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The Department of Defense

DoD DEPARTMENTS/AGENCIES:

Department of the Army

Department of the Navy

Department of the Air Force

DARPA — Defense Advanced Research Projects Agency

Defense Nuclear Agency

Strategic Defense Initiative Organization

DEFENSE SMALL BUSINESS INNOVATION RESEARCH PROGRAM (SBIR)

AD-A224 648

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VOLUME II
NAVY
ABSTRACTS OF PHASE I AWARDS
1989

VOLUME II

NAVY PROJECTS

ABSTRACTS OF PHASE I AWARDS

FROM

FY 1989 SBIR SOLICITATION

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April 1990

PREFACE

On September 11, 1990, the Department of Defense (DoD) announced the selection of small business firms proposals under Phase I of the Fiscal Year (FY) 1989 DoD Small Business Innovation Research (SBIR) Program to be funded upon successful completion of contract negotiations.

The selection of proposals for funding was made from proposals received by the Military Departments, the Defense Advanced Research Projects Agency (DARPA), the Defense Nuclear Agency (DNA), and the Strategic Defense Initiative Organization (SDIO) in response to the FY 1989 solicitation distributed on October 1, 1988 with a closing date of January 6, 1989.

FY 1989 Program

	Number of Topics	Proposals Received	Phase I Awards
Army	86	998	92
Navy	213	2139	323
Air Force	257	3479	337
DARPA	47	596	100
DNA	14	213	14
SDIO	15	860	155
	632	8385	1021

In order to make information available on the technical content of the Phase I projects supported by the Department of Defense SBIR Program, this report presents, in four volumes, the abstracts of those proposals which have resulted in contract awards.

This is Volume II which contains abstracts and contacts for the 323 Phase I projects funded by the Navy from the FY 1989 SBIR Program. Projects funded by other Department of Defense components are published in separate volumes as follows:

- Volume I - Army Projects (Pages 1 - 58)
- Volume III - Air Force Projects (Pages 267 - 484)
- Volume IV - DARPA, DNA and SDIO Projects (Pages 485 - 668)

Venture capital and large industrial firms that may have an interest in the research described in the abstracts in this publication are encouraged to contact the SBIR firm whose name and address is shown.

INTRODUCTION

On July 22, 1982 the President signed the "Small Business Innovation Development Act of 1982" (Public Law 97-219). This law became effective October 1, 1982 and was designed to give small high technology firms a greater share of Federal R&D contract awards.

The SBIR Program consists of three distinct phases. Under Phase I, DoD Components make awards to small businesses, typically of one-half to one man-year effort over a period generally not to exceed six months, subject to negotiation. Phase I is to determine, insofar as possible, the scientific or technical merit and feasibility of ideas or concepts submitted in response to SBIR topics. All DoD topics address specific R&D needs to improve our defense posture. Proposals selected for contract award are those which contain an approach or idea that holds promise to provide an answer to the specific problem addressed in the topic. The successful completion of Phase I is a pre-requisite for further DoD support in Phase II.

Phase II awards will be made only to firms on the basis of results from the Phase I effort, and the scientific and technical merit of the Phase II proposal. In addition, proposals which identify a follow-on Phase III funding commitment from non-Federal sources will be given special consideration. Phase II awards will typically cover two to five man-years of effort over a period generally not to exceed 24 months, also subject to negotiation. The number of Phase II awards will depend upon the success rate of the Phase I effort and availability of funds. Phase II is the principal research or research and development effort, and will require a more comprehensive proposal which outlines the intended effort in detail.

Phase III is expected to involve private-sector investment and support for any necessary development that will bring an innovation to the marketplace. Also, under Phase III, DoD may award follow-on contracts not funded by the SBIR Program for products or processes meeting DoD mission needs.

Selection Criteria

Phase I proposals received in each topic area in the DoD solicitation brochure are evaluated on a competitive basis in the organization which generated the topic, by scientists and engineers knowledgeable in that area and in accordance with the following criteria:

1. The scientific/technical quality of the research proposal and its relevance to the topic description, with special emphasis on its innovation and originality.

2. Qualifications of the principal investigator, other key staff, and consultants, if any, and the adequacy of available or obtainable instrumentation and facilities.

3. Anticipated benefits of the research to the total DoD research and development effort.

4. Adequacy of the Phase I proposed effort to show progress toward demonstrating the feasibility of the concept.

The Act mandates that all Federal Agencies establish an SBIR program if their FY 1982 extramural budgets for R&D exceeded a threshold figure of $100 million. Beginning in FY 1983, DoD must make available the following percentages of its extramural R&D budget for this program:

Public Law 99-443, the "Small Business Innovation Act of 1986" was signed by the President on October 6, 1986. This law re-authorized P.L. 97-219 to extend the "Sunset Clause" to 1993; to continue 1.25 percent taxation of the extramural research and development budget; and excludes from taxation those amounts of the DoD research and development budget obligated solely for operational systems development.

SUBMITTED BY

ABARIS
125 CATRON DR
RENO, NV 89512
CONTRACT NUMBER:
W L MURPHY
TITLE:
EXPERT SYSTEM FOR JOINING COMPOSITE MATERIALS
TOPIC# 12 OFFICE: ONT IDENT#: 37352

AN EXPERT SYSTEM REQUIREMENTS AND DEVELOPMENT PROGRAM IS PROPOSED TO ACHIEVE AN EXPERT SYSTEM FOR JOINING COMPOSITE MATERIALS. THE NEED IS TO ASSIST DESIGN ENGINEERS TO ACCESS LARGE AMOUNTS OF JOINT DESIGN AND DATA THAT IS AVAILABLE. THE EXPERT SYSTEM WILL PROVIDE ALPHA-NUMERIC AND GRAPHICS INFORMATION TO THE DESIGNER TO ASSIST IN THE OPTIMUM SELECTION OF COMPOSITE MATERIALS JOINING TECHNIQUES. THE RESEARCH WILL INCLUDE THE DEVELOPMENT OF AN ARCHITECTURE OF AN EXPERT SYSTEM, A KNOWLEDGE TREE OF COMPOSITES AND OF JOINING TECHNIQUES, AND THE HIERARCHY OF POTENTIAL APPLICATIONS. THE DATABASES OF COMPOSITE JOINING MATERIALS, JOINT DETAILS, AND PROCEDURES THAT EXIST SHOULD BE ACCESSED. A METHOD BY WHICH NEW INFORMATION CAN BE COLLECTED AND ORGANIZED MAY BE REQUIRED. THE NEXT TASK WILL BE TO EXAMINE AVAIL-ABLE EXPERT SYSTEM SHELLS FOR THEIR APPLICABILITY TO THE PROJECT. A SIMPLE MODEL SYSTEM WILL BE DEVELOPED USING AN AVAILABLE DEVELOPMENT AND RUN-TIME SHELL, XI PLUS OR EXSYS, TO FURTHER EXPLORE THE INTER-ACTION OF THE RULES AND DATABASE. THE INPUT/OUTPUT DEVICES WILL BE EXAMINED TO DETERMINE IF VOICE, A MOUSE, OR TOUCH WILL ASSIST THE DESIGNER. A PHASE II EFFORT WOULD RESULT IN A RUN-TIME SYSTEM THAT WAS MODULAR IN CONCEPT AND EXPANDABLE TO INCORPORATE NEW DATABASES AS THEY BECOME AVAILABLE.

ADCOM SYSTEMS INC
30 GRANT ST
WALTHAM, MA 02154
CONTRACT NUMBER:
DR E J BAGHDADY
TITLE:
ACCURATE PASSIVE RANGING TECHNIQUES
TOPIC# 207 OFFICE: NOSC IDENT#: 37919

SUBMITTED BY

INNOVATIVE TECHNIQUES ARE PROPOSED FOR INVESTIGATION IN A PHASE I EFFORT TO DETERMINE PASSIVE RF SURVEILLANCE AND TARGETING SENSORS AND ASSOCAITED METHODOLOGY FOR PERFORMING RAPID AND ACCURAGE MEASUREMENTS OF RANGE/LOCATION OF THREAT RF EMITTERS. THE ESSENTIAL PHYSICAL CONSTRAINTS TO BE OBSERVED ARE SENSOR COMPATIBILITY WITH, AND PORTABILITY OF THE ASSOCIATED RANGE DETERMINATION/PROCESSING EQUIPMENT ON, AN AIRBORNE PLATFORM. THE INNOVATIVE TECHNIQUES OUTLINED IN THIS PROPOSAL OFFER VERY PROMISING ALTERNATIVE OPTIONS FOR REALIZING PASSIVE RF RANGING SYSTEMS THAT SATISFY THESE CONSTRAINTS. THESE TECHNIQUES WILL BE EVALUATED ANALYTICALLY IN THE PROPOSED PHASE I EFFORT. DESIGN ANALYSES WILL BE PERFORMED TO DEFINE THE TRADEOFFS IN THE PRACTICAL IMPLEMENTATIONS WITHIN THE DYNAMIC ENVIRONMENT OF AIRBORNE PLATFORMS WITH VARIABLE ATTITUDE, POSITION AND ASSOCIATED RATES AND OTHER SIGNIFICANT CONSIDERATIONS. DEFINITIVE SENSOR CONFIGURATIONS, SENSOR PROCESSING SCHEMES/TECHNIQUES, COMPUTATIONAL ALGORITHMS AND OPERATING MODALITIES WILL BE FIRMED UP, AND DESIGN AND IMPLEMENTATION LATITUDES WILL BE ESTABLISHED, COMPLETE WITH PERFORMANCE PREDICTIONS, AND A PLAN FOR PROOF-OF-METHOD EXPERIMENTS AND A HARDWARE DEVELOPMENT PROGRAM FOR PHASE II.

ADVANCE RATIO DESIGN CO INC
2540 GREEN ST - JEN INDUSTRIAL CAMPUS
CHESTER, PA 19013
CONTRACT NUMBER:
DAVID F THOMPSON
TITLE:
MONOLITHIC COMPOSITE PERISCOPE FAIRING
TOPIC# 108 OFFICE: NAVSEA IDENT#: 36779

SUBMARINE PERISCOPE AND ANTENNA MAST ASSEMBLIES ARE CURRENTLY CONFIGURED WITH AN INTERNAL METALLIC STRUCTURAL MEMBER SURROUNDED BY A TWO PIECE FRP FAIRING. THE FORWARD AND AFT FAIRING COMPONENTS ARE MECHANICALLY FASTENED TO THE INTERNAL STRUCTURE ALONG THEIR EDGES. THIS PROJECT WILL INVESTIGATE THE FEASIBILITY OF DESIGNING AND FABRICATING A ONE PIECE ADVANCED TECHNOLOGY COMPOSITE STRUCTURE TO REPLACE THE EXISTING BUILT-UP CONFIGURATION. THE PROPOSED EFFORT WILL INCLUDE THE FOLLOWING ACTIVITIES: 1. ESTABLISH APPLICABLE

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DESIGN CRITERIA; 2. CONDUCT PRELIMINARY DESIGN STUDY; 3. EXAMINE TOOLING REQUIREMENTS; AND 4. DEVELOP PROGRAM OUTLINE AND ESTIMATE COSTS FOR PROTOTYPE AND PRODUCTION FABRICATION.

ADVANCED COMMUNICATION SYSTEMS INC
1900 N BEAUREGARD ST - STE 300
ALEXANDRIA, VA 22311
CONTRACT NUMBER:
THOMAS A COSTELLO
TITLE:
PROTOCOL DEVELOPMENT FOR SECURE VOICE NETWORK MANAGEMENT
TOPIC# 41 OFFICE: SPAWAR IDENT#: 36961

THE INTEGRATION OF VOICE AND DATA PRESENTS AN OPPORTUNITY TO USE HERETOFORE IDLE SECURE VOICE LINK CAPACITY, AND THE CHALLENGE OF IMPLEMENTING PROTOCOLS SUPPORTING BOTH VOICE AND DATA. THE NEW ARCHITECTURE DEMANDS A LAYERED FUNCTIONAL IMPLEMENTATION SIMILAR TO THE INTERNATIONAL STANDARDS ORGANIZATION (ISO) OPEN SYSTEMS INTER-CONNECT (OSI) MODEL AND THE ABILITY TO GLOBALLY ADDRESS ANY MESSAGE, DATA FILE OR VOICE CALL. NETWORK MANAGEMENT AND PROTOCOL FUNCTIONS MUST BE DATA TRANSPARENT WHILE PROVIDING THE THROUGHPUT, TIMELINESS AND RESPONSIVENESS DEMANDED BY ALL USER COMMUNITIES. THESE PROTOCOLS MUST SUPPORT COMPUTER TO COMPUTER DATA EXCHANGE WITHIN A NETWORK AND SATISFY THE RAPID ACCESS DEMANDS OF SECURE VOICE USERS WHO EXPECT SECURE VOICE CALL PLACEMENT WITHIN SECONDS. THESE CHALLENGES MUST BE MET IN A COMMUNICATION ENVIRONMENT HAVING PROPAGATION TIMES RANGING FROM MILLISECONDS IN UHF LOS TO SECONDS FOR THE HIGHLY INTERLEAVED MILSTAR WAVEFORM. PHASE I WILL HAVE THREE TECHNICAL OBJECTIVES: 1) FULLY CHARACTERIZE THE SECURE VOICE ADDRESSING REQUIREMENTS AND DETERMINE THE CSS ADDRESS MAPPING AND/OR CONVERSION FUNCTIONS REQUIRED; 2) DEFINE AND DEVELOP THE OVERALL PROTOCOL REQUIREMENTS FOR SEVOX/DATA OPERATION WITHIN THE CSS MULTI-MEDIA ENVIRONMENT; AND 3) DEVELOP STRAWMAN PTOTOCOLS FOR EACH CSS MEDIA BASED ON THE IDENTIFIED REQUIREMENTS.

ADVANCED COUNTER-MEASURE SYSTEMS
9838 OLD PLACERVILLE RD
SACRAMENTO, CA 95827
CONTRACT NUMBER:
DR JEFF REED
TITLE:
THE SPECTRAL CORRELATION DISCRIMINATOR: A TECHNIQUE FOR DETECTIN IDENTIFYING AND SORTING SPREAD SPECTRUM SIGNALS
TOPIC# 25 OFFICE: SPAWAR IDENT#: 37436

SUBMITTED BY

THE PROPOSED SPREAD-SPECTRUM DETECTION AND PARAMETER ESTIMATION TECHNIQUE, THE SPECTRAL CORRELATION DISCRIMINATOR (SCD), PROVIDES A MEANS OF PROCESSING WIDE-BAND SPREAD-SPECTRUM SIGNALS CORRUPTED BY COCHANNEL INTERFERENCE. THE SCD DISCRIMINATES AGAINST INTERFERING SIGNALS THAT DO NOT EXHIBIT CERTAIN SPECTRAL CORRELATION PROPERTIES. THE SPECTRAL CORRELATION OF A SIGNAL DEPENDS ON ITS SIGNAL PARAMETERS: MODULATION TYPE, CHIP RATE, BAUD RATE, CARRIER FREQUENCY, HOP RATE, PULSE SHAPING, AND BANDLIMITING. THE SCD CAN ELIMINATE ALL SIGNALS THAT DO NOT HAVE A PARTICULAR SIGNAL PARAMETER. DETECTING THE SIGNAL IS SIMPLY A MATTER OF EXAMINING THE PROCESSED SIGNAL SPECTRUM AFTER NOISE AND INTERFERENCE HAVE BEEN SUPPRESSED BY THE SCD. ONCE THE SCD HAS DETERMINED THE EXISTENCE OF A TARGET SIGNAL, APPROPRIATE COUNTERMEASURES CAN BE APPLIED TO THE TARGET SIGNAL. ONE COUNTERMEASURE WOULD BE TO PLACE A REPEATER JAMMER AT THE OUTPUT OF THE CSD. THE ADVANTAGE HERE IS THAT THE JAMMER POWER WOULD ONLY BE APPLIED TO THE TARGET SIGNAL AND NOT TO EXTRANEOUS SIGNALS IN THE BAND.

