNICATIONS TECHNIQUES AND SPECIAL OPERATIONS

Michael Douglas Hall-U.S. Department of Defense
B.S.E.E., University of Alabama, Huntsville, 1986
Master of Science in Systems Technology-March 1991
Advisor: Donald A. Lacer-Command, Control, & Communications Academic Group

The author examines the need for and implementation of low probability of intercept/low probability of detection (LPI/LPD) communications techniques in light of the increasing importance of special operations forces. Shortcomings of operational approaches to achieve communications security are described. Physical, temporal, and spatial methods to improve LPI/LPD aspects are discussed. After a brief review of communications fundamentals, spectral (spread spectrum) techniques are discussed in detail. The development of the various techniques, strengths and weaknesses of the techniques, and early spread spectrum systems are discussed. Systems currently under development to support special operations forces and on-line systems which implement LPI/LPD techniques are briefly described. The conclusion comments on the utility of LPI/LPD techniques in a down-sized military organization.

A MANAGEMENT PROPOSAL FOR DETERMINING THE EFFECTS OF COMBAT STRESS ON THE MAN-MACHINE INTERFACE OF COMPLEX INFORMATION DISPLAY SYSTEMS

Karen M. Kempton-Captain, United States Air Force
B.S., Seattle University, 1981
Master of Science in Systems Technology-March 1991
Advisor: Gary K. Poock-Department of Operations Research

This thesis culminates in a management plan for determining the effects of combat stress on the man-machine interface of complex information display systems. The objective is to provide to the reader both background information detailing the historical development of military attitudes towards combat stress and a survey of the physiological and psychological factors which influence the resolution of this problem. Current research in these areas is discussed with emphasis on research which strongly supports the problems resolution. The management plan cites those agencies who have a specific background, expertise and capability of accomplishing portions of the research. For concepts requiring further study, individuals within established institutions who are currently addressing these areas are suggested. An overall program coordinator is recommended. In conclusion, recommendations for implementation of changes in the areas of training and acquisition are cited.

A METHODOLOGY FOR EVALUATING THE RELATIONSHIP BETWEEN MEASURES OF EVALUATION: THE STF APPROACH

Stephen Charles Kessner-Captain, United States Air Force
B.S., Norwich University, 1983
Master of Science in Systems Technology-June 1991
Advisor: Donald A. Lacer-C^3 Academic Group

This thesis shows how the subjective transfer function (STF) approach can be used to evaluate the relationship between measures of evaluation (MOEVs). This methodology, developed by The Rand Corporation, uses algebraic modeling and expert opinion to measure the effectiveness of complex systems. Measures of evaluation (MOEVs) are defined and a relationship between the MOEVs is developed. This hierarchy of MOEVs is derived from a defense planning process and a corresponding military system structure. The STF approach is described in detail. An example is provided showing the relationship between the measure of effectiveness (MOE) of tactical air command and control and the measure of force effectiveness (MOFE) of tactical air forces. Finally, the STF approach is evaluated from two perspectives. First, it is evaluated as an evaluation methodology, using Hollnagel's six criteria. Second, Giordano and Weir's criteria for evaluating a model's effectiveness and construction are discussed. Key issues and recommendations are made in the following areas: 1) the defense planning structure, 2) the military system hierarchy, 3) the definitions of MOEVs, 4) the hierarchical relationship among MOEVs, and 5) the assessment of system evaluation methodologies.

THE DEVELOPMENT OF GERMAN DOCTRINE AND COMMAND AND CONTROL OF ITS APPLICATION TO SUPPORTING ARMS, 1832-1945

Marvin Knorr, Jr.-Major, United States Marine Corps
B.S., University of Alaska, 1975
Master of Science in Systems Technology-March 1991
Advisor: Russel H.S. Stolfi-Department of National Security

This thesis describes how German doctrine and command and control evolved in Wrold War II with respect to supporting arms. Structured knowledge of a subject, based on empirical data and experience, contributes to successful practice and further development. The German experience of the Second World War is used to discern the applicable lessons of command and control for understanding the development of modern warfare as it relates to supporting arms.

MASS CONFLAGRATION: AN ANALYSIS AND ADAPTATION OF THE SHIPBOARD DAMAGE CONTROL ORGANIZATION

James Michael Leist-Lieutenant, United States Navy
B.S., University of Southern Mississippi, 1985
Master of Science in System Technology-March 1991
Advisor: Carl R. Jones-Department of Command, Control & Communications

The author presents an analysis of a typical shipboard Damage Control (DC) organization, with emphasis placed on the general failure of the organization to cope with the variety generated by a Mass Conflagration. Two environmental scenarios, the Main Space Fire and the Mass Conflagration, are compared using an Environmental Analysis Framework. The organization is then discussed in terms of its applicable command and control characteristics, and how each of these contributes to the overall ability to cope with the two scenarios described above. After all analyses have been performed, the author then presents recommended adaptations to the organizational technology and command and control characteristics of the DC organization, with the goal of expanding variety handling capacity to meet the more complex environment posed by a Mass Conflagration.

NAVSPASUR SENSOR PERFORMANCE STUDY

Stephen Forsyth Schaaf-Lieutenant, United States Navy
B.S., Virginia Military Institute, 1983
Master of Science in Systems Technology-September 1991
Advisor: Donald R. Barr-Department of Mathematics

The Naval Space Surveillance Command (NAVSPASUR) has been in existence since the late 1950s. Operating with a formidable array of three large transmitters and six receiving stations, the command has carried out the mission of surveilling and maintaining a catalog of space objects in earth orbit. To date, over 21,000 artificial satellites have been tracked and catalogued by the command. This thesis provides NAVSPASUR with a statistics based measure of demonstrated system detection performance as demonstrated in recent operational periods. Following a discussion and review of NAVSPASUR operating parameters, a statistical analysis of system performance is presented. This analysis includes data analysis performed with the GRAFSTAT program and logistic regressions performed with the SAS statistical software. This effort provides NAVSPASUR an independently derived, statistically based means of predicting future probabilities of success in detecting satellites of known characteristics, such as altitude and radar cross section.

ARMY JTIDS: A C^3 CASE STUDY

Richard Emil Volz, Jr.-Captain, United States Army
B.S., Siena College, 1983
Master of Science in System Technology-March 1991
Advisor: D.A. Lacer-Department of Command, Control, & Communications

The author examines the Army command, control, and communications aspects of the Joint Tactical Information Distribution System (JTIDS). The developmental history of JTIDS as a secure, jam-resistant, data distribution system is discussed with emphasis placed on the acquisition process. An overview of the system, highlighting the key components, is also presented. Particular emphasis is placed on management of the network and the current joint concept of operations. The potential of JTIDS to pass other forms of surveillance information is examined. In particular, the Joint Surveillance Target Attack Radar System (JSTARS) produces a wealth of information for all Army C^2 elements. JTIDS can provide the means to transmit JSTARS ground surveillance data to the Army Tactical Command and Control System (ATCCS), making this information available to users that would not ordinarily receive it. Total Battlefield Automated System integration is the key component to full exploitation for this information.