ADVANCED DECISION SYSTEMS
1500 PLYMOUTH ST
MOUNTAIN VIEW, CA 94043
CONTRACT NUMBER:
GREGORY J COURAND
TITLE:
DECEPTION METHODS FOR FUEL-BASED DECISION AIDS IN ADVERSARIAL ENVIRONMENTS
TOPIC# 9 OFFICE: ONR IDENT#: 37583

AUTOMATIC AIDS FOR SITUATION ASSESSMENT, GENERAL INFORMATION FUSION, DECISION MAKING AND PLANNING ARE VULNERABLE TO DECEPTION IN ADVERSARIAL SITUATIONS. COUNTER-DECEPTION CAPABILITIES TO DETECT POSSIBLE DECEPTIVE ACTIONS AND OBTAIN THE CORRECT ASSESSMENT ARE NEEDED TO PRESERVE THE EFFECTIVENESS OF THESE AIDS. THE PROPOSED RESEARCH WILL CREATE TECHNOLOGICAL SUPPORT SO THAT THE EFFECTS OF DECEPTION ON PROBLEM-SOLVING SYSTEMS ARE RECOGNIZED AND MITIGATED AS MUCH AS POSSIBLE. THE SPECIFIC OBJECTIVES FOR PHASE I ARE TO ELUCIDATE THE PROBLEM OF PROVIDING AUTOMATED SUPPORT FOR COUNTER-DECEPTION AND TO DESIGN A GENERAL PROBLEM-SOLVING SUPPORT SYSTEM THAT

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WILL PERFORM A PROBLEM-SOLVING TASK, AND ALSO ASSIST THE USER IN DEALING WITH DECEPTION RELATIVE TO THE PROBLEM-SOLVING TASK. THE FOUR CATEGORIES OF COUNTERDECEPTION SUPPORT ARE: EXPLICIT REPRESENTATION OF DECEPTION CONCEPT, MULTIPLE REASONING METHODS, SYSTEM-WIDE REPRESENTATION, AND SYSTEM CONTROL. THE PHASE I EFFORT WILL RESULT IN A DESIGN OF A DECEPTION-RESISTANT PROBLEM SOLVING SUPPORT SYSTEM FROM WHICH A PROTOTYPE WILL BE BUILT IN PHASE II.

ADVANCED MECHANICAL TECHNOLOGY INC
151 CALIFORNIA ST
NEWTON, MA 02158
CONTRACT NUMBER:
FOREST J CARIGNAN
TITLE:
QUANTITATIVE LUBRICATING OIL DEBRIS MONITORING AND ANALYSIS
TOPIC# 123 OFFICE: NAVSEA IDENT#: 35774

THE OBJECTIVE OF THE PROPOSED PROJECT IS TO EVALUATE THE FEASIBILITY OF AN ON-LINE MONITOR OF OIL CONDITION WHICH WOULD DETECT THE PRESENCE AND NATURE OF DEBRIS PARTICLES IN LUBRICATING OIL SYSTEMS. THIS WOULD PROVIDE A MORE TIMELY AND LESS LABOR INTENSIVE METHOD OF OIL CONDITION MONITORING THAN PRESENT METHODS THAT INVOLVE OFF-LINE ANALYSIS. THE PROPOSED APPROACH WOULD CONSIST OF MEASURING THE FORCES GENERATED AS WEAR PARTICLES IN THE LUBRICATING STREAM ENCOUNTER THE ROLLERS OF A SPECIFICALLY INSTRUMENTED ROLLING ELEMENT BEARING. THE PHASE I STUDY WOULD INVESTIGATE SOME OF THE KEY FACTORS AFFECTING THE FEASIBILITY OF THE CONCEPT, AND WOULD PRODUCE A PROOF-OF-PRINCIPLE MODEL OF THE SYSTEM.

ADVANCED RSCH & APPLICATIONS CORP/ARACOR
425 LAKESIDE DR
SUNNYVALE, CA 94086
CONTRACT NUMBER:
JOHN A PENKETHMAN
TITLE:
EVALUATION OF X-RAY MICROTOMOGRAPHY FOR ENERGETIC MATERIALS CHARACTERIZATION
TOPIC# 134 OFFICE: NSWC IDENT#: 35864

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THE DEVELOPMENT OF ADVANCED CHEMICAL SYSTEMS WOULD BENEFIT GREATLY FROM THE AVAILABILITY OF NEW INSPECTION TECHNIQUES WHICH COULD IMAGE MATERIALS WITH SUBMIRCON RESOLUTION. BENEFITS OF SUCH A CAPABILITY WOULD INCLUDE THE ABILITY TO NONDESTRUCTIVELY EXAMINE SAMPLES IN THREE DIMENSIONS TO HIGH RESOLUTION; OBTAIN SPATIALLY RESOLVED CHEMICAL ELEMENT MAPS; EXAMINE FILLER PARTICLE SIZE DISTRIBUTIONS; MAKE PARTICLE SIZE AND HOMOGENEITY MAPS AND/OR HISTOGRAMS; DETERMINE PARTICLE COMPOSITION; EXAMINE AVOID SIZES AND MAKE VOID MAPS. A PHASE I PROGRAM TO EXTEND MICROTOMOGRAPHY TO SAMPLE SIZES AND SCAN TIMES OF PRACTICAL VALUE FOR THE CHARACTERIZATION OF ENERGETIC MATERIALS IS PROPOSED. SPECIFICALLY, PHASE I WILL IMPLEMENT PROOF-OF-PRINCIPLE EXPERIMENTS TO DEMONSTRATE THAT LAYERED SYNTHETIC MICROSTRUCTURE (LSM) MONOCHROMETERS CAN BE USED TO ENHANCE, BY AT LEAST AN ORDER OF MAGNITUDE OVER PRESENT MONOCHROMETER DESIGNS, THE RADIATIVE FLUX NECESSARY FOR MICROTOMOGRAPHIC IMAGING. IF DESIRED, THIS INCREASE FLUX CAN BE TRADED FOR INCREASED RADIATION ENERGY, MAKING IT POSSIBLE FOR THE FIRST TIME TO PERFORM SUBMICRON CT SCANS AT ENERGIES IN THE 30-69 keV RANGE. A SURVEY OF THE RESEARCH NEEDS OF ENERGETIC MATERIALS COMMUNITY WILL BE MADE TO DETERMINE THE PRECISE RANGE OF SIZES, MATERIALS, SCAN TIMES, AND TEST SCENARIOS THAT WOULD BE MOST BENEFICAL. DESIGN CONCEPTS WILL BE DEVELOPED FOR BOTH A SCANNER SYSTEM USING A LABORATORY X-RAY SOURCE AND ONE USING A SYNCHROTRON SOURCE. A TOMOGRAPHIC IMAGE USING AN LSM MONOCHROMETER WILL BE OBTAINED AT AN EXISTING SYNCHROTRON LABORATORY.

ADVANCED SYSTEM TECHNOLOGIES INC
12200 E BRIARWOOD AVE - STE 260
ENGLEWOOD, CO 80112
CONTRACT NUMBER:
WILLIAM F DUDZIK
TITLE:
A LOCAL AREA NETWORK RECONFIGURATION ANALYSIS TOOL
TOPIC# 50 OFFICE: SPAWAR IDENT#: 37011

TWO LOCAL AREA NETWORK (LAN) STANDARDS, IEEE 802.5 AND ANSI X3T9.5 FFDDI, HAVE SEEN INCREASED USE AMONG BOTH MILITARY AND INDUSTRIAL USERS ESPECIALLY FOR APPLICATIONS WHICH HAVE TIME-CRITICAL PERFORMANCE REQUIREMENTS. THESE STANDARDS ARE THE BASIS OF PROPOSED

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NAVY STANDARDS, DESIGNATED SAFENET-I AND SAFENET-II. IN THE EVENT OF A FAILURE, A KEY PERFORMANCE PARAMETER ESSENTIAL TO DESIGNERS OF TIME-CRITICAL APPLICATIONS IS THE CAPACITY OF THESE PROTOCOLS TO RECONFIGURE THE NETWORK IN A PREDICTABLE AMOUNT OF TIME. CONSEQUENTLY, THERE IS A NEED TO DEVELOP A HIGHLY ACCURATE TOOL FOR ANALYZING AND THEN OPTIMALLY FINE-TUNING LOCAL AREA NETWORK RECONFIGURATION TIMES IN RESPONSE TO VARIOUS FAILURE SCENARIOS. THE ULTIMATE GOAL OF THE PROPOSED RESEARCH IS THE DEVELOPMENT OF SUCH A TOOL. THE TOOL WILL CONSIST OF A FIMULATION MODEL IMPLEMENTED ON A PARALLEL PROCESSOR AND A SIMULATED ANNEALING OPTIMIZATION TECHNIQUE. THE MAJOR INNOVATION IN THE PROPOSED RESEARCH IS THE UNIQUE INTEGRATION OF GRAPHICAL REPRESENTATION OF NETWORKS, DISTRIBUTED SIMULATION USING ADAPTIVE TIME WARP, AND A TECHNIQUE FOR DETERMINING SETS OF NETWORK PARAMETER VALUES WHICH MINIMIZE LAN RECONFIGURATION TIMES. SATISFYING TWO TECHNICAL OBJECTIVES WILL DEMONSTRATE THE TECHNICAL FEASIBILITY OF THE PROPOSED APPROACH: (1) DESIGNING A SIMULATION MODEL THAT ACCURATELY AND EFFICIENTLY ESTIMATES THE NETWORK RECONFIGURATION TIME IN RESPONSE TO VARIOUS TYPES OF NETWORK FAILURE SCENARIOS AND (2) DEVELOPING A TECHNIQUE THAT GUIDES THE NETWORK DESIGNER TOWARDS A DESIGN THAT MINIMIZES RECONFIGURATION TIME SUBJECT TO VARIOUS CONSTRAINTS.

ADVANCED SYSTEMS TECHNOLOGY CORP (ASTEC)
9111 EDMONSTON RD - STE 404
GREENBELT, MD 20770
CONTRACT NUMBER:
HASAN H SAYANI
TITLE:
DEVELOPMENT OF A HIGHER-ORDER META MODEL FOR SYSTEMS DEVELOPMENT
TOPIC# 157 OFFICE: NSWC IDENT#: 36091

EACH PHASE OF THE DEVELOPMENT LIFE CYCLE IS IMPORTANT AND THE PRODUCTS OF EACH ARE ESSENTIAL FOR A SUCCESSFUL SYSTEM. HOWEVER, DEVELOPMENT TECHNIQUES AND TOOLS ARE PHASE-SPECIFIC AND DO NOT COMMUNICATE WITH ONE ANOTHER. WE BELIEVE THAT THIS IS THE CASE BECAUSE DEVELOPERS HAVE NOT YET DISCOVERED A UNIFYING CONCEPTUAL MODEL OF INFORMATION SYSTEM DEVELOPMENT CONSTRUCTS APPLICABLE TO THE WHOLE LIFE CYCLE. WE PROPOSE TO SURVEY CURRENT TECHNOLOGY FOR ALL LIFE CYCLE PHASES, FORMULATE AN INTEGRATED CONCEPTUAL MODEL, INDICATE

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THE RELATIONSHIPS BETWEEN CONSTRUCTS IN THE INDIVIDUAL PHASES, DEMONSTRATE HOW CURRENT TECHNIQUES AND TOOLS RELATE TO THIS INTEGRATED CONCEPTUAL MODEL, AND ESTABLISH SPECIFICATIONS FOR AN INFORMATION REPOSITORY BASED ON THIS INTEGRATED CONCEPTUAL MODEL. ACHIEVEMENT OF THESE OBJECTIVES WILL ENABLE NSWC TO DEMONSTRATE HOW THE COMPLETE SYSTEM DEVELOPMENT LIFE CYCLE CAN BE ADDRESSED, HOW DIFFERENT SYSTEM DEVELOPMENT TECHNIQUES AND TOOLS FROM VARIOUS VENDORS CAN BE INTEGRATED, AND HOW TO REPRESENT EACH DEVELOPMENT PHASE, MAKE TRANSITIONS FROM ONE PHASE TO THE NEXT, AND MAINTAIN TRACEABILITY BETWEEN PHASES.

ADVANCED TECHNOLOGY MATERIALS INC
520-B DANBURY RD
NEW MILFORD, CT 06776
CONTRACT NUMBER:
DR WARD C STEVENS
TITLE:
MOCVD OF CONTINUOUSLY REINFORCED CARBIDES
TOPIC# 146 OFFICE: NSWC IDENT#: 35989

HYPERSONIC AND SUPERSONIC SPEEDS ARE FEASIBLE DUE TO ADVANCES IN AEROSPACE ENGINEERING, VEHICLE DESIGN, AND PROPULSION TECHNOLOGY. THE EFFICIENCIES, RELIABILITY, AND ULTIMATE POTENTIAL OF AIR BREATHING PROPULSION SYSTEMS HINGE UPON NEW MATERIALS THAT CAN SURVIVE THE HARSH COMBUSTION ENVIRONMENTS. HAFNIUM AND ZIRCONIUM CARBIDE AND BORIDE MATRICES ARE CANDIDATE MATERIALS SYSTEMS, BUT ONLY IF MANUFACTURING METHODS CAN BE DEVELOPED. CHEMICAL VAPOR INFILTRATION (CVi) PROCESSES BASED UPON THE DECOMPOSITION OF THE METAL HALIDES SUFFER FROM NON-STOICHIOMETRIC DEPOSITS, INCOMPLETE INFILTRATION, AND LOW DENSITY. THE DEPOSITION KINETICS OF ORGANO-METALLAIC CHEMICAL VAPOR DEPOSITION (OMCVD) BASED PROCESSED MAY BE CONTROLLED TO PERMIT COMPLETE INFILTRATION OF CARBON PREFORMS, AND THUS OFFERS AN ATTRACTIVE ALTERNATIVE TO METAL HALIDE CVI. IN PHASE I WE WILL STUDY THE DECOMPOSITION OF ORGANOMETALLIC HAFNIUM CARBIDE SOURCE REAGENTS, QUANTIFY AND MODEL THE INFILTRATION CAP-ABILITIES OF THE OMCVD PROCESS, AND INFILTRATE A CARBON PREFORM. THE INFILTRATION CARBON PREFORM WILL BE DELIVERED FOR EVALUATION. IN PHASE II, WE WILL EXTEND THE METHOD TO INCLUDE MIXED CARBIDE/NITRIDE/BORIDE SYSTEMS WHICH ARE PREDICTED TO OFFER THE

SUBMITTED BY

ULTIMATE IN OXIDATION PROTECTION.

ADVANCED TECHNOLOGY MATERIALS INC
530-B DANBURY RD
NEW MILFORD, CT 06776
CONTRACT NUMBER:
DR PETER S KIRLIN
TITLE:
DEVELOPMENT OF A LOW LOSS PLANAR HTSC MILLIMETER WAVE MIXER
TOPIC# 169 OFFICE: NSWC IDENT#: 36200

MANY INFRARED AND ELECTRO-OPTICAL IMAGING SYSTEMS ARE CONFOUNDED BY FOG AND DUST. MILLIMETER EAVE IMAGING SYSTEMS WOULD NOT BE AFFECTED BY THESE BATTLEFIELD OBSCURANTS. HOWEVER, THE LIQUID HELIUM COOLING REQUIREMENT OF TODAYS HIGH PERFORMANCE LOW NOISE MIXERS IS BLOCKING THE DEPLOYMENT OF ADVANCED MILLIMETER WAVE COMMUNICATIONS AND IMAGING SYSTEMS. IN PRINCIPAL, JOSEPHSON MIXERS FABRICATED WITH THE NEW HIGH T(c) SUPERCONDUCTORS (HTSC) COULD ALEVIATE THIS CONSTRAINT. HOWEVER, SEVERAL PROCESSING PROBLEMS NEED TO BE OVERCOME BEFORE THE MANUFACTURE OF MILLIMETER WAVE MIXERS CAN BE ACHIEVED. THE OBJECTIVE OF THE PHASE I PROGRAM IS TO DETERMINE THE FEASIBILITY OF PRODUCING HTSC MIXERS WITH JOSEPHSON JUNCTIONS MADE FROM THE GRAIN BOUNDARIES TRANSVERSING 10 x 5 MICRON(2) MICROBRIDGES. FOUR WAFERS CONTAINING EIGHT DEVICES EACH WILL BE PROCESSED. THE PROPERTIES OF THE FILMS WILL BE CORRELATED TO THE I-V CURVES OF HTSC MICROBRIDGES. THESE RESULTS WILL ESTABLISH PERFORMANCE VARIATIONS BETWEEN DEVICES AND OVERALL DEVICE YIELD. PHASE II WILL FOCUS ON THE PROCESSING, PACKAGING AND TESTING OF THE HTSC MIXERS AT 100 GHz. THE MAJOR ADVANTAGE OF THIS APPROACH IS THAT RATHER THAN REQUIRING PERFECT THIN FILMS, IT UTILIZES FLAWS PRESENT IN THE CURRENTLY AVAILABLE MATERIAL TO PLACE A WORKING PROTOTYPE INTO THE FIELD.

ADVANCED TRACKING TECHNOLOGY CORP
4195 VALLEY FAIR - STE 103
SIMI VALLEY, CA 93063
CONTRACT NUMBER:
JOHN S JASPER
TITLE:
HIGH SPEED TRACKER ALGORITHMS STUDY
TOPIC# 80 OFFICE: NAVAIR IDENT#: 36422

SUBMITTED BY

THREE DIFFERENT TRACK SMOOTHING ALGORITHMS WILL BE EVALUATED USING AN AUTOMATIC TRACKING SYSTEM DRIVEN BY BOTH A RADAR TARGET SIMULATOR AND A PASSIVE TARGET (ESM) SIMULATOR. THE ACTIVE TRACK SMOOTHING ALGORITHMS ARE ALSO TESTED USING PLAYBACK OF PREVIOUSLY RECORDED LIVE RADAR DATA. ALL PROCESSING IS PERFORMED ON IBM PC-COMPATIBLE COMPUTERS USING EXISTING HARDWARE, AND EXISTING SOFTWARE MODIFIED WITH THE SMOOTHING ALGORITHMS TO BE EVALUATED.

ADVEC CORP
2176 LA TIERRA RD
LOS ALAMOS, NM 87544
CONTRACT NUMBER: N00039-89-C-0230
DR WILBUR K BROWN
TITLE:
COMPACT HIGH POWER LASERS FOR MODERN DEFENSE APPLICATIONS
TOPIC# 18 OFFICE: SPAWAR IDENT#: 37198

THE DEVELOPMENT OF COMPACT, HIGH ENERGY DENSITY, HIGH POWER (AND POTENTIALLY C.W.) LASER SYSTEMS CAPABLE OF PROPAGATING THROUGH BOTH AIR AND WATER COULD PAVE THE WAY FOR NEXT GENERATION TACTICAL NAVAL SYSTEMS. APPLICATIONS IN OTHER DEFENSE AREAS AS WELL AS A HOST OF COMMERCIAL APPLICATIONS ARE ALSO POSSIBLE WITH THESE TYPES OF SYSTEMS. WE PROPOSE TO PROVIDE A DETAILED PLAN AND DESIGN OF SPECIFIC EXPERIMENTS IN PHASE I AND TO BUILD AND CARRY OUT IN PHASE II SCALABLE LASER EXPERIMENTS TO DEMONSTRATE PROOF-OF-PRINCIPLE FOR THESE COMPACT HIGH ENERGY DENSITY LASING SYSTEMS.

AERO-CHEM RESEARCH LABS INC
PO BOX 12
PRINCETON, NJ 08542
CONTRACT NUMBER:
H F CALCOTE
TITLE:
PRODUCTION AND COATING OF FUEL BORON POWDERS
TOPIC# 7 OFFICE: ONR IDENT#: 37555

A NEW PROCESS IS PROPOSED TO SYNTHESIZE PURE SPHERICAL BORON POWDERS

SUBMITTED BY

COATED WITH EITHER TITANIUM OR ZIRCONIUM FOR USE IN ENERGETIC PROPELLANTS AND EXPLOSIVES. THE PROCESS IS BASED ON A PROCESS PREVIOUSLY DEVELOPED BY AERO-CHEM TO PRODUCE PHOTOVOLTAIC SILICON. IT INVOLVES THE REACTION OF VAPOR PHASE SODIUM WITH BORON TRICHLORIDE AND TITANIUM (OR ZIRCONIUM) CHLORIDE AND EXPANSION OF THE PRODUCTS THROUGH A SUPERSONIC NOZZLE TO PRODUCE THE DESIRED PRODUCT WITH PARTICLE DIAMETERS IN THE RANGE OF 0.5 TO 50 MICRONS. THE METAL COATING IS REQUIRED TO PREVENT OXIDE BUILDUP ON THE BORON SURFACE DURING HANDLING AND IN THE EARLY STAGES OF COMBUSTION. THE COATING WILL BE APPLIED PRIOR TO EXPOSURE OF THE NEWLY FORMED BORON PARTICLE TO AMBIENT AIR AND THE COATING THICKNESS WILL BE LIMITED SO THAT THE COMBUSTION ENERGY IS NOT REDUCED BY MORE THAN 10% OF THAT FROM PURE BORON. THE MAJOR RESEARCH PROBLEMS TO BE SOLVED INVOLVE DEFINING THE APPROPRIATE OPERATING CONDITIONS TO PRODUCE COATED BORON PARTICLES AND THE COLLECTION OF THE FINE COATED PARTICLES FROM HOT SODIUM CHLORIDE VAPOR.

AKM ASSOC INC
635 MARINER'S ISLAND BLVD - @205
SAN MATEO, CA 94404
CONTRACT NUMBER:
DR CARL PONDER
TITLE:
EFFECTS OF COMPILER AND RUN-TIME SYSTEM FEATURES ON FUTURE COMBAT SYSTEMS DESIGNS
TOPIC# 24 OFFICE: SPAWAR IDENT#: 37424

IN THE PHASE I EXPLORATORY DEVELOPMENT EFFORT, AKM ASSOCIATES PROPOSES TO PERFORM AN ADA RUNTIME SUPPORT REQUIREMENTS ANALYSIS BASED ON THE STUDY OF A NUMBER OF REAL-TIME EMBEDDED SYSTEMS, AS WELL AS DEFINE A METHODOLOGY FOR ASSESSING THE RUNTIME SUPPORT REQUIREMENTS FOR COMMON NAVY COMBAT SYSTEMS USING ADA. THE OVERALL EFFORT WILL CONSIST OF FOUR STEPS: (1) IDENTIFY THE CRITICAL AREAS OF EMBEDDED SYSTEM PERFORMANCE WHERE AVAILABLE ADA SYSTEMS ARE EXPECTED TO BE DEFICIENT; (2) STUDY THE RUN-TIME SUPPORT REQUIREMENTS OF SOME EXISTING EMBEDDED SYSTEMS. THIS WILL BE ACCOMPLISHED BY EXAMINING THE CODE, DOCUMENTATION, AND EXECUTION OF EACH EMBEDDED SYSTEM, EXTRACTING A SET OF REQUIREMENTS FROM EACH SYSTEM; (3) PRODUCE A REQUIREMENTS DOCUMENT CLASSIFYING THE STUDIED EMBEDDED SYSTEMS IN

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TERMS OF THE RELEVANT AREAS OF NECESSARY PERFORMANCE, WHICH WILL INCLUDE DESCRIPTION OF THE METHODOLOGY FOR STUDYING A GIVEN EMBEDDED SYSTEM; (4) EVALUATE A NUMBER OF AVAILABLE ADA SYSTEMS IN TERMS OF THE RUN-TIME SUPPORT REQUIREMENTS. PHASE II FOLLOW-ON EFFORTS WILL INCLUDE: (a) PRODUCTION OF A SET OF BENCHMARKS FOR TESTING ADA IMPLEMENTATIONS TO DETERMINE HOW WELL THEY SATISFY THE RUN-TIME SUPPORT REQUIREMENTS; (b) FULL-SCALE EVALUATION OF AVAILABLE ADA IMPLEMENTATIONS USING THE DEVELOPED BENCHMARKS OR FORMAL REQUIREMENTS WHICHEVER ARE MOST APPROPRIATE; (c) PRODUCING A RUNTIME-REQUIREMENT PROFILER FOR USE WITH CODES WRITTEN IN ADA, JOVIAL, CMS-2, PASCAL, FORTRAN, ETC. WHICH WILL AUTOMATICALLY PRODUCE A REQUIREMENTS ANALYSIS FOR A GIVEN EMBEDDED SYSTEM.

ALPHATECH INC
111 MIDDLESEX TURNPIKE
BURLINGTON, MA 01803
CONTRACT NUMBER:
WILLIAM S POWELL
TITLE:
AN ITERATIVE MODELING APPROACH TO ARCHITECTURE EVALUATION
TOPIC# 17 OFFICE: SPAWAR IDENT#: 37263

ALPHATECH'S ITERATIVE MODELING METHODOLOGY (AIMM) DEVELOPS A SYSTEM REPRESENTATION BY USING A TEAM-BASED APPROACH TO DEVELOPING A SERIES OF CHART-BASED MODELS OF THE SYSTEM WITHIN THE CONTEXT OF AN APPROPRIATE SCENARIO; THIS SET OF CHART-BASED MODELS CULMINATES WITH A PETRI NET REPRESENTATION WHICH CAN BE DIRECTLY IMPLEMENTED IN ALPHATECH'S SIMULATION TOOL, MODELER. THE COMPUTER MODEL THAT RESULTS IS EXERCISED TO YIELD STATISTICAL PROFILES OF SIGNIFICANT SYSTEM PARAMETERS AND THEIR IMPACT ON THE SCENARIO. ALPHATECH PROPOSES TO APPLY AIMM TO THE PROBLEM OF SYSTEMS THAT SUPPORT CARRIER-BASED BATTLE GROUP COMMAND AND CONTROL.

ALPHATECH INC
111 MIDDLESEX TURNPIKE
BURLINGTON, MA 01803
CONTRACT NUMBER:
KENDRA MOORE
TITLE:
STOCHASTIC TIMED ATTRIBUTED PETRI NET (STAPN) MODELING OF C(3) NETWORKS
TOPIC# 22 OFFICE: SPAWAR IDENT#: 37411

SUBMITTED BY

THE OBJECTIVE OF THIS RESEARCH IS TO DETERMINE THE FEASIBILITY OF USING THE STOCHASTIC, TIMED, ATTRIBUTED PETRI NET (STAPN) METHODOLOGY TO DESCRIBE AND ANALYZE ALTERNATIVE NAVAL C3 ARCHITECTURES. THE US NAVY IS IN THE PROCESS OF DEVELOPING C3 ARCHITECTURES TO SUPPORT THE NAVY'S MISSION AND FUNDAMENTAL WARFARE TASKS. THIS PROCESS INVOLVES ASSESSING ALTERNATIVE C3 ARCHITECTURES TO DETERMINE THEIR IMPACT ON THE MISSIONS THEY SUPPORT. ANALYZING THE PERFORMANCE OF C3 SYSTEMS IS, HOWEVER, NOTORIOUSLY DIFFICULT DUE TO THE COMPLEX NATURE OF C3 AND THE PROBLEMS ASSOCIATED WITH RELATING VARIATIONS IN THE C3 SYSTEM TO THE PERFORMANCE OF THE MISSION IT SUPPORTS. STAPNs HAVE SHOWN PROMISE IN ADDRESSING THESE ISSUES. ALPHATECH PROPOSES TO CONDUCT THE FEASIBILITY STUDY BY WAY OF EXAMPLES, USING AN ANTISUBMARINE WARFARE (ASW) SCENARIO AS A CASE STUDY. WE WILL CONDUCT THE FIVE TASKS. 1) IDENTIFY AND DESCRIBE THE ASW SYSTEM AND SCENARIO TO BE MODELED. 2) CONSTRUCT A STAPN MODEL OF THE ASW SCENARIO. 3) IMPLEMENT AND EXERCISE THE STAPN MODEL FOR A BASELINE C3 ARCHITECTURE AND ONE ALTERNATIVE C3 ARCHITECTURE USING MODELER, ALPHATECH'S GRAPHICAL C3 SIMULATION TOOL; WE WILL COLLECT AND PERFORM STATISTICAL ANALYSIS ON MEASURES ASSOCAITED WITH THE ASW TOP LEVEL WARFARE REQUIREMENTS. 4) ASSESS THE FEASIBILITY OF STAPNs AND MODELER FOR NAVAL C3 ARCHITECTURAL STUDIES. AND, 5) PREPARE A FINAL REPORT DETAILING THE RESULTS OF THE PHASE I RESEARCH.

AMERICAN MATRIX INC
PO BOX 23556 - 118 SHERLAKE DR
KNOXVILLE, TN 37933
CONTRACT NUMBER:
ROBERT H KRABILL
TITLE:
WHISKER-REINFORCED CERAMIC CUTTING TOOL FOR TITANIUM AND TITANIUM ALLOYS
TOPIC# 81 OFFICE: NAVAIR IDENT#: 36448

BASED UPON THERMODYNAMIC DATA AND EXPERIMENTAL RESULTS, AMI HAS DETERMINED THAT ZIRCONIUM DIBORIDE IS ONE OF THE FEW CERAMIC MATERIALS THAT IS CHEMICALLY COMPATIBLE WITH TITANIUM METAL AT ELEVATED TEMPERATURES. THEREFORE, THIS CERAMIC MATERIAL, REINFORCED WITH SUITABLE CERAMIC WHISKERS, SHOULD BE AN IDEAL CANDIDATE TO

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REPLACE TUNGSTEN CARBIDE AS A MACHINE TOOL INSERT FOR MACHINING TITANIUM ALLOYS. AMI WOULD USE ITS EXPERIENCE IN WHISKER-REINFORCED CERAMIC COMPOSITES AND ITS UNIQUE LABORATORY FACILITIES TO OPTIMIZE A WHISKER-REINFORCED ZIRCONIUM DIBORIDE COMPOSITE FOR THIS PURPOSE. THE DEVELOPMENT EFFORT WOULD INCLUDE MATERIAL SELECTION, COMPOSITE PREPARATION, COMPOSITE EVALUATION, MACHINING TESTS, AND POST-MACHINING COMPOSITE ANALYSIS. SUCCESS OF THIS PROJECT WOULD RESULT IN A SIGNIFICIANT REDUCTION IN THE COST OF MILITARY AND COMMERCIAL AIRCRAFT COMPONENTS.

AMERICAN POWER JET CO
705 GRAND AVE
RIDGEFIELD, NJ 07657
CONTRACT NUMBER:
GEORGE CHERNOWITZ
TITLE:
WARFARE SYSTEMS ARCHITECTURE
TOPIC# 17 OFFICE: SPAWAR IDENT#: 37264

THE APPLICATION OF MODERN COMPUTER ASSISTED SYSTEMS ENGINEERING (CASE) TOOLS IS PROPOSED TO ADDRESS THE DEVELOPMENT OF A NAVY LOGISTICS WARFARE SYSTEMS ARCHITECTURE AND ENGINEERING (WSA&E) CONCEPT. THIS TECHNIQUE HAS BEEN APPLIED TO SIMILARLY COMPLEX AND INTERRELATED LARGE-SCALE ENTERPRISES. APJ HAS DEMONSTRATED THE VIABILITY OF STRUCTURED SYSTEMS ANALYSIS UTILIZING CASE IN THE PROCESS OF ORGANIZING OF MIL-STD-1388-1A AND AR 700-127. THIS TECHNIQUE PROVIDES A STRUCTURE FOR A FULLY DETERMINATE SET OF REQUIRED OPERATIONAL FUNCTIONS WHICH SATISFY MISSION REQUIREMENTS AS THE BASIS FOR SUBSEQUENT ASSESSMENT EVALUATION, AND TRADE-OFFS. ALTERNATIVES MAY BE EVALUATED AND PRIORITIZED. THE RESULT IS AN ARCHITECTURE FOR A RATIONAL NAVY INVESTMENT STRATEGY IN ITS LOGISTICS INFRASTRUCTURE OPERATIONS AND PROCESSES. THE ARCHITECTURE PROVIDES THE BASIS FOR EVALUATING THE CURRENT/POM LOGISTICS STRUCTURE IN THE LIGHT OF REQUIREMENTS ARISING FROM CURRENT AND PROJECTED NAVY LOGISTICS MISSIONS.