IF YOU DON'T LIKE THIS, YOU MAY RESIGN AND GO HOME:
COMMANDERS' CONSIDERATIONS IN ASSAULTING A FORTIFIED POSITION

Michael Woodgerd-Captain, United States Army
B.S., United States Military Academy, 1982
Master of Science in Systems Technology-March 1991
Advisor: Russel H.S. Stolfi-Department of National Secrurity Affairs

The author studies the experiences of British, German, American and Soviet armies in assaults on fortified positions to find critical considerations for contemporary commanders. A fortified position is a series of mutually supporting areas comprising bunkers, pillboxes, weapons emplacements, entrenchments, wire, mines and other obstacles. Assaulting such a position held by determined defenders is a uniquely brutal and bloody event. The author systematically studies fighting at El Alamein, the Normandy Campaign, Okinawa, the Siegfried Line, Kursk, Manchuria and the Petsamo-Kirkenes area. Each battle is examined in terms of the use and importance of intelligence, smoke, armor, infantry, engineers, artillery, air support, C2 and special weapons. A portion of this study also examines current training at the U.S. Army's National Training Center to find if current training reflects battle proven techniques. The conclusion offers the author's recommendations to assist commanders and staffs in determining the organization, equipment, tactics, training and means of control of forces in the assault of a fortified position.

MASTER OF SCIENCE
IN
SYSTEMS TECHNOLOGY
(COMMAND, CONTROL, AND COMMUNICATIONS)

AN ASSESSMENT OF THE MARINE TACTICAL COMMAND AND CONTROL SYSTEM (MTACCS)

Philip Lewis Cochran, III-Captain, United States Marine Corps
B.S., Carnegie Mellon University, 1981
Master of Science in Systems Technology-March 1991
and
Michael James Foley-Captain, United States Marine Corps
B.S., United States Naval Academy, 1983
Master of Science in Systems Technology-March 1991
Advisor: D.A. Lacer-Command, Control, & Communications Academic Group

This thesis is an assessment of the current efforts in the development of a Marine Corps Tactical Command and Control System (MTACCS). The Marine Corps has been developing MTACCS for more than twenty years. The recent cancellation of a key component subsystem and the DoD reorganization efforts of the late 1980's caused a two year period of dormancy in this program. The driving goal of this assessment is to develop an understanding of the strengths and the possible risks inherent in the "revitalized" program that is now in renewed development. The assessment effort examines the history of the program, the feasibility of the new concept, cost-effectiveness, systems engineering, and interoperability. Conclusions stress the importance of doctrinal consensus, adequate requirements definition, engineering the system as a whole, and evolutionary acquisition in the development of modern command and control systems.

AN ASSESSMENT OF THE MARINE TACTICAL COMMAND AND CONTROL SYSTEM (MTACCS)

Michael James Foley-Captain, United States Marine Corps
B.S., United States Naval Academy, 1983
Master of Science in Systems Technology-March 1991
and
Philip Lewis Cochran, III-Captain, United States Marine Corps
B.S., Carnegie Mellon University, 1981
Master of Science in Systems Technology-March 1991
Advisor: D.A. Lacer-Command, Control, & Communications Academic Group

This thesis is an assessment of the current efforts in the development of a Marine Corps Tactical Command and Control System (MTACCS). The Marine Corps has been developing MTACCS for more than twenty years. The recent cancellation of a key component subsystem and the DoD reorganization efforts of the late 1980's caused a two year period of dormancy in this program. The driving goal of this assessment is to develop an understanding of the strengths and the possible risks inherent in the "revitalized" program that is now in renewed development. The assessment effort examines the history of the program, the feasibility of the new concept, cost-effectiveness, systems engineering, and interoperability. Conclusions stress the importance of doctrinal consensus, adequate requirements definition, engineering the system as a whole, and evolutionary acquisition in the development of modern command and control systems.

COMPUTER SOFTWARE PROJECT MANAGEMENT: AN INTRODUCTION

Samuel Matthew Liberto-Captain, United States Air Force
B.S., State University College of Buffalo, 1982
M.E.A., George Washington University, 1989
Master of Science in Systems Technology-June 1991
Advisor: Donald A. Lacer-C^3 Academic Group

This thesis addresses the general principles of computer software project management. The main objective is to aid perspective software project managers in dealing with the development and management of software projects. The definition of the classical software development life cycle is given. The components include system engineering, analysis, design, coding, testing, and maintenance. The thesis contains a description of the reasons why many software projects have cost overruns and late schedules. The variability of requirements and software complexity are two factors. Proper project management is one remedy to project cost overruns and late schedules. The components of software project management are planning, organizing, directing, and controlling. Many tables of comparisons and techniques for aiding software project management are given. State of the art software development techniques are discussed. Finally, a checklist to aid software managers when developing software is provided.

STRUCTURED ANALYSIS OF THE SCHEDULING SYSTEM FOR B-52 AIRCREW TRAINING

Craig Stephen McLane-Major, United States Air Force
B.S., Pennsylvania State University, 1976
Master of Science in Systems Technology-March 1991
Advisors: J.S. Stewart, USN, Ret. &
Tung X. Bui-Department of Administrative Sciences

This research explains the salient issues of B-52 aircrew training and the process for planning B-52 flight training programs. Shortcomings of the training planning and management system now in use are identified, including the tremendous amount of work required for any large change from one semester to the next, the fact that it is driven by, rather than driving, aircraft maintenance activities, and most seriously, the fact that it does not have any means of assigning training opportunities to individuals on the basis of need. This thesis presents a structured analysis of the scheduling process which is a suitable basis for construction of cooperative modules which can be combined to automate the entire process. Areas of scheduling performance which would improve as a result of automation are identified and explained.

MASTER OF SCIENCE
IN
SYSTEMS TECHNOLOGY
(SPACE SYSTEMS OPERATIONS)

DESIGN OF AN ENHANCED INTERACTIVE SATELLITE COMMUNICATIONS SYSTEM ANALYSIS PROGRAM

Kevin Robert Andersen-Lieutenant, United States Navy
B.S., United States Naval Academy, 1984
Master of Science in Systems Technology-September 1991
Advisor: Donald V. Z. Wadsworth-Department of Electrical and Computer Engineering

This thesis describes the design of a user-friendly interactive satellite communications analysis program for use on a personal computer. The user inputs the various parameters of a satellite orbit, ground station location and communications equipment. The output generated allows a user to view the satellite ground trace and footprint, calculate satellite rise and set times, and analyze the performance of the communications link. The link analysis allows the user to input various signal losses and jamming interference. Care was taken to ensure that the program is simple to operate and that it provides on-line help for each segment. A principal goal of this thesis effort is to provide an educational tool that familiarizes the user with the communications segment of a space system. The initial success of the program based upon student response validates the use of object-oriented like software tools that enhance user understanding of complex subjects.

DESIGN OF FAST EARTH-RETURN TRAJECTORIES FROM A LUNAR BASE

Walter Anhorn
B.A., The Citadel, 1984
Master of Science in Systems Technology-September 1991
Advisor: Donald V. Z. Wadsworth-Department of Electrical and Computer Engineering

The Apollo Lunar Program utilized efficient, i.e, Earth-return, transearth trajectories which employed parking orbits in order to minimize energy requirements. This thesis concentrates on a different type of transearth trajectory. These are direct-ascent, hyperbolic trajectories which omit the parking orbits in order to achieve short flight times to and from a future lunar base. The object of the thesis is the development of a three-dimensional transearth trajectory model and associated computer program for exploring trade-offs between flight-time and energy, given various mission constraints. The program also targets the Moon with a hyperbolic trajectory, which can with a time-reversed trajectory; be used for targeting Earth impact points. The first-order model is based on an Earth-centered conic and a massless spherical Moon, using MathCAD 3.0. This model is intended as the basis for a future patched-conic formulation for the design of fast Earth-return trajectories. Applications include placing nuclear-deterrent arsenals on the Moon, various space support related activities and finally protection against Earth-threatening asteroids and comets using lunar bases.