AMERICAN RESEARCH CORP OF VA
PO BOX 3406 - 642 FIRST ST
RADFORD, VA 24143
CONTRACT NUMBER:
JOHN A NEAL
TITLE:
COMPARISON OF THE PRODUCTIVITY OF DIAGRAMMATIC AND TEXTUAL PROGRAMMING
TOPIC# 154 OFFICE: NSWC IDENT#: 36055

SUBMITTED BY

THE PRESENT TREND IN HUMAN/COMPUTER INTERFACES IS THE USE OF VISUAL, ICONIC MANIPULATION FOR COMPUTER CONTROL. THE APPLICATION OF A VISUAL INTERFACE CAN BE ADAPTED TO USE IN PROGRAMMING LANGUAGES. THE PROPOSED RESEARCH AND TESTING PROGRAM WILL BE CARRIED OUT TO DETERMINE IF A DIAGRAMMATIC PROGRAMMING LANGUAGE PROVIDES AS MUCH PRODUCTIVITY AND AS HIGH A QUALITY OF SOFTWARE AS TEXTUAL LANGUAGES. THE OBJECTIVES OF THE PHASE I RESEARCH INCLUDE THE DETERMINATION OF THE LANGUAGE MOST SUITED FOR THE TARGET APPLICATION, THE SELECTION OF A PROPER COMPILER FOR THAT LANGUAGE, THE ADAPTATION OF THE EXISTING VISUAL PROGRAMMING LANGUAGE AVAILABLE AT ARCOVA TO THE LANGUAGE SELECTED, THE CREATION OF A TESTING PROGRAM, THE HUMAN TESTING, AND THE ANALYSIS OF THE RESULTS. A REPORT WILL BE COMPILED THAT EVALUATES THE DEVELOPMENT TIME, LEVEL OF EFFORT, AND QUALITY OF RESULTING PROGRAMS AS DETERMINED FROM THE TESTING PROGRAM. THE LEVEL OF EFFORT REQUIRED BY ARCOVA IS REDUCED BY THE AVAILABILITY OF THE EXISTING VISUAL PROGRAMMING LANGUAGE SYSTEM DEVELOPED IN-HOUSE. A MORE COMPLETE AND PROFESSIONAL TESTING SCHEME CAN BE CARRIED OUT DUE TO THE DECREASE IN SETUP AND SOFTWARE DESIGN EFFORT.

AMERICAN RESEARCH CORP OF VA
PO BOX 3406
RADFORD, VA 24143
CONTRACT NUMBER:
DR ROGER W WYGANT
TITLE:
ASBESTOS DETECTION BY MULTIPLE FOCAL PLANE MICROSCOPIC FLUORESCEN IMAGING
TOPIC# 190 OFFICE: NCEL IDENT#: 37757

THERE EXISTS A NEED FOR METHODS OF IN SITU DETERMINATION OF ASBESTOS PRESCENCE AND CONCENTRATION IN BOTH MATERIAL SPECIMENS AND IN AIRBORNE SAMPLES. THE DETECTION SYSTEMS SHOULD BE PORTABLE, RAPID, RELIABLE, EASY TO USE AND SAFE. THIS PROPOSAL SUGGESTS AN OPTICAL TECHNIQUE EMPLOYING DIGITAL IMAGE PROCESSING OF MULTIPLE FOCAL PLANE MICROSCOPIC IMAGES OF FLUORESCING ASBESTOS FIBERS FOR THEIR DETECTION. OBJECTIVES OF THE RESEARCH PROGRAM INCLUDE THE DETERMINATION OF THE OPTICAL ABSORPTION AND FLUORESCENCE SPECTRA OF THE DIFFERENT TYPES OF ASBESTOS, DESIGN AND FABRICATION OF A MULTIPLE FOCAL PLANE

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FLUORESCENCE IMAGING MICROSCOPE, ACQUISITION OF FAMILIES OF TEST DATA FROM U.S. N.I.S.T. TRACEABLE ASBESTOS SAMPLES, DEVELOPMENT OF IMAGE ANALYSIS SOFTWARE FOR FIBER RECOGNITION AND QUANTIFICATION AND THE DESIGN OF PHASE II INSTRUMENT PROTOTYPES FOR THE ANALYSIS OF BOTH AIRBORNE AND BULK MATERIAL SAMPLES. THE RESULTS OF THE PHASE I PROGRAM WILL BE THE DETERMINATION OF THE FEASIBILITY OF USING MICROSCOPIC FLUORESCENCE IMAGING FOR ASBESTOS DETECTION AND THE DESIGN OF PROOF-OF-CONCEPT INSTRUMENTS FOR USE IN THE PHASE II PROGRAM. THE PHASE II PROGRAM WILL RESULT IN PORTABLE AIRBORNE AND BULK MATERIAL SPECIMEN ASBESTOS DETECTORS CAPABLE OF PERFORMING RAPID IN SITU MEASUREMENTS OF ASBESTOS CONTAMINATION IN NAVAL FACILITIES.

AMERICAN SUPERCONDUCTOR CORP
21 ERIE ST
CAMBRIDGE, MA 02139
CONTRACT NUMBER:
CARL RUSSO
TITLE:
A RARE-EARTH CRYOGENIC PROJECTOR USING HIGH-Tc SUPERCONDUCTORS
TOPIC# 177 OFFICE: NAVSEA IDENT#: 37644

A RARE-EARTH, MAGNETOSTRICTIVE, MATERIAL, Tb(x)Dy(1-x) (0.5<x>0.6), OPERATING AT CRYOGENIC TEMPERATURES, CAN STORE AND RELEASE TWENTY TIMES THE ENERGY OF PIEZOELECTRIC MATERIALS, AND FIVE TIMES THE ENERGY OF THE BEST ROOM-TEMPERATURE, MAGNETOSTRICTIVE, RARE-EARTH ALLOYS. THIS MAKES IT IDEAL FOR THE CONSTRUCTION OF LOW-FREQUENCY, HIGH-POWER, UNDERWATER, ACOUSTIC PROJECTORS. BROAD-BAND, LOW-Q, PROJECTOR APPLICATIONS ARE LIMITED BY THE AC ELECTRICAL DRIVE AND THE DC BIAS FIELDS. THE LOW LOSSES INHERENT IN HIGH-T(c) SUPERCONDUCTORS CAN SIGNIFICANTLY REDUCE THE POWER REQUIREMENTS AND INCREASE OVERALL EFFICIENCY. IN THIS SBIR WE PLAN TO: 1. DEMONSTRATE A RARE EARTH Tb(x)Dy(1-x) TRANSDUCER DRIVEN BY A SUPERCONDUCTING COIL AND OPERATED AT LIQUID NITROGEN TEMPERATURES. 2. MEASURE PERFORMANCE WITH A SUPERCONDUCTING COIL AND A COMPARISON COPPER COIL. 3. DETERMINE IF A SUPERCONDUCTING-COIL TRANSDUCTION DEVICE CAN BE DESIGNED FOR USE OPERATING BELOW 500 Hz WITH ACOUSTIC POWER OUTPUT EXCEEDING 4 KW AND WITH AT LEAST 70% EFFICIENCY. 4. EXTRAPOLATE ELECTRICAL EFFICIENCY FOR THE CASE OF AN ARRAY-LOADED, TRANSDUCER OPERATED AT RESONANCE BASED ON THE DATA DERIVED FROM THE EXPERIMENTS. 5. DERIVE

SUBMITTED BY

RESISTIVE INDUCTIVE AND MAGNETOSTRICTIVE "D" CONSTANT VALUES FROM THE MEASUREMENTS.

AMHERST SYSTEMS INC
30 WILSON RD
BUFFALO, NY 14221
CONTRACT NUMBER:
EDWARD J BIALEK
TITLE:
TRANSPORTABLE RF SIMULATOR FOR ELECTRONIC SUPPORT MEASURE (ESM)
TOPIC# 115 OFFICE: NAVSEA IDENT#: 36866

THE PROPOSED STUDY WILL GENERATE PERFORMANCE AND DESIGN SPECIFICATIONS FOR AN RF SUBSYSTEM TO BE ADDED TO THE TRAINING AND MAINTENANCE SYSTEM (TRAMS). PRELIMINARY GUIDELINES FOR THE PROPOSED DESIGN EFFORTS ARE (a) AN INSTANTANEOUS EMITTER CAPACITY OF UP TO 150 EMITTERS (b) 2-18 GHz FREQUENCY COVERAGE, AND (c) LIGHT WEIGHT AND PACKAGED FOR CARRY-ON EMPLOYMENT. THE PHASE I TASKS WILL REVIEW OVERALL TRAMS REQUIREMENTS, DEFINE THE RF SUBSYSTEM REQUIREMENTS AND IMPLEMENTATION APPROACHES, AND DESIGN THE RF SUBSYSTEM, BOTH ELECTRICALLY AND MECHANICALLY, TO SATISFY THE PERFORMANCE REQUIREMENTS.

ANALYTICS INC
2500 MARYLAND RD
WILLOW GROVE, PA 19090
CONTRACT NUMBER:
HELENE P IAVECCHIA
TITLE:
UNDERWATER RANGE DATA DISPLAY UPGRADE
TOPIC# 105 OFFICE: NAVSEA IDENT#: 36743

CURRENTLY, THE DISPLAY OF REAL-TIME RANGE TRACKING DATA OF SUBSURFACE CONTACTS IS ACCOMPLISHED USING SEPARATE 2D PLOTS - X AND Y DATA IS DEPICTED IN SEPARATE DISPLAYS FROM DEPTH AND BOTTOM CONTOUR INFORMATION. THIS VISUAL SEPARATION REQUIRES THE USER TO FORMULATE A MENTAL MAP OF A 3D AREA BASED UPON THE COMBINATION OF THIS SEPARATE DATA.

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THIS PRESENTS A SIGNIFICANT INFORMATION PROCESSING BURDEN FOR THE USER AND CAN RESULT IN THE LOSS OF CRITICAL DATA AS WELL AS MIS-INTERPRETATION OF DATA. A NEED EXISTS TO DEVELOP A VIABLE THREE-DIMENSIONAL DISPLAY THAT CAN BE USED IN NAVAL TACTICAL ENVIRONMENTS. THE OBJECTIVE OF THIS EFFORT IS TO SURVEY RECENT ADVANCES IN HOLO-GRAPHIC AND OTHER TECHNIQUES FOR PRODUCING AND PROJECTING REAL-TIME 3D IMAGES. ALTERNATIVE TECHNIQUES WILL BE REVIEWED AGAINST SPECIFIC NAVY REQUIREMENTS FOR TACTICAL DISPLAY AS WELL AS COST AND RISK FACTORS IN ORDER TO DETERMINE THE FEASIBILITY OF DEVELOPING 3D UNDER-WATER RANGE DATA DISPLAY. IF A VIABLE ALTERNATIVE IS FOUND, A CANDIDATE SYSTEM DESIGN WILL BE PROPOSED. PHASE II EFFORTS WILL CULMINATE IN THE DEMONSTRATION OF THAT SYSTEM DESIGN.

APPLIED LOGIC SYSTEMS INC
PO BOX 90 - UNIVERSITY STA
SYRACUSE, NY 13210
CONTRACT NUMBER:
KENNETH A BOWEN
TITLE:
INTEGRATED BATTLE FORCE SCENARIO GENERATION
TOPIC# 128 OFFICE: NAVSEA IDENT#: 35829

THE NAVY TODAY POSSESSES DATABASES SUPPORTING THE UNIQUE REQUIREMENTS OF INDIVIDUAL COMBAT TRAINING SYSTEMS. THESE INDIVIDUAL DATABASES ARE IMPLEMENTED USING DIFFERENT DATABASE MANAGEMENT SYSTEMS (DBMSs) AND SUPPORT DIFFERING PROGRAMMING LANGUAGES. MANY EXIST ON SEPARATE COMPUTER HARDWARE. TO GENERATE ACCURATE AND REALISTIC SCENARIOS FOR BATTLE FORCE TACTICAL TRAINING, IT IS NECESSARY TO ACCESS, CORRELATE AND INTEGRATE THE DATA CONTAINED IN THESE DISPARATE DATABASES, AND TO BE ABLE TO PROGRAM THE GENERATION OF BATTLE FORCE TACTICAL TRAINING SCENARIOS IN A COMMON, HIGH-ORDER LANGUAGE. BECAUSE THE INDIVIDUAL DATABASES WILL CONTINUE TO BE USED FOR THEIR UNIQUE COMBAT TRAINING FUNCTIONS, NEW DATA WILL CERTAINLY BE ADDED TO THEM OVER TIME. ALSO, NEW INDIVIDUAL SYSTEMS WILL BE DEVELOPED, AND THEIR DATA WILL BE AN ACCEPTABLE SOLUTION. AN OPTIMAL SOLUTION IS TO ALLOW THE BATTLE FORCE SYSTEMS TO DIRECTLY ACCESS THE DATA RESIDENT IN THE INDIVIDUAL SYSTEMS. IN ADDITION, THE BATTLE FORCE SCENARIO SYSTEM MUST BE ABLE TO SUPPORT ONE OR MORE DATABASES OF INFORMATION UNIQUE TO BATTLE FORCE LEVEL CONCERNS, AND SHOULD BE CONSTRUCTED IN SUCH A WAY AS TO

SUBMITTED BY

FOLLOW THE GRADUAL INTRODUCTION OF EXPERT SYSTEMS COMPONENTS. THE SOLUTION IS TO BUILD BRIDGES BETWEEN THE HIGH-LEVEL EXPERT SYSTEMS LANGUAGE AND THE VARIOUS DATABASES. THESE BRIDGES ALLOW THE EXPERT SYSTEM TO VIEW THE DATA IN THE DATABASE AS IF IT WERE EXPRESSED IN THE EXPERT SYSTEM'S NATIVE LANGUAGE. THE EXPERT SYSTEM CAN BOTH READ THE DATA AND WRITE DATA TO THE DATABASE, WITHOUT DUMPING THE DATABASE ACROSS TO THE EXPERT SYSTEM LANGUAGE. MOREOVER, IT CAN INVOKE MANY OF THE FOREIGN-LANGUAGE APPLICATIONS ROUTINES WHICH ARE ASSOCIATED WITH THE DATABASE. APPLIED LOGIC SYSTEMS, INC. PROPOSES A FEASIBILITY STUDY AIMED AT PRODUCING A PROTOTYPE DEMONSTRATION BATTLE FORCE SCENARIO GENERATION SYSTEM WHICH INTEGRATES DATA FROM TWO OR MORE INDIVIDUAL SCENARIO GENERATION SYSTEMS. ACCESS TO INDIVIDUAL DATA-BASE INFORMATION WILL BE PROVIDED THROUGH USE OF THE ALS DATA ACCESS TOOLS. THE SYSTEM WILL DEMONSTRATE THE ABILITY TO FLEXIBLY INTEGRATE AND CORRELATE THE DATA FROM INDIVIDUAL DATABASES...SCENARIO GENERATION

APPLIED MEASUREMENT SYSTEMS INC
1 OAKWOOD BLVD - STE 180
HOLLYWOOD, FL 33020
CONTRACT NUMBER:
CLIFFORD R MERZ
TITLE:
HULL POTENTIAL MEASUREMENT SYSTEM FOR UNDERWAY SHIPS
TOPIC# 189 OFFICE: NCSC IDENT#: 37750

FOR PHASE I, APPLIEDMEASUREMENT SYSTEMS, INC. (AMSI) PROPOSES TO IDENTIFY AND ESTABLISH THE TECHNICAL FEASIBILITY OF A SELF-CONTAINED HULL POTENTIAL MEASUREMENT SYSTEM FOR UNDERWAY SHIPS. THREE GENERIC APPROACHES ARE CURRENTLY IDENTIFIED: 1) MEASUREMENT SENSOR SELEC-TION, 2) ELECTRONIC/SOFTWARE DESIGN, AND 3) STRUCTURAL ARRANGEMENT DESIGN. MORE TECHNIQUES MAY RESULT FROM THE COMPREHENSIVE LITERATURE SEARCH. THE MOST VIABLE TECHNIQUE(S) WILL THEN BE COMPLETELY EVALUATED AND A CONCEPTUAL DESIGN PREPARED, SUPPORTED BY ANALYTIC STUDIES. THE FINAL REPORT WILL DETAIL THIS DESIGN AND COULD BE UTILIZED TO DIRECT PROTOTYPE DEVELOPMENT, PHASE II.

APPLIED RESEARCH ASSOCS INC
4300 SAN MATEO BLVD NE - STE B380
ALBUQUERQUE, NM 87110
CONTRACT NUMBER:
ALY H SHAABAN
TITLE:
HIGH PERFORMANCE COMPOSITE HEAT SINK FOR ELECTRONIC DEVICES
TOPIC# 97 OFFICE: NAVSEA IDENT#: 36632

SUBMITTED BY

THE INCREASED DEMANDS FOR LARGE SCALE INTEGRATION AND VERY HIGH SPEED PROCESSING OF INFORMATION HAVE LED TO INCREASING DENSITY OF CHIPS IN ELECTRONIC MODULES. THIS, IN TURN, HAS INCREASED DRAMATICALLY THE HEAT GENERATED PER UNIT AREA. IN ORDER TO MEET THE NEW DESIGN SPECIFICATIONS, AN INNOVATIVE HEAT SINK CONCEPT IS PROPOSED. THE HEAT SINK WILL HAVE A THERMAL EXPANSION IN THE RANGE OF 2.8 ppm/DEG F AND A THERMAL CONDUCTIVITY OF AT LEAST 250W/M DEG K TO MEET THE SPECIFICATION OF THE NAVY SEM. THE PROPOSED CONCEPT EMPLOYS CARBON FIBER STRUCTURE EMBEDDED IN RESIN MATRIX IMPREGNATED WITH HIGHLY CONDUCTIVE METAL FILLERS. THE CARBON FIBER STRUCTURE WILL BE DESIGNED USING BRAIDING TECHNOLOGY PROCESSES TO ACHIEVE THE REQUIRED THERMAL EXPANSION IN THE CRITICAL DIRECTIONS, WHILE USING THE FIBER STRUCTURE WITH THE METAL FILLER TO ACHIEVE THE THERMAL CONDUCTIVITY NEEDED. THE PHASE I WORK WILL DEMONSTRATE THE FEASIBILITY OF THE PROPOSED CONCEPT BY ENGINEERING THE FRACTION, TYPE, AND GEOMETRY OF METAL FILLER, RESIN MATRIX, AND FIBER IN THE ASSEMBLY.

APPLIED SCIENCES INC
PO BOX 186 - 800 LIVERMORE ST
YELLOW SPRINGS, OH 45387
CONTRACT NUMBER:
MAX L LAKE
TITLE:
HIGH THERMAL CONDUCTIVITY COMPOSITES FOR THERMAL ENERGY MANAGEMEN
TOPIC# 95 OFFICE: NAVSEA IDENT#: 36597

THE ECONOMICS OF LAUNCH COST, COUPLED WITH POWER REQUIREMENTS FOR SPACE BASED WEAPONS SYSTEMS, MANDATE OPTIMIZATION OF THE RATIO OF POWER TO MASS IN SPACE POWER SYSTEMS. A LOW DENSITY, HIGH TEMPERATURE, RADIATION-COMPATIBLE MATERIAL WITH HIGH THERMAL CONDUCTIVITY USED FOR CONSTRUCTION OF THERMAL MANAGEMENT DEVICES WOULD OFFER A SUBSTANTIAL ENHANCEMENT TO THE POWER/MASS RATIO, AND TO THE COST OF DEPLOYMENT OF SPACE NUCLEAR POWER SYSTEMS. THE PROPOSED RESEARCH EFFORT IS TO FABRICATE AND EVALUATE ULTRA-THIN COMPOSITES DESIGNED TO HAVE EXTREMELY HIGH THERMAL CONDUCTIVITY, AND TO OPERATE AT ELEVATED TEMPERATURES IN THE PRESENCE OF OXYGEN. THE BENEFIT OF THE PROPOSED COMPOSITE IS THAT BY EXPLOITING THE HIGH THERMAL CONDUCTIVITY OF A NOVEL CARBON FIBER AND OF DIAMOND, SUBSTANTIAL WEIGHT

SUBMITTED BY

REDUCTION CAN BE ACHIEVED FOR HEAT REJECTION APPLICATIONS.

APPLIED THERMODYNAMIC SYSTEMS
PO BOX 1397 - WELCH AVE STA
AMES, IA 50010
CONTRACT NUMBER:
JAMES E FOLEY
TITLE:
DEVELOPMENT OF A HIGH HEAT FLUX HEAT EXCHANGER
TOPIC# 210 OFFICE: NSRDC IDENT#: 37940

GAS-TO-LIQUID HEAT EXCHANGERS FIND APPLICATION IN NEARLY EVERY ENERGY CONVERSION AND PROCESS SYSTEM. HOWEVER, DUE TO LOW HEAT FLUXES, THEY ARE EXCESSIVELY LARGE AND EXPENSIVE. LOW HEAT FLUXES ARE CAUSED PRIMARILY BY LOW GAS-SIDE HEAT TRANSFER COEFFICIENTS. THE OBJECTIVE OF THIS STUDY IS TO DEVELOP A NOVEL FLUIDIZED BED HEAT EXCHANGER WHICH HAS SIGNIFICANTLY GREATER HEAT FLUXES THAN CONVENTIONAL HEAT EXCHANGERS. IT IS EXPECTED THAT THE ADDITION OF A FLUIDIZED BED ON THE GAS-SIDE WILL INCREASE HEAT FLUX BY AN ORDER OF MAGNITUDE. THE FLUIDIZED BED ALSO PROVIDES RESISTANCE TO FOULING. EXPERIMENTS WILL BE PERFORMED TO SELECT FLUIDIZED BED MATERIAL AND HEAT EXCHANGER GEOMETRY. CONSIDERATIONS IN BED MATERIAL SELECTION ARE MAXIMUM HEAT TRANSFER COEFFICIENTS AND LOW PRESSURE DROPS. HEAT EXCHANGER GEOMETRY SELECTION WILL BE BASED ON PREVENTION OF BED PARTICLE ELUTRIATION AND COMPACT AND SIMPLE CONSTRUCTION. AN ANALYTICAL MODEL WILL BE DEVELOPED TO PREDICT THE PERFORMANCE AS WELL AS AID IN THE DESIGN OF THE HEAT EXCHANGER. A PROOF-OF-CONCEPT MODEL WILL BE FABRICATED AND THE ANALYTICAL MODEL WILL BE VERIFIED. RECOMMENDATIONS FOR FUTURE WORK WILL BE MADE BASED ON RESULTS OF THIS PRELIMINARY STUDY.

APS MATERIALS INC
153 WALBROOK AVE
DAYTON, OH 45405
CONTRACT NUMBER:
DOUGLAS HARRIS
TITLE:
SiC REINFORCED THERMAL BARRIER COATING
TOPIC# 86 OFFICE: NAVSEA IDENT#: 36523

SUBMITTED BY

PRESENT STATE OF THE ART THERMAL BARRIER COATINGS DEPOSITED BY ARC-PLASMA SPRAYING FAIL JUST ABOVE THE CERAMIC/BONDCOAT INTERFACE DUE TO ACCUMULATED STRESSES WHICH RISE DURING THERMAL CYCLING. THE PROPOSED PROJECT EXPLORES THE INCLUSION OF STRENGTHENING SiC WHISKERS OR PLATELETS TO COMBAT THESE STRESSES. WHEREAS PREVIOUS ATTEMPTS HAVE CAUSED DISASSOCIATION OF THE SiC, WE PROPOSE A STAGGERED INJECTION ARRANGEMENT TO AVOID SUCH PENALTY. THE CONCEPT WILL BE VERIFIED BY FULL CHARACTERIZATION OF THE COATINGS AND BY THERMAL CYCLE TESTS USING ALUMINUM SUBSTRATE AND AN IN-HOUSE BURNER RIG.

APTEK INC
1257 LAKE PLAZA DR
COLORADO SPRINGS, CO 80906
CONTRACT NUMBER:
MARK D LANDON
TITLE:
AN OPTIMAL MANEUVERING REENTRY BODY SHAPE DESIGN PACKAGE
TOPIC# 140 OFFICE: NSWC IDENT#: 35933

THE OVERALL GOAL OF PHASE I AND PHASE II IS TO DEVELOP SOFTWARE THAT WILL FIND THE OPTIMAL SIZE AND SHAPE OF MaRB DESIGNS ACCORDING TO USER DEFINED DESIGN CRITERIA. PHASE I WILL SHOW THE FEASIBILITY OF MaRB SHAPE DESIGN OPTIMIZATION BY COMBINING A GEOMETRIC MODELER, OPTIMIZATION SOFTWARE, AND FREE-FORM DEFORMATION WITH AN ANALYSIS MODULE. THE PHASE I ANALYSIS MODULE WILL CONTAIN AERODYNAMICS AND INTERNAL COMPONENT PACKAGING SOFTWARE. THE SOFTWARE WILL HELP THE USER FIND AN OPTIMAL MaRB AERODYNAMIC SHAPE (E.G. MAXIMUM LIFE TO DRAG RATIO, OR MINIMUM SURFACE PRESSURE, ETC.) WHILE PACKAGING INTERNAL COMPONENTS INSIDE THE MaRB SHAPE AND WHILE SATISFYING DESIGN CONSTRAINTS (E.G. LIMITS OF SURFACE AREA, VOLUME, PRESSURE, DRAG, LENGTH, WIDTH, ETC.). PHASE II WILL ENHANCE THE DESIGN PACKAGE BY INCLUDING OTHER ANALYSIS CODES (I.E. STRUCTURAL, ABLATION, AEROHEAT, RADAR CROSS-SECTION, STABILITY, TRAJECTORY, ETC.) NECESSARY FOR MaRB DESIGN SYNTHESIS.

ASOMA INSTRUMENTS
12212-H TECHNOLOGY BLVD
AUSTIN, TX 78727
CONTRACT NUMBER:
DAVE CLIFTON
TITLE:
QUANTITATIVE LUBRICATING OIL DEBRIS MONITORING AND ANALYSIS
TOPIC# 123 OFFICE: NAVSEA IDENT#: 35775

SUBMITTED BY

ASOMA INSTRUMENTS, INC. IS PROPOSING TO DEVELOP A LOW COST, PORTABLE, ENERGY DISPERSIVE, RADIOISOTOPE ACTIVATED X-RAY FLUORESCENCE ANALYZER, WHICH CAN BE USED AT OR NEAR THE SAMPLING POINT FOR LUBRICATING OILS. IF SUCCESSFULLY DEVELOPED, THIS INSTRUMENT COULD BE OPERATED BY NON-TECHNICAL PERSONNEL, TO PROVIDE ANALYSES WITHIN ONE TO FIVE MINUTES FOR ACCUMULATIONS IN LUBRICATING OILS OF WEAR METAL DEBRIS. AS A MANUFACTURER OF SIMILAR INSTRUMENTS ASOMA WILL MODIFY AND OPTIMIZE EXISTING TEST BED HARDWARE AND DEVELOP CALIBRATIONS USING KNOWN STANDARD SAMPLES TO FULLY DEMONSTRATE THE RELIABILITY AND PRECISION OF THIS RAPID, NON-DESTRUCTIVE METHOD OF ANALYSIS FOR DEBRIS IN LUBE OIL SAMPLES. IN PREPARATION FOR A POSSIBLE PHASE II INVESTIGATION, A PRELIMINARY INVESTIGATION WILL BE MADE TO DETERMINE THE COMPARABLE PRECISION OF ANALYSES MADE ON CONTINUOUSLY FLOWING CIRCULATED STREAMS OF CONTAMINATED LUBE OILS.

ASTRON CORP
470 SPRING PARK PL - STE 100
HERNDON, VA 22070
CONTRACT NUMBER:
JOSEPH R JAHODA
TITLE:
ADVANCED DIRECTION OF ARRIVAL PULSE SORTING ARRAY
TOPIC# 119 OFFICE: NAVSEA IDENT#: 36888

AN INNOVATIVE SINGLE ANTENNA ARRAY IS PROPOSED WHICH CAN ACHIEVE EXTREMELY HIGH DIRECTION OF ARRIVAL ACCURACY FOR PULSE SORTING APPLICATIONS. THE MAXIMUM DIAMETER IS LESS THAN 4 INCHES AND CAN BE MADE FLUSH MOUNTING.

ASTRON CORP
470 SPRING PARK PL - STE 100
HERNDON, VA 22070
CONTRACT NUMBER:
JOSEPH R JAHODA
TITLE:
ADVANCED DIRECTION FINDING TECHNIQUE
TOPIC# 206 OFFICE: NOSC IDENT#: 37908

SUBMITTED BY

RADIO DIRECTION FINDING IS A VALUABLE PASSIVE INTERCEPT TECHNIQUE THAT CAN PROVIDE CRITICALLY IMPORTANT DATA WHICH MAY INFLUENCE THE OUTCOME OF A MILITARY ENGAGEMENT. CONVENTIONAL ANTENNAS FOR DF ARE NARROWBAND AND PHYSICALLY LARGE IN THE HF AND VHF BANDS. ENHANCING THE PERFORMANCE OF SMALL ARRAYS REQUIRES LARGE, COSTLY DIGITAL COMPUTERS WITH THE CAPABILITY OF EXECUTE COMPUTATIONALLY INTENSIVE SIGNAL PROCESSING ALGORITHMS. ASTRON CORPORATION PROPOSES AN INNOVATIVE DF ANTENNA SYSTEM THAT IS BROADBAND, HIGH DYNAMIC RANGE, SENSITIVE, ACCURATE, AND PHYSICALLY SMALL ENOUGH TO BE USED ON MOST DEPLOYMENT PLATFORMS AT VHF AND EVEN HF FREQUENCY BANDS.

BATTERY ENGINEERING INC
1636 HYDE PARK AVE
HYDE PARK, MA 02136
CONTRACT NUMBER:
DR CARL R SCHLAIKJER
TITLE:
THE IMPACT OF HYDROLYSIS PRODUCTS AND POSITIVE ELECTRODE BINDERS SAFETY OF LITHIUM/SULFUR DIOXIDE.../CARBON RECHARGEABLE CELLS
TOPIC# 152 OFFICE: NSWC IDENT#: 36042

OUR OBJECTIVE IS TO IMPROVE THE SAFETY OF LITHIUM/SULFUR DIOXIDE (TETRACHLOROALUMINATE) RECHARGEABLE CELLS. RECENT WORK AT OUR LABORATORY SHOWED THAT SULFUR DIOXIDE SOLUTIONS OF TETRACHLORO-ALUMINATE SALTS CONTAIN HYDROLYSIS PRODUCTS WHICH ARE DIFFICULT TO ELIMINATE, EVEN IF THE ALUMINUM CHLORIDE USED HAS FIRST BEEN CAREFULLY PURIFIED. WE HAVE SUSPECTED THAT HYDROLYSIS PRODUCTS CONTRIBUTE TO THE INSTABILITY OF CELLS DURING CHARGING, AND PROPOSE THREE METHODS TO ELIMINATE PROTON-CONTAINING IMPURITIES. WE ALSO PROPOSE TO INVESTIGATE WHETHER REPLACING THE TEFLON BINDER IN THE POSITIVE ELECTRODE WITH AN ACID RESISTANT ELASTOMER THAT WILL NOT REACT AS VIOLENTLY WITH LITHIUM MIGHT REDUCE THE INCIDENCE OF RUNAWAY REACTIONS DURING CHARGING. THE TEST VEHICLE IS TO BE A HERMETICALLY SEALED AA SIZE CELL PREVIOUSLY ENGINEERED FOR USE IN THE STUDY OF LITHIUM RECHARGEABLE SYSTEMS.