SELECTION AND SPECIFICATION OF A DATA LINK PROTOCOL FOR VSAT BASED INTER-LAN COMMUNICATIONS

Eugene S. Benvenutti, Jr.-Captain, United States Marine Corps
B.S., United States Naval Academy, 1985
Master of Science in Systems Technology-September 1991
Advisor: G.M. Lundy-Department of Computer Science

This thesis proposes an architecture for the development of inter-LAN communication across a VSAT network. The architecture of a VSAT node consists of the entities *node, bridge, buffer, transmitter, receiver,* and *frame assembler/disassembler.* Each of these entities contains a finite state machine, predicate/action tables, and local variables. Entities communicate by reading from and writing to shared variables. A selective repeat, sliding window data link protocol for the VSAT architecture, the *transmitter* and *receiver*, is formally specified using the systems of communicating machines model. A partial analysis of the specified protocol is performed using reachability diagrams.

MANAGEMENT OF THE FLEET SATELLITE COMMUNICATIONS SATELLITE ACQUISITION FOR THE NAVAL POSTGRADUATE SCHOOL

David Eric Eyler-Lieutenant Commander, United States Navy
B.S.E.E., United States Naval Academy, 1978
Master of Science in Systems Technology-June 1991
Advisor: Rudolf Panholzer-Department of Space Systems Academic Group

This thesis discusses the management of the acquisition of the Fleet Satellite Communications Satellite (FLTSATCOM) Qualification Model for the Naval Postgraduate School. The preparations, scheduling, and accomplishment of the delivery and the efforts required to establish the FLTSATCOM laboratory are discussed. The interaction between the Naval Postgraduate School, various government agencies, and the FLTSATCOM prime contractor necessary to accomplish the project is also described.

AN EDUCATIONAL SPACE SEMINAR TO INCREASE AMERICAN STUDENT INTEREST IN SPACE CAREERS

Gregory A. Heruth, Sr.-Lieutenant, United States Navy
B.S., United States Naval Academy, 1984
Master of Science in Systems Technology-September 1991
Advisor: Dan C. Boger-Department of Space System Operations

The ultimate goal of AMERICA'S YOUTH: Our Future In Space, an educational space seminar for college bound high school age students, is to inspire American youth with the wonders of space, providing them with the desire to overcome obstacles and prepare themselves properly for a career in America's space program. The problem is comprised of three parts: first, studies show a decline in math and science capabilities and interest in science and engineering degrees by America's youth. Second, with a decreasing population of high school age students, and an increasing number of "Apollo era" experienced scientists and engineers retiring, the U.S. is faced with a serious supply and demand problem. Finally, the aerospace industry has been the largest contributor to America' balance of trade for a number of years; unfortunately, international competition is quickly eroding the country's share of the world's commercial space 'pie'. A solution: (1) a detailed review of four major space related educational programs designed for young people in search of their most effective and most unique aspects when attempting to influence young students; (2) a space oriented seminar with well-known speakers, IMAX quality film, college/university information, aerospace career opportunities, and a group design project all brought together in a fast paced, one day session travelling to a different state each week. To assist the orator, A User's Guide is included which steps through the seminar.

A PROTOTYPE MULTI-MEDIA DATA BASE FOR TRACKING INTERFACE RELATIONSHIPS AND PERFORMING COST TRADEOFFS FOR THE SEA LAUNCH AND RECOVERY (SEALAR) SPACE LAUNCH SYSTEM

Joseph Francis Mark-Commander, United States Navy
B.S., United States Naval Academy, 1976
Master of Science in Systems Technology-September 1991
Advisor: Michael Melich-Department of Physics

This thesis develops a prototype multimedia database from which interface relationships and cost tradeoffs in the early stages of development of the Sea Launch and Recovery System (SEALAR) program can be rapidly and easily explored and evaluated. This prototype is developed employing HyperCard/Macintosh and demonstrates the feasibility of employing off-the-shelf technology to solve real world problems. The goal of attaining a cost effective system for access to space is thereby enhanced and brought one step closer to reality. Implementation issues are discussed and evaluated along with possible future enhancements to the model.

A COMPARISON OF THE UHF FOLLOW-ON AND MILSTAR SATELLITE COMMUNICATION SYSTEMS

Clifton E. Perkins, Jr.-Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1979
Master of Science in Systems Technology-September 1991
Advisor: Dan C. Boger-Department of Administrative Sciences

The author compares the UHF Follow-on and MILSTAR satellite communication systems. The comparison uses an analytical hierarchy process. Although the two systems have been tasked with different missions, a comparison of cost, capability, and orbit is conducted. UFO provides many of the same capabilities as MILSTAR, but on a smaller scale. Since UFO is also a new space system acquisition, it is used to compare dollars spent to field a viable communication system. A review of frequency bands, losses, and problems is conducted to establish the similarity of the systems. The available classical orbits are investigated to further establish the relationship. Cost data is provided to establish the major difference in the systems. While MILSTAR does possess more total capability than UFO, it is 10 times more costly. Additionally, UFO is a satellite that will evolve with new technology while MILSTAR is built to full capability immediately. In the author's opinion, the incremental performance of MILSTAR does not justify its incremental cost.

TRADE STUDY OF THREE OXYGEN PROCESSORS FOR THE MARTIAN ATMOSPHERE

Steven R. Plystak-Lieutenant, United States Navy
B.S., Chemistry, Virginia Military Institute, 1984
Master of Science in Systems Technology-September 1991
Advisor: Dan C. Boger-Department of Space Systems

This thesis is focused toward the Mars atmosphere and its potential resource use for life support systems which provide oxygen to astronauts during all phases of a mission. The weight required to send numerous oxygen tanks to Mars would drastically increase the cost of the mission and might even take up space in the rocket for other needed items on Mars. The solution to this problem is to design a processor that will convert Martian resources to oxygen. Utilization of resources to support life in the Martian environment is performed through the development of life support systems. Life support systems which provide oxygen belong to the Air Revitalization functional area of the Environmental Control Life Support System for Space Station Freedom which will be analyzed in this thesis. Since the Martian atmosphere is primarily composed of carbon dioxide, this thesis will look at three oxygen processors under development which will convert carbon dioxide to oxygen. These three candidate technologies are the Electrochemical Oxide Cell, Sabatier, and Bosch carbon dioxide reductors. The oxide cell is a self-containing carbon dioxide to oxygen system, but the other two produce water. This suggest that other subsystems must be attached to the output to produce oxygen from water. A trade study is performed using parameters such as power, weight, mass, etc. in order to find the most suitable oxygen processor for the Martian atmosphere. The trade study is a leverage analysis used by NASA to compare similar systems to find the best one. The trade study suggest that the electrolyte oxide cell is the most effective alternative.