BELTRAN INC
1133 E 35TH ST
BROOKLYN, NY 11210
CONTRACT NUMBER:
MICHAEL R BELTRAN
TITLE:
ADVANCED SYSTEMS AND CONCEPTS FOR FUTURE NAVAL WARFARE - COMPACT NUCLEAR REACTOR PROPULSION
TOPIC# 18 OFFICE: SPAWAR IDENT#: 37205

SUBMITTED BY

THROUGHOUT THE HISTORY OF MILITARY CONFLICT, INNOVATIVE TECHNOLOGY IN THE HANDS OF RESOURCEFUL LEADERSHIP HAS PROVED TO BE AN UNEQUALED FORCE MULTIPLIER. NAVAL BATTLE FORCE WARFARE IN THE YEARS 2000 AND BEYOND MUST BE CAPABLE OF MISSION EXECUTION AND DEFENSE IN A MULTIPLICITY OF SUBSURFACE, SURFACE, AEROSPACE AND SPACE PLATFORMS. MANY OF THESE MISSIONS REQUIRE PROPULSION SYSTEMS AND POWER GENERATION NOT AVAILABLE WITH STATE-OF-THE-ART SYSTEMS. BELTRAN, INC., IN CONJUNCTION WITH DR. JAMES R. POWELL, IS APPLYING THE WORK OF THE DOE BROOKHAVEN NATIONAL LABORATORY IN THE DESIGN OF SMALL COMPACT NUCLEAR REACTORS WHICH CAN BE APPLIED TO NAVAL BATTLE FORCE WARFARE APPLICATIONS. SINCE NUCLEAR FUELS PROVIDE APPROXIMATELY ONE MILLION TIMES THE ENERGY PER UNIT WEIGHT OF CHEMICAL FUELS, VAST INCREASES IN PERFORMANCE ARE POSSIBLE FOR UNMANNED VEHICLE APPLICATIONS WHICH CAN INCLUDE REMOTELY PILOTED VEHICLES (RPV) AIRCRAFT, TORPEDOS, SUBMERSIBLE RPV'S (ROBOT SUBMARINES), AND SPACECRAFT OR SATELLITE PROPULSION AND POWER GENERATION.

BIO-PHOTONICS
4342 W TESCH AVE
GREENFIELD, WI 58220
CONTRACT NUMBER:
REINHARDT ROSSON
TITLE:
BIOLUMINESCENCE FOR DETECTION OF TRACE COMPOUNDS
TOPIC# 4 OFFICE: ONR IDENT#: 37530

THE OBJECTIVES OF PHASE I ARE TWOFOLD: DEMONSTRATE THE FEASIBILITY OF BIOLUMINESCENT TESTING FOR DETECTION OF TOXIC COMPOUNDS, AND DEVELOP AN INEXPENSIVE PHOTO-DIODE BASED LIGHT DETECTION SYSTEM FOR FIELD MEASUREMENT OF LOW LEVEL BIOLUMINESCENCE. THIS UNIQUE TEST WILL UTILIZE DARK STRAINS OF E. COLI CONTAINING CLONED LUX GENES FROM THE LUMINOUS BACTERIUM PHOTOBACTERIUM LEIOGNATHI TO DETECT CARCINOGENS. THESE GENES HAVE BEEN ISOLATED, CLONED INTO, AND EXPRESSED IN E. COLI, AND ARE KNOWN TO RESPOND TO NUMEROUS CARCINOGENS WITH AN EMISSION INTENSITY WHICH IS PROPORTIONAL TO THE CARCINOGEN CONCENTRATION. THE GENE RESPONSE IS RAPID (MINUTES) AND SENSITVE (ppb RANGE); AND THE MATERIALS ARE INEXPENSIVE AND INERT. PHASE I WILL FOCUS ON DEFINING AND OPTIMIZING THE SYSTEM FOR DETECTION OF

SUBMITTED BY

SEVERAL SPECIFIC GROUPS OF CARCINOGENS. THE ANTICIPATED BENEFITS OF BIOSENSOR DETECTION OF TOXIC COMPOUNDS (CARCINOGENS, METALS, SPECIFIC ORGANIC COMPOUNDS, ETC...) INCLUDE IN-SITU HAZARDOUS WASTE IDENTIFICATION, LEAK DETECTION, WATER TESTING, TOXICITY SCREENING, SECURITY SCREENING, ETC... THIS BIOLOGICAL SYSTEM, BECAUSE OF ITS INHERENT SENSITIVITY, IS UNIQUELY SUITED FOR THE DETECTION LOW LEVELS OF TOXIC COMPOUNDS; EMITTING EASILY MEASURABLE LEVELS OF VISIBLE LIGHT PRODUCING A RESPONSIVE, INEXPENSIVE, AND USER-FRIENDLY DETECTION SYSTEM.

BREED & HARVEL ASSOCS
4310 MEDICAL PKWY
AUSTIN, TX 78756
CONTRACT NUMBER:
DR BEN R BREED
TITLE:
CHARACTERIZATION OF OWNSHIP DOPPLER AND TRANSMISSION CHANNEL PARAMETERS BY MEANS OF CLUTTER MEASUREMENTS
TOPIC# 53 OFFICE: SPAWAR IDENT#: 37036

IT HAS BEEN FOUND, FROM EXPERIENCE GAINED ON THE CRITICAL SEA TEST (CST) AND THE LOW FREQUENCY ACOUSTICS (LFA) PROGRAMS, THAT THE ACOUSTIC ENVIRONMENT FOR LONG RANGE ACTIVE SYSTEMS IS UNIQUE. A PRINCIPAL CONCERN IS CLUTTER DISCRIMINATION, AND MANAGEMENT, AND ONE OF THE PRINCIPAL CLUTTER DISCRIMINANTS IS DOPPLER. IF ONE CAN ELIMINATE OWNSHIP'S MOTION, CLUTTER CAN BE CHARACTERIZED AS HAVING ZERO VELOCITY OR ZERO RELATIVE DOPPLER. THE FIRST ASPECT OF THE PROJECT PROPOSED HERE, IS TO USE CLUTTER ITSELF AS A MECHANISM FOR ESTIMATING OWNSHIP'S MOTION RELATIVE TO THE BOTTOM. THIS IS A NEW IDEA IN ACOUSTICS, BUT IT HAS BEEN USED IN RADAR (PARTICULARLY SYNTHETIC APERTURE RADARS) FOR MOTION COMPENSATION FOR SOME TIME. WE PROPOSE TO USE APPROPRIATE ADAPTATIONS OF SUCH TECHNIQUES, FOR ACTIVE ACOUSTIC SURVEILLANCE. ANOTHER USE OF CLUTTER STATISTICS WHICH WE PROPOSE, IS IN THE CHARACTERIZATION OF THE TRANSMISSION CHANNEL. THESE CHANNELS ARE CHARACTERIZED AS HAVING ATIME SPREADING FUNCTION. FOR SOME CHANNELS THE SPREADING RESULTS IN DISCRETE MULTIPATHS TO AND FROM A GIVEN RANGE, FOR OTHERS THE TIME SPREADING IS NOT RESOLVED INTO DISCRETE MULTIPATHS BUT IS MORE A CONTINUOUS FUNCTION. WE HAVE DEVELOPED TECHNIQUES WHICH USE THE CLUTTER

SUBMITTED BY

STATISTICS TO FORM ESTIMATES OF THE TIME SPREAD FUNCTION VERSUS RANGE.

BREED & HARVEL ASSOCS
4310 MEDICAL PKWY
AUSTIN, TX 78756
CONTRACT NUMBER:
KERMIT W HARVEL
TITLE:
DATA COMPRESSION FOR ACOUSTIC SURVEILLANCE DATA
TOPIC# 56 OFFICE: SPAWAR IDENT#: 37058

THE TREND IN ACOUSTIC SURVEILLANCE DEVELOPMENT IN THE LAST DECADE HAS BEEN FOR A GREATER NUMBER OF ACOUSTIC ARRAYS, EACH WITH A GREATER NUMBER OF SENSORS, AND AS A CONSEQUENCE A GREATER NUMBER OF BEAMS TO BE PROCESSED, TRANSMITTED, AND STORED. IN THE FUTURE THE QUANTITY WILL CONTINUE TO INCREASE. AT THE SAME TIME THERE IS A REQUIREMENT TO IMPROVE THE QUALITY OF THE DATA WHICH IS STORED AND TRANSMITTED TO SUPPORT SURVEILLANCE OF NONTRADITIONAL SIGNALS AND TO MONITOR LONG RANGE ACTIVE SIGNALS. IT IS THE OBJECTIVE OF THE PROJECT PROPOSED HERE TO PROVIDE A METHOD TO MORE EFFICIENTLY MAKE USE OF STORAGE AND TRANSMISSION RESOURCES AND TO PROVIDE IMPROVED DATA FIDELITY. THIS IS TO BE ACCOMPLISHED BY THE DEVELOPMENT OF EFFICIENT DATA COMPRESSION ALGORITHMS, AND ACCOMPANYING MESSAGE FORMATS, WHICH CAN BE INTRODUCED DIRECTLY INTO THE EXISTING IUSS. THESE SAME ALGORITHMS AND TECHNIQUES HAVE BROAD APPLICABILITY TO THE TRANSMISSION OF DATA OF ALL TYPES. WE PROPOSE TO FIRST APPLY THE ALGORITHMS TO THE SURTASS SYSTEM, WHERE SIGNIFICANT IMPROVEMENTS I DATA TRANSMISSION AND STORAGE WILL BE REALIZED.

BRIMROSE CORP OF AMERICA
7720 BELAIR RD
BALTIMORE, MD 21236
CONTRACT NUMBER:
DR R G ROSEMEIER
TITLE:
A MICROSECOND XENON CHLORIDE LASER TORPEDO DETECTION SYSTEM
TOPIC# 15 OFFICE: ONT IDENT#: 37301

SUBMITTED BY

RECENT ADVANCES IN STATE-OF-THE-ART LASER TECHNOLOGY SHOULD PERMIT THE DEVELOPMENT OF DETECTING AND LOCALIZING TORPEDOS USING BLUE-GREEN XENON CHLORIDER LASERS, STEERED BY BRAGG CELLS TO DEFINE A PROTECTIVE ENVELOPE OR PERIMETER AROUND A MOVING SHIP. BRIMROSE PROPOSES TO EXAMINE CONVENTIONAL MIRROR STEERED SYSTEMS, AS WELL AS THE ACOUSTO-OPTIC LASER BEAM STEERING METHOD TO COMPARE OPERATIONAL ADVANTAGES UNDER VARIOUS TACTICAL AND WEATHER CONDITIONS. THIS SYSTEM MAY HAVE AN ADDED ADVANTAGE, IN THE SUBSURFACE MINES IN OR NEAR THE PATH OF THE SHIP MAY ALSO BE DETECTED WITH SUFFICIENT TIME TO RENDER THEM IMPOTENT. SHOULD THIS WORK BECOME CLASSIFIED, BRIMROSE HAS A SECRET FACILITY CLEARANCE.

CERAMATEC INC
2425 S 900RD W
SALT LAKE CITY, UT 84119
CONTRACT NUMBER:
DR RAYMOND A CUTLER
TITLE:
HIGH SPEED MACHINING OF TITANIUM ALLOYS USING CERAMIC CUTTING TOO
TOPIC# 81 OFFICE: NAVAIR IDENT#: 36449

TITANIUM MACHINING HAS INCREASED SUBSTANTIALLY DURING THE PAST 25 YEARS BUT DESPITE INTENSE INTEREST IN FINDING IMPROVED TOOL MATERIALS, WC-6 WT. % CO IS STILL USED AT CUTTING SPEEDS LESS THAN 75 M/MIN. RECENT WORK AT CERAMATEC SHOWED THAT NOVEL CERAMIC CUTTING TOOLS COULD BE USED TO MACHINE TITANIUM ALLOYS WITH 30-75% LESS FLANK WEAR THAN CONVENTIONAL CEMENTED CARBIDES AT SPEEDS OF 100-175 M/MIN. DESPITE THIS SUCCESS, FURTHER IMPROVEMENT IS NECESSARY IN ORDER TO INCREASE THE LIFE OF CERAMIC CUTTING TOOLS BEFORE COMMERCIALIZATION WILL OCCUR. THE PROPOSED PHASE I RESEARCH ADDRESSES CRITICAL ISSUES WHICH WILL DEMONSTRATE THE FEASIBILITY OF INCREASING THE APPARENT FRACTURE TOUGHNESS AND DEFORMATION RESISTANCE OF CERAMIC CUTTING TOOLS WHICH HAVE ALREADY SHOWN PROMISE FOR TITANIUM MACHINING. THE RESULTING CERAMIC WILL HAVE HIGH THERMAL CONDUCTIVITY, HIGH FRACTURE TOUGHNESS, GOOD CREEP RESISTANCE AND MODERATE CHEMICAL STABILITY. THE PHASE I RESEARCH WILL ANSWER CRITICAL QUESTIONS NECESSARY FOR THE SUCCESSFUL DEVELOPMENT OF CERAMIC CUTTING TOOLS DURING PHASE II.

CFD RESEARCH CORP
3313 BOB WALLACE AVE - STE 205
HUNTSVILLE, AL 35805
CONTRACT NUMBER:
CLIFFORD E SMITH
TITLE:
CHARACTERIZATION OF FLAMHOLDER BLOWOUT IN GAS TURBINE AUGMENTORS
TOPIC# 193 OFFICE: NAPC IDENT#: 37782

SUBMITTED BY

GAS TURBINE AUGMENTORS HAVE HISTORICALLY EXPERIENCED DIFFICULT MAINTAINING COMBUSTION AT HIGH ALTITUDES AND LOW FLIGHT MACH NUMBERS. DUE TO THE LACK OF ANALYTICAL TOOLS, TESTING PROVIDES THE PRINCIAL MEANS OF IMPROVING A DESIGN FOR STABILITY. SUCH TESTING IS EXPENSIVE AND TIME CONSUMING, THUS ALLOWING ONLY A LIMITED NUMBER OF DESIGNS TO BE ASSESSED. WHAT IS LACKING IS A GOOD UNDERSTANDING OF THE FLOW CHARACTERISTICS THAT CAUSE FLAMEHOLDER BLOWOUT. THIS PROJECT PROPOSES TO USE AN EXISTING COMPUTATIONAL FLUID DYNAMICS (CFD) CODE TO ANALYZE THE BLOWOUT PHENOMENA IN A CONFINED DUCT WITH A CHOKED NOZZLE. THE CFD CODE WILL SOLVE THE TIME-DEPENDENT, COMPRESSIBLE NAVIER-STOKES EQUATIONS TO PREDICT LARGE SCALE EDDIES SHED FROM THE FLAMEHOLDER AND LONGITUDINAL/RADIAL ACOUSTIC WAVES GENERATED BY THE COMBUSTION PROCESS. THE FOCUS IN PHASE I WILL BE ON SHOWING THE VIABILITY OF USING LARGE EDDY SIMULATIO (LES) TO CAPTURE THE INTERACTION OF VORTEX SHEDDING, CHEMICAL REACTION, AND ACOUSTIC WAVES AT BLOWOUT. THE BLOWOUT SIMULATION WILL BE VALIDATED IN PHASE II, AND THEN USED TO PERFORM PARAMETRIC STUDIES ON ADVANCED FLAMEHOLDER SHAPES SUCH AS THE INTEGRAL SPRAYBAR/FLAMEHOLDER. THE FINDINGS WILL CULMINATE IN A CHARACTERIZATION AND DESIGN TECHNOLOGY FOR IMPROVING AUGMENTOR STABILITY.