A COMPARISON OF HEAVY LIFT LAUNCH VEHICLE OPTIONS FOR THE 1990s

Jonathan K. Schreiber-Lieutenant Commander, United States Navy
B.S., University of Arizona, 1977
Master of Science in Systems Technology-September 1991
Advisor: Dan C. Boger-Department of Administrative Sciences

This thesis compares attributes of the heavy lift launch vehicle options that are available for the United States to use in support of the Space Exploration Initiative. The systems compared are the Advanced Launch System, Shuttle-C, Saturn V/F-1 and Energia. The F-1 development history is presented along with the proposed development of the ALS and Shuttle-C. Advantages and disadvantages of each of the systems are presented and possible trade-offs between them are discussed. The thesis shows that the option that is most cost effective and can be used to support the deployment of Space Station Freedom is that of developing a booster with a core engine like the F-1. In conclusion, a recommendation is given as to what the best option, with regard to both short and long term mission requirements, is for a new heavy lift launch vehicle for the United States.

NOAA'S WEATHER SATELLITES: ECONOMICALLY BENEFICIAL PATHFINDERS

Andrew Hamilton Wilson-Lieutenant, United States Navy
B.S., United States Naval Academy, 1982
Master of Science in Systems Technology-September 1991
Advisor: Dan C. Boger-Department of Administrative Sciences

The National Oceanic and Atmospheric Administration's (NOAA) meteorological satellites have made many important contributions to society since their first introduction over 30 years ago. These polar-orbiting and geostationary satellite systems provide weather information as well as other benefits to both the public and private sectors. This thesis examines a number of these economically benefitted areas and quantifies these contributions when possible. Additionally, the concept of weather satellite provided data as a public or a private good is analyzed. The growing private sector application of satellite derived data, or so called value-added service, is surveyed. A few key examples of this field are identified, and the impacts of past, current, and future governmental data dissemination policies are discussed. In conclusion, the role NOAA's environmental satellites will play in the planned global observation of the earth is discussed. By studying these satellite systems in this way, their worldwide benefits to society can be ascertained, both in terms of current economic benefits as well as their important role as a test case for the future of earth remote sensing.

SATELLITE ANOMALIES AND ELECTROSTATIC SURFACE DISCHARGES

Yan Chun Wong-Major, United States Marine Corps
B.S., University of Arizona, 1978
Master of Science in Systems Technology-September 1991
Advisor: Richard C. Olsen-Department of Physics

Various aspects of the space environment can cause on-orbit satellite anomalies. Studies have shown that adverse interactions between natural space environment and space systems can have deleterious consequences comparable to those caused by human or design errors. Electrostatic surface discharge (ESD), electron caused electromagnetic pulse (ECEMP), and single event upset (SEU) are the three most common anomaly producing mechanisms in space systems. The plasma environment, such as in geosynchronous orbit, can cause differential charging of satellite components and lead to ESD's on satellite surfaces. By using the Spacecraft Anomaly Manager (SAM) software package, spacecraft anomaly data of operational satellites contained in the database of National Geophysical Data Center (NGDC) were analyzed. The analysis concluded that ESD is directly related to geomagnetic storm activity and ESD related anomalies are local time and seasonal dependent. Proper engineering solutions should be integrated into satellite designs to prevent ESD from causing anomalies. This can be done effectively on multi-satellite programs such as GPS. Active charge control is recommended for DoD satellites which cannot tolerate functional anomalies due to ESD's, and on the first flight of new satellite designs. Passive engineering solutions should be integrated into satellite designs.

USING THE GLOBAL POSITIONING SYSTEM (GPS) TO FULFILL THE POSITION/LOCATION REQUIREMENTS OF THE NATIONAL TRAINING CENTER (NTC) AND OTHER U.S. ARMY INSTRUMENTED TESTING AND TRAINING RANGES

Nolan B. Young-Major, United States Army
B.S., University of Maryland, 1980
Master of Science in Systems Technology-March 1991
Advisors: Bard Mansager-Chief, TRAC-MTRY &
Carl R. Jones-Department of Administrative Sciences

This thesis discusses the use of the Global Positioning System (GPS) to fulfill requirements for exact position/location (P/L) of combat elements of Army testing and training ranges. These requirements include the control of the ranges, measuring effectiveness of employing new systems or doctrine, use in after action reviews (AARs) to discuss battlefield events, recording operations for later analysis, and safety. It also addresses use of GPS equipped systems by the player units while participating in simulated combat on these ranges. The National Training Center (NTC) at Fort Irwin, California, is currently the largest and most complex of the Army's instrumented ranges. It is referred to throughout this thesis for examples of P/L requirement and instrumentation capabilities. The development and fielding of GPS has added a new detention in the Army's ability to accurately measure and record P/L. The designers of future instrumentation upgrades are incorporating GPS capabilities. This thesis will show how capabilities can be improved and money saved by using a coordinated effort when employing GPS on the Army's instrumented ranges.

MASTER OF SCIENCE
IN
TELECOMMUNICATIONS
SYSTEMS MANAGEMENT

IMPROVING THE LAMPS MK III SH-60B HF COMMUNICATION SYSTEM

Frederick C. Adams, Jr.-Lieutenant, United States Navy
Master of Science in Telecommunications Systems Management-September 1991
Advisors: Kenneth L. Davidson-Department of Meteorology &
Dan C. Boger-Department of Administrative Sciences

This thesis examines the over-the-horizon (OTH) communications capability of the SH-60B Seahawk. The LAMPS Mk III communications system incorporates a high frequency (HF) radio in its design to provide reliable two-way voice communications at extended ranges for use during operations that require the helicopter to be below the ship's radio horizon. In addition, the HF radio system is necessary to provide communications with non-LAMPS equipped naval forces and commercial shipping and to provide long-range, sea-air rescue capabilities. Topics addressed with respect to the OTH communications capability of the SH-60B Seahawk are the basics of HF propagation theory, a chronology of events concerning the SH-60B's current communication system and an analysis of issues.

RADIOMEN STAFFING LEVELS FOR THE UNITED STATES COAST GUARD PACIFIC AREA COMMUNICATION SYSTEM

Steven M. Barker-Lieutenant, United States Coast Guard
B.S., United States Coast Guard Academy, 1981
Master of Science in Telecommunications Systems Management-September 1991
Dan C. Boger-Department of Administrative Sciences

The United States Coast Guard maintains four communication stations (COMMSTAs) with the responsibility of providing communication services throughout the Pacific Ocean maritime region. A study of the functions performed at these four stations is presented, their Radiomen staffing level is determined using the current staffing standard and the workload model, and their authorized staffing level is compared. A proposal is made to create one operations facility for the Pacific Area Communication System, where the workload from the four facilities is performed under one roof. The Radiomen staffing level for the proposed facility is determined and compared to the overall staffing level of the four COMMSTAs. The results of this study is that there is a savings of personnel when the four facilities are consolidated. There are discussions qualifying the results of the study with respect to what watch positions may need additional Radiomen. There also are discussions of some potential inaccuracies when using the workload model.

AN OVERVIEW OF CELLULAR TELECOMMUNICATIONS

John Raymond Bucher-Captain, United States Marine Corps
B.A., University of California at Los Angeles, 1982
Master of Science in Telecommunications Systems Management-March 1991
Advisor: Gary K. Poock-Department of Operations Research

The cellular telecommunications industry is one of the fastest growing segments in the international telecommunications domain. Many current communications systems will soon interface with cellular voice and data signals, and this interface will not be restricted to just vehicular cellular. In fact, cellular systems are now even replacing wireline telecommunications systems in certain applications. Today's communications managers and engineers should understand how cellular systems work, and how these systems might be put to work to solve communications requirements. The mobile, low-cost, tetherless characteristics of cellular systems make them ideal candidates for many military needs. This paper provides an overview of current cellular communications systems, and treats their history, theory and operation, applications, and limitations. Additionally, new experimental digital and micro-cellular systems will be introduced and described.