CHARLES RIVER ANALYTICS INC
55 WHEELER ST
CAMBRIDGE, MA 02138
CONTRACT NUMBER:
DR GREG L ZACHARIAS
TITLE:
DYNAMIC PROCESSOR FOR PASSIVE RF RANGING
TOPIC# 207 OFFICE: NOSC IDENT#: 37921

THE PRIMARY OBJECTIVE OF THE PHASE I EFFORT IS TO EVALUATE THE FEASIBILITY OF DEVELOPING A DYNAMIC PROCESSOR OF SINGLE-PLATFORM PASSIVE RADIO FREQUENCY (RF) MEASUREMENTS, FOR REAL-TIME ESTIMATION OF RANGE AND LOCATION OF THREAT EMITTERS. THE BASIC APPROACH PROPOSED FOR STUDY IS BASED ON A TWO-STAGE PROCESSOR: A "FRONT-END" PROCESSOR WHICH TRANSFORMS THE INCOMING STREAM OF ANGLE-ONLY MEASUREMENTS INTO AN EVOLVING TIME HISTORY OF THREAT HEADING AND RANGE TIME (OR SPEED-NORMALIZED RANGE); AND A SECOND-STAGE DYNAMIC

SUBMITTED BY

ESTIMATOR WHICH INCORPORATES A MODEL OF THE THREAT/PLATFORM DYNAMICS TO EFFECT NOISE REDUCTION AND ACCURATE RANGING, VIA OPTIMAL FILTERING. WE PROPOSE TO EVALUATE THE SYSTEM'S FEASIBILITY OVER THREE TASKS. WE WILL: 1) DEFINE A PRELIMINARY DESIGN FOR A PASSIVE RANGING SYSTEM BASED UPON THE PROPOSED TWO-STAGE PROCESSOR, AND IDENTIFY BASIC PROCESSING REQUIREMENTS, CANDIDATE ALGORITHMS, AND PERFORMANCE SPECIFICATIONS; 2) IMPLEMENT AND EVALUATE CANDIDATE ALGORITHMS FOR USE IN EACH SUBSYSTEM, AND IDENTIFY THESE FOR INCORPORATION INTO THE OVERALL SYSTEM DESIGN; AND 3) EVALUATE PERFORMANCE VIA A SYSTEM-LEVEL SIMULATION, AND IDENTIFY SIGNIFICANT DESIGN TRADES. A FINAL REPORT WILL SUMMARIZE THE PROGRAM'S OBJECTIVES AND RESULTS, ASSESS BASIC SYSTEM FEASIBILITY, AND OUTLINE A PROGRAM FOR FURTHER DEVELOPMENT, AS REQUIRED.

CHEMTECH SYSTEMS INC
PO BOX 1067
BURLINGTON, MA 01803
CONTRACT NUMBER:
DR M L GOPIKANTH
TITLE:
Mg/MnO(2) NON-AQUEOUS BATTERY
TOPIC# 150 OFFICE: NSWC IDENT#: 36023

A MAGNESIUM-MANAGANES DIOXIDE NON-AQUEOUS BATTERY IS BEING PROPOSED. BY USING NON-AQUEOUS ELECTROLYTE, MAJOR PROBLEMS ASSOCIATED WITH THE AQUEOUS ELECTROLYTE COULD BE SOLVED, THUS WOULD MAKE THIS NON-AQUEOUS BATTERY COMPARABLE TO THE PRESENT DAY LITHIUM BATTERY. ADDED ADVANTAGE OF THIS SYSTEM WOULD BE ITS SAFETY, AND HIGH ENERGY DENSITY. OUR APPROACH TO ARRIVE AT NON-AQUEOUS ELECTROLYTE INVOLVES USE OF MIXTURE OF TWO OR MORE SOLVENS AND SALTS, ALLOWING US TO TAILOR MAKE A DOPED FILM ON MAGNESIUM. THE FILM WILL BE ENOUGH TO PROTECT THE METAL, AND ALSO ALLOW IONIC CONDUCTIVITY TO OCCUR THRU ITS FILM. PHASE I WILL FOCUS ON DEVELOPMENT OF NON-AQUEOUS ELECTROLYTE AND ITS COMPATIBILITY AND CHARACTERISTICS WITH MAGNESIUM ELECTRODE. PHASE II WILL FOCUS ON OPTIMIZATION OF THE BATTERY COMPONENTS, NON-AQUEOUS ELECTRODE, CATHODE, AND SEPARATOR. ALSO, EXTENSIVE BATTERY TESTING WILL BE CARRIED OUT TO IDENTIFY APPLICATIONS FOR THIS NEW BATTERY SYSTEM.

CHIRP CORP
8248 SUGARMAN DR
LA JOLLA, CA 92037
CONTRACT NUMBER:
DR RICHARD A ALTES
TITLE:
FEASIBILITY STUDY FOR MULTI-MODE RANGE INSTRUMENTATION RADAR SYST
TOPIC# 213 OFFICE: NATC IDENT#: 37972

SUBMITTED BY

CHIRP CORPORATION PROPOSES TO PERFORM A STUDY TO ASSESS TECHNICAL FEASIBILITY TRADE-OFFS AND TO DEVELOP A BASIC DESIGN CONCEPT FOR A MULTI-MODE RANGE INSTRUMENTATION RADAR SYSTEM. BUILDING ON CURRENT CTR ASSETS, THE STUDY WILL CONSIDER SIGNAL PROCESSING TECHNIQUES AND THE ASSOCIATED HARDWARE AND SOFTWARE TO PERFORM RCS MEASUREMENT, CHAFF EVALUATION, RADAR SIGNATURE GENERATION, ECM TEST AND EVALUATION, TARGET POSITION/VELOCITY ESTIMATION, RADAR IMAGING, JAMMER-TO-SKIN RATIO MEASUREMENTS, ANTENNA PATTERN CALIBRATION, SENSITIVITY TESTING, TEST MEASUREMENTS ON LOW OBSERVABLE TARGETS, SIMULATION OF MODERN RADAR COMMAND, CONTROL, AND COMMUNICATION THREAT SIGNALS, AND OTHER RELEVANT TASKS WITH A VARIETY OF DIFFERENT WAVEFORMS, PROCESSING MODES, AND METHODS. THE STUDY WILL IDENTIFY MAJOR OBSTACLES THAT PREVENT IMPLEMENTATION OF DESIRED RADAR FUNCTIONS, AND WILL ATTEMPT TO FIND COST EFFECTIVE WAYS TO CIRCUMVENT THESE OBSTACLES.

CIM SYSTEMS INC
2425 N CENTRAL EXPWY - STE 432
RICHARDSON, TX 75080
CONTRACT NUMBER:
MIKE FLOWER/DR J PRIEST
TITLE:
EXPERT SYSTEM FOR CIRCUIT BOARD ASSEMBLY
TOPIC# 62 OFFICE: NSSC IDENT#: 36214

THE PROPOSED EXPERT SYSTEM FOR CIRCUIT BOARD ASSEMBLY IS AN ENGINEERING SOFTWARE TOOL WHOSE GOAL IS TO HELP AN ORGANIZATION TO OPTIMIZE THE PLACEMENT AND INSERTION SEQUENCE OF ELECTRONIC PART COMPONENTS FOR A CIRCUIT CARD ASSEMBLY USING KITTED PARTS. IT ASSUMES THAT THE ASSEMBLY PROCESS IS NOT A SERIAL DECISION METHOD, RATHER, IT IS A PROCESS WITH PARALLEL INTERACTION FROM ORIGINATION OF A CONCEPTUAL DESIGN FOR A PCB TO DIRECT LINKAGE WITH DESIGN, AND ASSEMBLY CONSIDERATIONS. THE TOOL'S PRIMARY VALUE IS THAT IT INTEGRAT ES KNOWLEDGE IN A CONCISE FORM AND CONTENT FROM TRADITIONALLY SEPARATE SOURCES. BY FORMALLY ESTABLISHING DESIGN RULES AND ASSEMBLY CRITERIA, THE PROPOSED SYSTEM WILL PROVIDE AN OPTIMAL COMPONENT INSERTION SEQUENCE FOR KITTED COMPONENTS. A CONTINUOUS UPDATING CAPABILITY WILL BE PROVIDED FOR CHANGES IN THE STATE-OF-THE-ART RELATIVE TO NEW TECHNOLOGIES AND REQUIREMENTS.

SUBMITTED BY

COLEMAN RESEARCH CORP
5950 LAKEHURST DR
ORLANDO, FL 32819
CONTRACT NUMBER:
ANDREW E JACKSON
TITLE:
S-3B VIKING/HARPOON ENGAGEMENT TRAINER
TOPIC# 72 OFFICE: NAVAIR IDENT#: 36320

THE OBJECTIVE OF OUR PHASE I EFFORT IS TO PRODUCE AN AUTHENTIC SIMULATION OF AGM-84 (HARPOON) ATTACK PROFILES AGAINST HOSTILE SHIPS OPERATING INDEPENDENTLY AND IN UNISON. WE WILL SIMULATE WEAPON LAUNCH FROM S-3B AND A-6E AIRCRAFT SEPARATELY AND IN A COORDINATED OPERATIONS SCENARIO. THE SIMULATION WILL TAKE THE STUDENT THROUGH A SERIES OF HARPOON ATTACK SCENARIOS TO ENHANCE HIS KNOWLEDGE OF THE TACTICS TO BE UTILIZED FOR THE ATTACK, HIS OWN PLATFORM CAPABILITIES, AND THE THREATS FACED IN A HOSTILE ENVIRONMENT. EFFECTS OF WEATHER, SEA STATE AND ELECTRONIC COUNTER MEASURES WILL BE SIMULATED TO PROVIDE THE MOST REALISTIC TRAINING POSSIBLE ON A TABLETOP DEVICE. PHASE II WILL BE USED TO DEVELOP ATTACK PROFILES FOR OTHER PLATFORMS (SURFACE, SUBSURFACE AND ALL HARPOON CAPABLE U.S. AIRBORNE PLATFORMS) AGAINST AN EXTENSIVE LIBRARY OF HOSTILE SHIPS. SOFTWARE WILL BE DEVELOPED AS PART OF PHASE I WHICH WILL BE DELIVERED TO THE GOVERNMENT TO DEMONSTRATE THE HARPOON EMPLOYMENT TRAINING CAPABILITIES ON A Z-248 BASED COMPUTER ARCHITECTURE.

COMPUTER COMMAND & CONTROL CO
2401 WALNUT ST - STE 402
PHILADELPHIA, PA 19103
CONTRACT NUMBER:
DR NOAH S PRYWES
TITLE:
SOFTWARE INTENSIVE SYSTEMS REVERSE ENGINEERING
TOPIC# 149 OFFICE: NSWC IDENT#: 37984

THIS PROPOSAL IS BASED ON THE REVERSE ENGINEERING OF SOFTWARE

SUBMITTED BY

METHODOLOGY DEVELOPED UNDER A PHASE I NSF SBIR GRANT (#ISI 876-0223). THE NSF SPONSORED PROJECT PRODUCED AN ALGORITHM FOR TRANSLATING A PROCEDURAL FORTRAN PROGRAM INTO AN EQUATIONAL SPECIFICATION IN MODEL. THE LATTER IS INPUT TO THE MODEL SYSTEM WHICH REGENERATES THE PROGRAM IN PL/1, C OR ADA. THIS PROPOSAL IN DIRECTED TOWARDS APPLYING THE ABOVE METHOD TO SOURCE PROGRAMS IN CMS-2 IN REAL-TIME MILITARY APPLICATIONS. THE GENERATED SPECIFICATIONS WILL BE IN THE MODEL LANGUAGE, FROM WHICH PROGRAMS IN ADA WILL BE GENERATED. THE EMPHASIS WILL BE ON PARALLEL AND DISTRIBUTED ARCHITECTURES. THESE ARCHITECTURES ARE PRESENTLY SUPPORTED BY THE MODEL SYSTEM. THIS METHODOLOGY WILL SUPPORT THE ENTIRE LIFE CYCLE OF THE SOFTWARE REVERSE ENGINEERING: REDESIGN, DOCUMENTATION, MAINTENANCE, PROGRAM REGENERATION AND TESTING. THIS METHODOLOGY WILL BE USED TO REVERSE ENGINEER THE TENS OF MILLIONS OF CMS-2 PROGRAM LINES IN NAVY TACTICAL AND STRATEGIC SYSTEMS. A TWO THIRDS REDUCTION IN COST AND IMPROVED QUALITY ARE ENVISIONED, AS COMPARED WITH REPLACING THE OLD PROGRAMS WITH NEWLY DEVELOPED PROGRAMS. CCCC IS OFFERING COMMERCIALLY THE MODEL SYSTEM AND PLANS TO EXTEND THIS OFFERING TO A CMS-2-TO-ADA AUTOMATED REVERSE ENGINEERING PRODUCT.

CORDEC CORP
PO BOX 188 - 8270-B CINDER BED RD
LORTON, VA 22079
CONTRACT NUMBER:
DR RAYMOND J WEIMER
TITLE:
HIGH DAMPING CAPACITY STRUCTURAL METAL MATRIX COMPOSITES
TOPIC# 8 OFFICE: ONR IDENT#: 37571

A NEW CLASS OF METAL MATRIX COMPOSITES (MMC'S) BASED ON POLYMERIC REINFORCEMENTS WAS RECENTLY SHOWN TO BE FEASIBLE IN OUR LABORATORIES. PROPERLY DESIGNED, SUCH COMPOSITES WOULD HAVE LOW DENSITY IN ADDITION TO HIGH STRENGTH, TOUGHNESS, AND FATIGUE RESISTANCE. MOREOVER, THE ACOUSTIC DAMPING CAPACITY IS POTENTIALLY EXCEPTIONAL. IN THE PROPOSED WORK, NEWLY DEVELOPED MANUFACTURING TECHNOLOGY WOULD BE USED TO DEMONSTRATE CONTINUOUS PILOT-SCALE PRODUCTION IN PRACTICAL QUANTITIES SUITABLE FOR ENGINEERING CHARACTERIZATION OF PROTOTYPE STRUCTURES AND TO DEMONSTRATE THE COMMERCIAL VIABILITY OF SUCH A PROCESS. PRELIMINARY PROCESS/STRUCTURE/PROPERTY RELATIONSHIPS WILL

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BE OBTAINED TO ESTABLISH INITIAL PERFORMANCE ENVELOPES AND DESIGN CRITERIA.

COVALENT ASSOCS INC
52 DRAGON CT
WOBURN, MA 01801
CONTRACT NUMBER:
DR VICTOR R KOCH
TITLE:
NOVEL NON-AQUEOUS ELECTROLYTES FOR A HIGH RATE PRIMARY MAGNESIUM BATTERY
TOPIC# 150 OFFICE: NSWC IDENT#: 36024

THE NAVY CURRENTLY USES AQUEOUS ELECTROLYTE-BASED Mg PRIMARY BATTERIES IN A VARIETY OF WEAPONS SYSTEMS. OWING TO PARASITIC Mg/H(2)O CORROSION REACTIONS, DELIVERABLE VOLTAGES AND ENERGY DENSITIES ARE SUBSTANTIALLY LESS THAN THEORETICAL. MOREOVER, VOLTAGE DELAYS OFTEN COMPROMISE PERFORMANCE AND THEEBY APPLICABILITY. THUS THERE IS A NEED FOR NEW NON-AQUEOUS ELECTROLYTES COMPATIBLE WITH Mg BATTERY CHEMISTRY. OUR EXPERIENCE WITH ORGANIC ELECTROLYTES FOR Li BATTERIES SUGGESTED A NOVEL NON-AQUEOUS ELECTROLYTE FOR THE Mg ANODE. DURING PHASE I WE PLAN ON INVESTIGATING THE Mg OPEN CIRCUIT CORROSION RATE, ANODE EFFICIENCY, RATE CAPABILITY, AND THE NATURE OF Mg/NON-AQUEOUS SURFACE FILMS. FINALLY, Mg/MnO(2) AND Mg/(CF[x])(n) PRIMARY CELLS WILL BE DISCHARGED EMPLOYING THE NEW NON-AQUEOUS ELECTROLYTE.