ELECTRONIC DATA INTERCHANGE

J.D. Chung-Major, Korean Army
B.S., Youn Sei University, Korea, 1987
Master of Science in Telecommunications Systems Management-March 1991
Advisor: Myung W. Suh-Department of Administrative Sciences

Electronic data interchange (EDI) is the intercompany, computer-to-computer exchange of business documents in standard formats. The direct benefits of EDI consist in cost savings, operational accuracy, and speedy processing of transactions. This thesis provides guidelines to develop an EDI (Electronic Data Interchange) system. It discusses the basic concepts, standards, data mapping, hardware and software requirements, and networking requirements. Also discussed are some auditing and security issues in implementing EDI.

A STUDY OF THE FEASIBILITY OF A MERGE BETWEEN THE RADIOMAN AND DATA PROCESSING TECHNICIAN RATINGS

Christine Sue Downing-Lieutenant, United States Navy
B.S., Bowling Green State University, 1979
M.S., National-Louis University, 1988
Master of Science in Telecommunications Systems Managment-March 1991
and
Jerry William Leugers-Lieutenant Commander, United States Navy
B.A., University of Louisville, 1979
Master of Science in Telecommunications Systems Management-March 1991
Advisors: Alice M. Crawford & Benjamin J. Roberts-Department of Administrative Sciences

The merging of the telecommunications and automatic data processing desciplines within the U.S. Navy to form Naval Computers and Telecommunications Command will result in many changes in the organization. One such change may be the merge between the enlisted ratings that perform the tasks of Radioman and Data Processing Technician. Background concerning the discipline merger and both ratings is presented, along with a discussion of organizational change. Findings from interviews with subject matter experts and others from both ratings were analyzed together with the results of two independent studies of merger feasibility. The author's recommendation concerning the decision to merge Radiomen and Data Processing Technicians is presented along with possible strategies to accomplish the merger, should the final official decision favor such a change.

LOCAL AREA NETWORKS WITH FIBER OPTICS

Gary Edwards-Lieutenant, United States Navy
B.S., Fort Valley State College, 1985
Master of Science in Telecommunications Systems Management-June 1991
Advisors: Myung Suh-Department of Administrative Sciences &
Thomas Schwendtner-Department of Electrical & Computer Engineering

Today's LANs are governed by two sets of standards. First, the IEEE 802 standards address the needs of low and medium speed LANs employing twisted pair and coaxial cable mediums. Second, the Fiber Distributed Data Interface (FDDI) standard addresses the needs of high speed LANs for backbone connectivity using optical fiber. This thesis examines both sets of standards along with their architecture with an emphasis placed on fiber optics. It is aimed to provide the reader with introductory and tutorial material and function as a primary reference for those who need an understanding of the technology.

INMARSAT COMMUNICATIONS SYSTEM: A SYSTEMS APPROACH

Aristides I. Fasoulas-Lieutenant Commander, Hellenic Navy
B.S., Hellenic Naval Academy, 1976
Master of Science in Telecommunications Systems Management-June 1991
Advisor: Dan C. Boger-Department of Administrative Sciences

This study describes the history of satellite communications from its beginning to the current date and explains the major components of satellite communications. It describes the satellite communications technology, and identifies some of its problems such as speech echo, data transmission and digital network synchronization. It deals with U.S. military and international satellite communications systems, and especially with Inmarsat. It also presents the possible threats for a satellite communications system and discusses how to deal with them. Finally, it introduces some conditions and technical considerations of the Inmarsat system in the Hellenic environment and provides some basic information for choosing a satellite system from an economic point of view.

EFFECT OF ECONOMIC TECHNIQUES ON RADIO FREQUENCY UTILIZATION

Richard N. Fox-Lieutenant, United States Navy
B.A., Millsaps College, 1978
Master of Science in Telecommunications Systems Management-March 1991
Advisor: William R. Gates-Department of Administrative Sciences

This thesis compares the efficacy of spectrum assignment and allocation using a market-based system with the current goverment-controlled regulatory system. In making this comparison, a brief review of the spectrum and its radio communication uses is given. An examination of the current sytems--historical, organizational and political--is also presented. The spectrum is then discussed as a resource in relation to its economic characteristics: supply demand, opportunity costs, prices, externalities and property rights. Although the spectrum is a unique resource as compared to most other natural resources, this conclusion is no valid reason for not allowing the establishment of a spectrum market exists. An examination of how such a market might be established and operated, and the implications of such a market are then discussed, with an example of how this market would operate in the Land Mobile Radio Services. To better illustrate this point, a brief history of land mobile radio, its technology and applications, and current allocation and assignment mechanisms is also presented. This study concludes by discussing the importance of the frequency spectrum to economic growth, summarizes the advantages and disadvantages of both marketplace and government regulation, and proposes that a market trial be instituted to test the viability of a spectral market.

THE COAST GUARD'S VHF-FM NATIONAL DISTRESS SYSTEM: ANALYSIS FOR RECAPITALIZATION

William C. Glidden-Lieutenant, United States Coast Guard
B.A., The College of Wooster, 1974
M.E., Bowling Green State University, 1977
Master of Science in Telecommunications Systems Management-June 1991
Advisor: Dan C. Boger-Department of Administrative Sciences

Twenty years ago the U.S. Coast Guard established the National Distress System (NDS) of VHF-FM remote-controlled transceivers to provide nationwide maritime distress coverage and Coast Guard C^2 communications. The NDS was designed to provide radio coverage along the coasts, the inland waterways, and the Great Lakes. The current NDS equipment is reaching the end of its useful life and the new requirements placed upon the system have mandated its replacement. In this thesis the author first details the C^2 structure of the Coast Guard and identifies its major missions, and then relates history of the NDS. An examination of the NDS' current configuration is performed, the requirements are identified, and applicable technology is explored. The author concludes that present technology and commercially available equipment is available to solve the present and anticipated requirements placed upon the NDS. The author provides a model of the proposed system and presents an implementation schedule for replacement of the NDS.

THE IMPACT OF THE DEFENSE MESSAGE SYSTEM (DMS) ON THE UNITED STATES SURFACE NAVY

Joseph Jason Kinder-Lieutenant, United States Navy
B.A., Linfield College, 1985
Master of Science in Telecommunication Systems Management-June 1991
Advisor: Myung Suh-Department of Administrative Sciences

This theses examines the planned implementation of the DMS and its impact on the Department of Defense (DOD), the Navy and, specifically, naval surface ships. The DMS "phased" planning will be evaluated, with a concentration on several key technological developments that will support the modernization of the DOD messaging system. The primary link to the DMS will be provided by the Base Information Transfer System (BITS) which is the Navy's plan for base-level communication system modernization. The BITS will network all units attached to the base and to include a pierside interface for ships. An overview of the BITS system will be presented with an emphasis on the shipboard interface. Several automated shipboard messaging systems will be reviewed with the primary attention toward their ability to meet future telecommunications requirements in terms of degree of automation, bandwidth constraints, security, manning, training and design.

AN INTEGRATED APPROACH TO THE SELECTION PROCESS OF INDEPENDENT RESEARCH AND DEVELOPMENT PROJECTS

Carol L. Larson-Lieutenant, United States Navy
M.S., Southern Illinois University, 1980
Master of Science in Telecommunications Systems Management-March 1991
Advisor: Dan C. Boger-Department of Administrative Sciences

An active independent research and development (IR&D) program is a contributing factor to the U.S. military's reputation for technologically superior weapon systems and combat support equipment. This thesis examines the current selection process of IR&D projects at Naval Research, Development, Test & Evaluation (RDT&E) Centers and develops a recommendation to tailor the selection process to the characteristics of the project under consideration. The U.S. Navy divides its IR&D projects into two categories, independent research (IR) and independent exploratory development (IED). This thesis recommends that a scoring method be used to select IR projects and an economic method be used to select IED projects. The thesis concludes by discussing future issues that will impact the IR&D programs.

A STUDY OF THE FEASIBILITY OF A MERGE BETWEEN THE RADIOMAN AND DATA PROCESSING TECHNICIAN RATINGS

Jerry William Leugers-Lieutenant Commander, United States Navy
B.A., University of Louisville, 1979
Master of Science in Telecommunications Systems Management-March 1991
and
Christine Sue Downing-Lieutenant, United States Navy
B.S., Bowling Green State University, 1979
M.S., National-Louis University, 1988
Master of Science in Telecommunications Systems Management-March 1991
Advisors: Alice M. Crawford & Benjamin J. Roberts-Department of Administrative Sciences

The merging of the telecommunications and automatic data processing desciplines within the U.S. Navy to form Naval Computers and Telecommunications Command will result in many changes in the organization. One such change may be the merge between the enlisted ratings that perform the tasks of Radioman and Data Processing Technician. Background concerning the discipline merger and both ratings is presented, along with a discussion of organizational change. Findings from interviews with subject matter experts and others from both ratings were analyzed together with the results of two independent studies of merger feasibility. The author's recommendation concerning the decision to merge Radiomen and Data Processing Technicians is presented along with possible strategies to accomplish the merger, should the final official decision favor such a change.

SPEECH RECOGNITION APPLICATION IN C.I.C.

Constantinos P. Leventis-Lieutenant Commander, Hellenic Navy
B.S. in Telecommunications Systems Management, NPS, 1991
Master of Science in Telecommunications Systems Management-September 1991
Advisor: Gary K. Poock-Department of Operations Research

The use of a Continuous Voice Recognition System for data input to tactical tables in the Combat Information Center would improve the man-machine interface and decrease the reaction time of operators who run the tables. The results of this study show that the delay times of trained personnel using manual typing input methods were far greater than when they used continuous speech input to run two tactical tables. Using VERBEX Series 5000 Version 3.00 Continuous Speech Recognition System, the operators' reaction times were improved by a factor of 3.3 and at the same time they committed fewer data entry errors when running the tables with speech input. The subjects who participated in the experiments also subjectively reported that the freedom allowed by speech input was an improvement over manual typing input methods. Using speech input, one operator could run two tactical tables, where now it takes two to three people to do the same job.

UNITED STATES COAST GUARD OPERATIONAL INFORMATION SYSTEMS: IMPROVING FUNCTIONALITY AND CROSS-FUNCTIONALITY

Peter S. Marsh-Lieutenant, United States Coast Guard
B.S., United States Coast Guard Academy, 1982
Master of Science in Telecommunications Systems Management-June 1991
Advisor: James C. Emery-Department of Administrative Sciences

The effective use of information can enable a public agency to better serve the taxpayers, or provide a crucial strategic advantage for a private sector firm. Present U.S. Coast Guard information systems do not provide information to all potential users as effectively as they could. They suffer from several shortcomings: (1) Poor connectivity, resulting in a awkward, torturous information flow which frequently does not provide information to people who need it. (2) Significant overlap in content, resulting in increased workload and frustration for field personnel who enter data and data inconsistencies between applications. (3) Poor user interface designs, resulting in a situation where although information may be accessible to a user, it is difficult to retrieve and therefore not gotten. Cross-functional systems, based on a robust information architecture, offer the potential to dramatically improve information flow and availability within an organization. In the Coast Guard, the flow of operational information can be greatly improved by developing a cross-functional Operations Information System (OIS). Developing such a system is critical to continued effective service to the public, but may require changes in the ways in which systems are developed and funded.

NAVAL RECORD COMMUNICATIONS: DEMAND REDUCTION FOR THE NAVAL TELECOMMUNICATIONS SYSTEM

Kathleen A McClurg-Lieutenant, United States Navy
B.S.I.M., Purdue University, 1985
Master of Science in Telecommunications Management-June 1991
Advisor: William Gates-Department of Administrative Sciences

This thesis analyzes the economic causes for continued excess demand in the Naval Telecommunications System (NTS). It provides a framework for relating the NTS market to the market for all Naval record communications. Substitute systems for specific types of Naval messages are identified along with reasons why these systems are not used. In some cases, facsimile (FAX) or personal computer (PC) networking can substitute for the NTS. Unfortunately, most users do not have access to these systems and/or would have to use their budget to gain access to and use these systems. Using microeconomic analysis, several alternative policies to reduce excess NTS demand are discussed in this thesis. Alternatives explored include; charging prices for NTS use, introducing inefficiencies to the NTS, subsidizing all Naval record communications, and administratively denying NTS use by precedence, community, and/or time period. For various reasons, pricing, introducing inefficiencies, and subsidizing record communications are not considered viable solutions. Administrative denial methods may be a more viable way to reduce demand for the NTS during peak periods.

A COST-EFFECTIVENESS ANALYSIS OF ALTERNATIVE GUIDED MEDIA FOR THE BACKBONE CABLE PLANT PORTION OF THE BASE INFORMATION TRANSFER SYSTEM

Vernon Michael Skelly-Lieutenant, United States Navy
B.S., University of Minnesota, 1984
Master of Science in Telecommunications Systems Management-March 1991
Advisor: William Gates-Department of Administrative Sciences

The Base Information Transfer Sytem (BITS) and the Telephone Modernization Plan (TMP) will upgrade the backbone cable plant of the telephone system on Navy bases. Using a hypothetical Navy base and its existing twisted-pair wire network, this paper analyzes the unique costs of optical fiber and twisted-pair wire for four installation options: immediate installation of optical fiber; time-phased installation twisted-pair wire in trenches; and time-phased installation of twisted-pair wire in existing conduit. The cost analysis indicates that the lowest cost option is twisted-pair wire installed in conduit. However, the cost-effectiveness analysis concludes that time-phased installation of optical fiber is the best alternative due to its performance characteristics.

COAST GUARD COASTAL PATROL BOAT COMMUNICATIONS DEMAND: AN ECONOMIC APPROACH

Curtis A. Stock-Lieutenant, United States Coast Guard
B.S., United States Coast Guard Academy, 1980
M.S., University of Washington, 1986
Master of Science in Telecommunications Systems Management-June 1991
Advisor: William R. Gates-Department of Administrative Sciences

The Coast Guard is examining the requirements for a new Coastal Patrol Boat to replace the aging POINT class patrol boat. The communications capabilities of the new vessel class is of particular interest to its designers. The purpose of this thesis is to analyze the ship/shore data communications need as perceived by the operators. The theoretical framework of the study is based on economic theory and demand forecasting. Communications needs are estimated through a survey of operators both afloat and ashore with experience in the present POINT class patrol boat. Several implementation considerations are presented which, although not directly affecting the communications requirements, are important factors to the survey respondents. Three levels of service, or tiers, are then offered to meet the ship/shore communications needs identified in this study.

EVALUATION AND SELECTION OF A TELECOMMUNICATIONS SYSTEM AT THE NAVAL POSTGRADUATE SCHOOL BOQ

Joseph Robert Stone-Lieutenant, United States Navy
B.S., University of South Carolina
Master of Science in Telecommunications Systems Management-March 1991
Advisor: Myung W. Suh-Department of Administrative Sciences

Acquiring telecommunication equipment and services requires a business approach in developing requirements and translating them into an RFP. The purpose of this thesis is to demonstrate the actual specification for a Digital Private Branch Exchange (DPBX) and Voice Response System and the review of Request For Proposals (RFP) in order to select the most effective proposal. The approach used towards evaluating vendor proposals consists of Life Cycle Analysis, Net Present Value, and Total System Effectiveness models.

A FRAMEWORK FOR IMPROVING INTEGRATIVE FACTORS IN C^3I SYSTEMS OF THE ARGENTINE ARMY

Eduardo Alfredo Trotta-Major, Argentine Army
Ingeniero Militar, Escuela Superior Tecnica, Buenos Aries, 1984
Advisor: Dan C. Boger-Department of Administrative Sciences

Achieving integration and interoperability among various different systems is a challenging task. In the particular case of the Argentine Army, this task comprises the reorganization of current applications and their integration with programs under development at different stages. The purpose of this thesis is to identify and analyze the up-to-date tools and techniques that can help the development efforts of the Argentine Army to integrate and make interoperable its current and future systems. This thesis attempts to serve as only a guide for the introduction of ideas, models, tools, and techniques related with the factors that can improve the interoperability in the C^3I system of the Argentine Army. It also attempts to be a compendium of up-to-date information to be used by people who are working in the management of related fields in the Argentine Army.

THE DEVELOPMENT FRAMEWORK OF THE INTEGRATED DIGITAL COMMUNICATION NETWORK FOR R.O.C. ARMED FORCES

Yu-Lin Wang-Lieutenant Commander, Republic of China Navy
B.S., Republic of China Naval Academy, 1979
Master of Science in Telecommunication Systems Management-March 1991
Advisor: Judith H. Lind-Department of Operations Research

This thesis discusses communication systems currently in use by the Republic of China (R.O.C.) Armed Forces and explores ways that the R.O.C. may increase the capability of its national defense by improving current communication networks. Modern network communication and components techniques such as digital data transmission, network protocols, network topologies, switching technologies and transmission media are discussed. The U.S. Defense Data Network (DDN) is used as a model for a successful military network. The DDN technology and Integrated Services Digital Network (ISDN) standards are combined with concepts from modern communication technologies to develop the conceptual framework for a proposed Integrated Defense Communication Network (IDCN) for R.O.C. Armed Forces. This framework is intended for use by the R.O.C. Department of Defense in establishing a nation-wide communication system that will improve its administration management, logistic supply, intelligence collection, and auxiliary tactical communication capabilities.

DECISION-MAKING GUIDE FOR THE PROPOSED COAST GUARD DIFFERENTIAL GLOBAL POSITIONING SYSTEM

Robert J. Wilson-Lieutenant, United States Coast Guard
B.S., United States Coast Guard Academy, 1980
Master of Science in Telecommunications Systems Management-June 1991
Advisors: Dan C. Boger-Department of Administrative Sciences &
Kurt Schnebele-Department of Oceanography

The Coast Guard has begun an initiative to deploy a nationwide Differential Global Positioning System (DGPS) to support Coast Guard missions and to enhance maritime safety in harbor navigation. DGPS service is expected to provide accuracy to within ten meters (95% of the time) to suitably equipped vessels. It would do this by broadcasting corrections to GPS navigation satellite signals, thereby improving accuracy by a factor of ten over standard GPS. The primary emphasis of this thesis is to show how decision making and planning for the DGPS project may be aided by comparing technological alternatives using Cost Effectiveness Analysis (CEA). This method is essentially a means of quantifying effectiveness per dollar of cost. The author consolidates the discussion of key issues within one document, identifies the technical decision criteria, estimates alternative system life-cycle costs, and makes a preliminary finding as to the merits of radiobeacon transmission over a dedicated satellite channel. In order to quantify effectiveness, many performance criteria are consolidated under five "figures of merit": accuracy, availability, coverage, integrity, and adaptability. The inclusion of user equipment prices in life-cycle costs proves to be critical to the preliminary finding in favor of the radiobeacon-based alternative. This CEA model is especially suited to decision making in an environment of technological and policy change, since it can be easily refined and updated over the predicted four-year implementation period.

ADVISOR INDEX

Abenheim, D. 269, 269, 278, 280

Abdel-Hamid, T.K. 130, 133, 140, 149

Adler, R.W. 79, 92

Agrawal, B.N. 33, 33

Atchley, A.A. 43, 97, 98

Bailey, M.P. 288, 294, 305

Barnes, P.D. 53

Barr, D.R. 38, 196, 199, 287, 289, 290, 293, 301, 331

Batteen, M.L. 249, 250, 309

Berzins, V. 50, 57, 67

Bhargavi, H.K. 118, 124, 127, 136

Biblarz, O. 24, 26, 28

Boger, D.C. 104, 168, 172, 183, 208, 285, 299, 340, 341, 341, 342, 342, 347, 347, 349, 350, 351, 354

Bradley, G.H. 286, 289, 299

Brown, D.A. 45, 105

Brown, R.M. 169, 268, 271, 277, 280, 281

Bruneau, T.C. 274, 274, 276

Bui, T.X. 60, 126, 128, 132, 135, 141, 141, 144, 147, 148, 148, 151, 152, 336

Burl, J.B. 75, 81

Buss, C.A. 262, 267, 270, 272, 277, 279

Caldwell, W.J. 300

Callahan, A.J. 301

Canright, D. 100

Carney, R.M. 186

Carrick, P.M. 173, 176, 194, 196, 208, 208, 209, 212, 221

Chiu, C.S. 255, 311

Chu, P.C. 312

Cleary, D.D. 317

Clynch, J.R. 109, 110, 310

Collins, C.A. 310

Colson, W.B. 315, 318

Cooper, A.W. 76, 325

Coppens, A.B. 44, 44

Crawford, A.M. 160, 165, 171, 172, 174, 183, 185, 186, 187, 189, 192, 198, 212, 213, 215, 222, 348, 351

Cristi, R. 3, 86, 103

Dahl, H.A. 44

Davidson, K.L. 251, 254

Davis, D.S. 318, 318

Denardo, B.C. 97, 98

Dolk, D.R. 120, 122, 132, 134, 139, 145, 153

Doyle, R.B. 177, 179, 198, 200, 205, 214, 214

Driels, M.R. 227, 237, 239, 240

Durkee, P.A. 256

Dutta, I. 232, 234, 238

Eagle, J.N. 46, 46

Eberling, G.D. 183, 186, 198

Eitelberg, M.J. 174, 175, 178, 180, 186, 188, 189, 191, 192, 198, 201, 212, 213, 215

Elsberry, R.L. 253

Elster, R.S.	191
Emery, J.C.	352
Esary, J.D.	300
Euske, K.J.	133, 136, 164, 171
Fox, A.G.	228, 230, 235, 240
Fremgen, J.M.	175, 188, 202, 202
Frenzen, C.L.	39
Frew, B.A.	123, 129, 151
Garfield, N.	257, 312
Garrett, S.L.	4, 45, 105
Garwood, R.W.	5, 258, 312
Gates, W.R.	182, 182, 189, 204, 213, 349, 353, 353, 354
Gaver, D.P.	285, 302, 302
Gorman, L.	206, 213, 216
Gragg, W.B.	301
Grassey, T.B.	275
Ha, T.T.	89, 91
Haga, W.J.	117, 117, 125, 130, 130, 131, 133, 136, 137, 140, 142, 145, 147, 148, 150, 154, 181, 195, 211, 219
Haney, R.L.	256
Hannah, J.	110
Harshman, R.	161, 189
Healey, A.J.	233, 234
Healey, J.V.	27
Hebbar, S.K.	10
Hippenstiel, R.	43, 85
Hocevar, S.P.	115, 163, 167, 197

Howard, R.M. 9, 21, 22, 28, 29

Hughes, W.P. 295, 329

Janasamy, R. 81

Jauregui, S. 88

Jones, C.R. 331, 343

Jones, L.R. 163, 169, 210, 219, 221

Joshi, Y. 227, 231

Kamel, M.N. 116, 119, 120, 125, 126, 142, 143, 146, 149, 153, 153, 155, 206

Kanayama, Y. 52, 54, 62, 68

Kang, K. 217

Kelleher, M.D. 17, 228, 231, 231, 234

Kemple, W.G. 288

Kennedy-Minott, R. 277, 281

Kim, D.D. 229

Kline, M.B. 296

Knight R. 138, 155

Knorr, J.B. 82, 85

Kodres, U.R. 103

Kraus, A.D. 80, 88, 91

Lacer, D.A. 329, 330, 331, 335, 335, 336

Lamm, D.V. 167, 179, 197, 200, 203, 207, 217, 220

Larson, H.J. 287

Larraza, A. 3, 98

Latta, G.E. 39

Laurance, E.J. 261, 267, 268

Lawphongpanich, S. 298, 303

Lee, C.H. 75, 84, 321

Lee, H.M. 77, 83

Lee, Y.J. 50, 62, 64, 68, 69, 70, 71, 296, 322

Levien, F.H. 89

Lewis, P.A. 5, 6

Liao, S.S. 126, 145, 153, 167, 181, 202

Ligrani, P.M. 17, 230, 232, 233, 236, 238

Lind, J.H. 291, 355

Lindsay, G.F. 295

Loomis, H.H. 324

Looney, R.E. 275

Lum, V.Y. 49, 66, 69

Lundy, G.M. 53, 54, 59, 339,

Luqi, L. 53, 61, 63

Magnus, R. H. 266, 276

Mansager, B. 343

Marto, P.J. 229, 239

Maruyama, X.K. 315, 317, 322

Matsushima, R.F. 154, 160, 164, 165, 169, 170, 171, 184, 220

McCaffery, J. 121, 131, 138, 143, 151, 159, 162, 170, 190, 191, 201, 207, 222

McCormick, G.H. 278

McGonigal, R.A. 187, 211

McMasters, A.W. 159, 168, 173, 193, 202, 208, 216, 216, 296

Medwin, H. 99

Mehay, S.L. 175, 178, 178, 190

Melese, F. 166, 168, 204

Melich, M. 340

Memory, S.B. 229

Michael, S. 87, 87

Milch, P.R. 182, 293

Miller, J.H. 78, 309, 310

Mitchell, T. 51

Moore,T.P. 193, 194, 210

Moose, P.H. 92

Morgan, M.A. 77, 321, 323

Moses, O.D. 166, 195, 199, 218, 220

Nelson, M.L. 54

Neta, B. 39

Netzer, D.W. 23, 25, 33

Newberry, C.F. 27

Nuss, W.A. 246, 253, 255, 258

Nystuen, J. 99, 249, 255, 258

Olsen, E.A. 266

Olsen, R.C. 316, 343

Panholzer, R.P. 340

Papoulias, F.A. 236, 237, 239

Parry, S.H. 285, 290, 290, 291, 298

Pauley, P.M. 250

Pieper, R.J. 89, 322, 325

Platzer, M.F. 10

Poock, G.K. 141, 292, 330, 347, 352

Powers, J.P. 82

Pratt, D.R. 51, 62, 65

Ramp, S.R. 257, 311

Read, R.R. 46

Roberts, B.J. 185, 192, 203, 348, 351

Robertson, R.C. 88, 90, 91, 104, 323

Roberts, N.C. 168

Rosenfeld, L.K. 311

Rosenthal, R.E. 295, 297, 303

San Miguel, J.G. 128, 162, 166, 174, 176, 179, 181

Sarpkaya, T. 18, 237

Schmidt, L.V. 9, 10, 24, 240, 241

Schnebele, K.J. 110, 355

Schneidewind, N.F. 119, 122, 128, 134, 138, 139, 143, 150

Schwendtner, T.A. 348

Schwirzke, F.R. 316, 316

Sengupta, K. 124, 127, 129, 130, 137, 146, 152

Sessions, S. 205

Shimeall, T.J. 49, 51, 53, 55, 55, 65

Shin, Y.S. 229

Shing, M. 4, 56, 61

Shreeve, R.P. 8

Shukla, S. 81

Soderstrand, M. 324

Solomon, K.A. 298

Stockton, P.N. 271

Stolfi, R.H.S. 263, 330

Subramanian, C.S. 232

Suchan, J.E. 122, 184, 209

Suh, M.W. 71, 116, 119, 137, 146, 195, 348, 350, 354

Terasawa, K. 169, 177, 204

Teti, F.M. 261, 273, 281

Therrien, C.W. 3, 76, 84

Thomas, G.F. 163, 167, 197, 218

Thomas, G.W. 180, 184

Thomas, K.W. 115, 163, 197, 218

Thornton, E.B. 3, 37, 38

Titus, H.A. 78, 86, 90

Tollefson, S.D. 265, 265, 272, 276

Trietsch, D. 161, 185, 203

Tritten, J.J. 263

Tsypkin, M. 262, 266, 267, 272, 273, 280

Tummala, M. 13, 79, 85

Wadsworth, D.V. Z. 77, 304, 339, 339

Walsh, W.J. 294, 300, 302, 304

Walters, D.L. 321

Wash, C.H. 245, 245, 246, 249, 252, 252, 254

Weir, M.D. 37

Whitaker, L.R. 286, 300, 304

Williams, R.T. 251

Wilson, O.B. 44

Winterford, D 264, 264, 270, 279

Wood, E.R. 22, 26

Wood, R.K. 292, 296, 297, 303

Woods, W.M. 305

Wu, C.T. 52, 56, 58, 60, 63, 65, 70, 121

Wu, E.M. 23, 25, 29

Yang, C. 75, 76, 79, 80, 82, 83, 86, 103, 104, 324

Yost, D.S. 166

Ziomek, L.J. 45, 78, 99

Zviran, M. 71, 118, 121, 123, 131, 135, 135, 144, 146, 147, 150

Zweig, D. 115

Zyda, M.J. 49, 51, 57, 58, 59, 62, 64, 65, 65, 67, 70

INITIAL DISTRIBUTION LIST

Defense Technical Information Center 2 Cameron Station Alexandria, VA 22304-6145	2
Naval Postgraduate School Dudley Knox Library Code 52 Monterey, CA 93943-5000	6
Naval Postgraduate School Research Office Code 08 Monterey, CA 93943-5000	

*U.S. GOVERNMENT PRINTING OFFICE: 1992-784-001/62155