CRYO-LIFE INC
2211 NEW MARKET PKWY - STE 142
MARIETTA, GA 30067
CONTRACT NUMBER:
DR JOHN F CARPENTER
TITLE:
DEVELOPMENT OF NOVEL CRYOPRESERVATION TECHNIQUE FOR HUMAN RED BLO CELLS
TOPIC# 69 OFFICE: NAVMED IDENT#: 36255

WITH CURRENT FDA-APPROVED PROTOCOLS FOR THE CRYOPRESERVATION OF

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HUMAN RED BLOOD CELLS, THE CELLS ARE TREATED WITH MULTIMOLAR CONCENTRATIONS OF GLYCEROL, A PERMEATING CRYOPROTECTANT. AFTER THAWING, EXTENSIVE PROCESSING OF RED CELLS IS REQUIRED TO REMOVE THE GLYCEROL, PRIOR TO TRANSFUSION, TO PREVENT HEMOLYSIS. FURTHERMORE, EVEN IN THE PRESENCE OF CRYOPROTECTANTS, THE FORMATION OF ICE DURING COOLING AND ICE RECRYSTALLIZATION DURING WARMING ARE MAJOR DAMAGING EVENTS DURING FREEZE-THAWING OF RED BLOOD CELLS. TO CIRCUMVENT THESE OBSTACLES TO RED CELL PRESERVATION, WE WILL USE A NOVEL PROTEIN (ICE CRYSTAL CONTROL PROTEIN, ICCP) THAT DEPRESSES THE FREEZING TEMPERATURE OF WATER, MODIFIES ICE CRYSTAL SHAPE AND INHIBITS RECRYSTALLIZATION. ICCP, IN MICROMOLAR CONCENTRATIONS, WILL BE COMBINED WITH CONVENTIONAL CRYOPROTECTANTS (HYDROXYETHYL STARCH, GLYCEROL) AT REDUCED CONCENTRATIONS, THEREBY ELIMINATING THE NEED TO REMOVE THE CRYOPROTECTANT AFTER THAWING AND ALLOWING IMMEDIATE TRANSFUSTION. THESE PROTEINS ARE LIKELY TO BE NON-TOXIC TO HUMANS; THEY OCCUR NATURALLY IN POLAR FISHES AND INSECTS. CRYO-LIFE HAS EXCLUSIVE ACCESS TO ICCP, WHICH CAN BE PRODUCED IN INDUSTRIAL QUANTITIES BY GENETIC ENGINEERING, FOR THE CRYOPRESERVATION OF MAMMALIAN CELLS AND TISSUES.

CRYSTAL SYSTEMS INC
27 CONGRESS ST
SALEM, MA 01970
CONTRACT NUMBER:
CHANDRA P KHATTAK
TITLE:
PRODUCTION OF TITANIUM-FREE SAPPHIRE FOR CESIUM CELL APPLICATIONS
TOPIC# 30 OFFICE: SPAWAR IDENT#: 36896

THE CESIUM RESONANCE FILTER IS AN IMPORTANT ELEMENT FOR THE BLUE-GREEN LASER REQUIRED BY THE NAVY FOR UNDERWATER COMMUNICATION. DURING FABRICATION OF PROTOTYPES OF THIS FILTER IT WAS OBSERVED THAT THE SAPPHIRE ELEMENTS PRODUCED PULSE SIGNALS WHICH COULD NOT BE ELIMINATED. IT IS NOW KNOWN THAT TITANIUM (Ti) IMPURITIES IN SAPPHIRE PRODUCED THESE PARASITIC PULSE SIGNALS IN CESIUM CELL CONFIGURATION. THE SOURCE OF Ti IMPURITIES IS THE MELTSTOCK UTILIZED FOR SAPPHIRE CRYSTAL GROWTH. THE PROPOSED PROGRAM IS TO GROW 4-INCH DIAMETER SAPPHIRE CRYSTALS UTILIZING THE HEAT EXCHANGER METHOD (HEM) WITH THE EMPHASIS OF MINIMIZING Ti CONTAMINATION BY SELECTION OF

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MELTSTOCK AND DEVELOPING CRYSTAL GROWTH PARAMETERS. IT IS ALSO INTENDED TO UTILIZE HIGH-PURITY ALUMINA POWDERS INSTEAD OF THE CONVENTIONAL SAPPHIRE CRACKLE AS MELTSTOCK FOR CRYSTAL GROWTH. SAMPLES WILL BE CHARACTERIZED FOR FLUORESCENCE FOR Ti AND FOR PRESENCE OF PULSE SIGNALS IN CESIUM CELL APPLICATIONS. ONCE THE FEASIBILITY OF PRODUCING "TITANIUM-FREE" SAPPHIRE IS ESTABLISHED THESE PROCEDURES WILL BE ADOPTED FOR GROWTH OF LARGER SAPPHIRE BOULES BY HEM DURING THE PHASE II PROGRAM.

CRYSTICA INC
615 W JOHNSON AVE
CHESHIRE, CT 06410
CONTRACT NUMBER:
DEL CUMMINGS
TITLE:
HIGH PRESSURE FLOAT ZONE GROWTH OF TiC
TOPIC# 11 OFFICE: ONT IDENT#: 37380

TITANIUM CARBIDE (TiC) IS THE IDEAL SUBSTRATE FOR SINGLE CRYSTAL EPITAXIAL GROWTH OF B-SILICON CARBIDE. THE TITANIUM CARBIDE CRYSTALS NOW AVAILABLE ARE LACKING IN BOTH SIZE AND QUALITY FOR THIS APPLICATION. IT IS BELIEVED THAT BY IMPROVING UPON THE HIGH PRESSURE FLOAT ZONE CRYSTAL GROWTH METHOD NOW USED FOR TiC CRYSTAL GROWTH, BOTH THE QUALITY AND SIZE REQUIREMENTS CAN BE MET. THE PRIMARY EFFORT IN THE PHASE I PROGRAM WILL BE TO REDUCE ALL IMPURITIES IN THE FLOAT ZONE CHAMBER, ESPECIALLY THOSE ORIGINATING FROM THE TiC FEED RODS AND THE PRESSURIZED INERT COVER GAS. IMPURITIES WITHIN THE FEED ROD CAN CAUSE DISLOCATIONS OR NUCLEATE NEW CRYSTALS, LIMITING THE SIZE OF THE SINGLE CRYSTAL BEING GROWN. THESE WILL BE REDUCED BY USING HIGH PURITY POWDERS IN THE MANUFACTURE OF THE FEED RODS. IMPURITIES IN THE PRESSURIZED INERT COVER GAS CAN CAUSE ARCING BETWEEN THE RF COIL AND THE WORKPIECE, IN ADDITION TO CONTAMINATING THE FEED ROD. THESE WILL BE REDUCED BY USING PROPRIETARY GAS PURIFICATIO. TECHNOLOGY. A COMPUTER SIMULATION RUN WILL ALSO BE DONE IN PHASE I. THIS PHASE I PROGRAM WILL RESULT IN THE GROWTH OF HIGH PURITY 3/4 IN. SINGLE CRYSTAL TiC. THE PHASE II PROGRAM WILL RESULT IN SCALE-UP TO 2 IN DIAMETER SINGLE CRYSTALS.

CVD
7209 DEER HOLLOW
WEST CHESTER, OH 45069
CONTRACT NUMBER:
CAN DANG
TITLE:
LIGHT WEIGHT TURBINE BLADE ATTACHMENT
TOPIC# 196 OFFICE: NAPC IDENT#: 37792

SUBMITTED BY

PROBLEMS - INCREASE THRUST-TO-WEIGHT REQUIREMENT IS ONE OF THE MAIN CONCERNS OF THE DoD (DEPARTMENT OF DEFENSE) AND THE AIRCRAFT INDUSTRY. THE THRUST-TO-WEIGHT RATIO COULD BE IMPROVED BY REDUCING THE WEIGHT OF THE ENGINE. ONE AREA IN THE ENGINE COULD BE REDUCED IS IN THE TURBINE BLADE/DISK ATTACHMENT. THE CURRENT DESIGN USED THE HIGH STRESS DOVETAIL OR FIR TREE ATTACHMENT. OBJECTIVES - THE OBJECTIVE OF THE PHASE I IS TO DEVELOP A FEASIBLE BLADE/DISK ATTACHMENT CONCEPT THAT WILL REDUCE THE BLADE/DISK ATTACHMENT WEIGHT AND STILL ALLOW THE EASE OF REMOVAL AND REPLACEMENT OF BLADES. APPROACH - THE PHASE I WORK WILL BE CARRIED OUT IN THREE MAIN STEPS. STEP 1 IS TO DEVELOP SEVERAL CONCEPTUAL DESIGNS AND A BEST FEASIBLE CONCEPT WILL BE CHOSEN. STEP 2 IS TO CREATE FEM (FINITE ELEMENT MODEL) AND PERFORM FEA (FINITE ELEMENT ANALYSIS) AND STEP 3 IS TO REFINE AND OPTIMIZE THE DESIGN.

DATASONICS INC
PO BOX 8 - 1400 RTE 28A
CATAUMET, MA 02534
CONTRACT NUMBER:
WILLIAM L DALTON
TITLE:
DIGITAL ENCODED ACOUSTIC TRANSPONDER - TORPEDO DATA LINK
TOPIC# 112 OFFICE: NAVSEA IDENT#: 36845

THERE IS A REQUIREMENT FOR RELIABLE, SECURE COMMUNICATION BETWEEN A SUBMARINE AND TORPEDO. THIS PROPOSAL DESCRIBES A NEW SYSTEM CONCEPT FOR DIGITAL ACOUSTIC DATA TRANSMISSION BASED ON SPREAD SPECTRUM CODED ACOUSTIC SIGNAL TRANSMISSION. THE FINAL GOAL OF THIS SYSTEM DEVELOPMENT WILL BE PRODUCTION OF A LOW COST ACOUSTIC MODEM DEVICE WHICH HAS A LONG OPERATING LIFE, IS SMALL, LIGHT IN WEIGHT, AND VERY SECURE FROM INTERFERENCE FROM AN UNAUTHORIZED SOURCE. IN ADDITION TO PROVIDING AN IMPROVED COMMUNICATION TECHNIQUE, THE UNIQUE DIGITAL ACOUSTIC MODULATION SCHEME SUGGESTS MANY OTHER APPLICATIONS WHERE SECURE, CODED DATA MUST BE TRANSMITTED THROUGH THE WATER FROM ONE INSTRUMENTATION PACKAGE TO ANOTHER. THE GOAL OF PHASE I IS TO PROVIDE PROOF OF CONCEPT FEASIBILITY AND TO PROVIDE A DETAILED SYSTEM DESIGN FOR PROTOTYPE HARDWARE CONSTRUCTION TO BE PROPOSED AS PART OF A PHASE II EFFORT.

SUBMITTED BY

DCS CORP
1330 BRADDOCK PL
ALEXANDRIA, VA 22314
CONTRACT NUMBER:
MARY E ORSINO
TITLE:
TRANSPORTABLE RF SIMULATOR FOR ELECTRONIC SUPPORT MEASURE (ESM)
TOPIC# 115 OFFICE: NAVSEA IDENT#: 36869

THE DEVELOPMENT OF A TRANSPORTABLE, PROGRAMMABLE DEVICE CAPABLE OF SIMULATING A REALISTIC ELECTROMAGNETIC SIGNAL ENVIRONMENT AT RF IN THE 2-18 GHz BAND HAS LONG BEEN NEEDED FOR NAVY ESM SYSTEM TRAINING AND TESTING APPLICATIONS. RECENT BREAKTHROUGHS IN SYNTHESIZER TECHNOLOGY HAS MADE THE POSSIBILITIES FOR HIGH SPEED, RELIABLE, LOW-MAINTENANCE RF GENERATION LIMITLESS. THE USE OF NEW TECHNOLOGY FOR RF GENERATION IN CONJUNCTION WITH AN EXISTING ENVIRONMENT SIMULATOR (THE TRAMS) YIELDS A LOW-COST SOLUTION TO THE NAVY'S REQUIREMENTS. THIS EFFORT WILL DETERMINE THE FEASIBILITY OF ADDING A 2-18 GHz CAPABILITY TO THE EXISTING TRAMS HARDWARE. THE PHASE I ASSESSMENT WILL RESULT IN A DETAILED HARDWARE SYSTEMS DESIGN AND A PLAN FOR DEVELOPING A PROTOTYPE OF THE RESULTING SIMULATOR IN A SUBSEQUENT PHASE II PROGRAM. THE SYSTEM WILL USE A HIGH-SPEED SYNTHESIZER TO MAXIMIZE SYSTEM CAPABILITY WITH A SINGLE RF SOURCE, AND DIGITALLY CONTROLLED MODULATORS AND ATTENUATORS TO PROVIDE THE NECESSARY DYNAMIC RANGE FOR RECEIVER SENSITIVITY TESTING. A CUSTOM RF INTERFACE SUBSYSTEM WILL PROVIDE THE INTERFACE BETWEEN THE EXISTING TRAMS HARDWARE AND THE RF GENERATION HARDWARE, AS WELL AS PULSE WIDTH TIMING CONTROL.

DCS CORP
1330 BRADDOCK PL
ALEXANDRIA, VA 22314
CONTRACT NUMBER:
DAVID B COBLITZ
TITLE:
INFRARED SCENE GENERATION MODEL
TOPIC# 211 OFFICE: NATC IDENT#: 37957

SUBMITTED BY

AIRBORNE INFRARED (IR) SYSTEMS ARE DIFFICULT TO EVALUATE IN FLIGHT BECAUSE THE COST OF CREATING REALISTIC MISSION SCENARIOS IS OFTEN PROHIBITIVE AND IR SENSOR PERFORMANCE IS DEPENDENT ON THE AMBIENT WEATHER CONDITIONS. AN IR SCENE GENERATOR USED IN CONJUNCTION WITH AN IR SIMULATOR COULD PROVIDE AN IR SCENE WITH KNOWN CHARACTERISTICS IN WHICH MANY DIFFERENT THREAT CONDITIONS COULD BE PRESENTED FOR EVALUATION. DCS PROPOSES TO DEVELOP A PLAN FOR MODIFYING A COMPU-SCENE IV SYSTEM TO PRESENT IR SCENERY FOR AIRCRAFT WEAPONS SYSTEM IR SENSOR TEST AND EVALUATION (T&E). AS PART OF THIS PLAN, METHODS FOR INTEGRATING THE LOWTRAN ATMOSPHERIC MODEL WITH THE COMPU-SCENE IV SIMULATOR SOFTWARE WILL BE INVESTIGATED. DCS ALSO PROPOSES TO RESEARCH AVAILABLE IR SIGNATURE DATA TO PROVIDE REALISTIC REPRESENTATIONS OF IR TARGETS FOR SIMULATION. FINALLY, DCS WILL ATTEMPT TO DEMONSTRATE THE ABILITY OF SIMULATING A REALISTIC IR ENVIRONMENT USING THE COMPU-SCENE IV.

DECISION SCIENCE CONSORTIUM INC
1895 PRESTON WHITE DR - STE 300
RESTON, VA 22091
CONTRACT NUMBER:
KATHRYN B LASKEY
TITLE:
ADVANCED DEEP-STRIKE CRUISE MISSILE AUTONOMOUS TARGET-SCENE INTERPRETATION AND DECISION MAKING
TOPIC# 165 OFFICE: NSWC IDENT#: 36181

ADVANCES IN AUTOMATED IMAGE UNDERSTANDING AND DECISION AIDS HAVE CREATED A VAST NEW POTENTIAL FOR SUPPORT OF STRATEGIC AND TACTICAL OPERATIONS. THE NON-MONOTONIC PROBABILIST (NMP), DEVELOPED BY MEMBERS OF THE PROPOSED PROJECT TEAM, IS A UNIQUE GENERIC INFERENCE FRAMEWORK WHICH IS DOMAIN INDEPENDENT AND CAN BE APPLIED TO A NUMBER OF PROBLEMS. NMP COMBINES THE SHAFER-DEMPSTER THEORY OF EVIDENTIAL REASONING WITH A FLEXIBLE ABILITY TO MAKE AND REVISE ASSUMPTIONS, TO EXAMINE THE DEGREE OF CONFLICT ASSOCIATED WITH THE CURRENT SET ASSUMPTIONS, AND TO BUILD IN CONFLICT RESOLUTION RULES THAT AUTOMATICALLY EXAMINE AND RESOLVE CONFLICTS WHEN THEY ARISE. IT IS A PARTICULARLY WELL SUITED FORMALISM FOR HANDLING CONFLICTING INFORMATION SOURCES SUCH AS THOSE THEY MAY BE ENCOUNTERED IN

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TARGETING PROBLEMS WHERE, FOR INSTANCE, CONFLICTS ARISE WHEN A PLANNED TARGET IS NO LONGER AVAILABLE. THE PROPOSED RESEARCH WILL APPLY THE CURRENT NMP ARCHITECTURE FOR EVIDENTIAL REASONING TO TARGETING PROBLEMS FOR RELOCATABLE OR MOVABLE TARGETS. THE ENSUING KNOWLEDGE BASE WILL PROVIDE A MODEL FOR ANALYZING THE COMPUTATIONAL STRUCTURE OF NMP WITH A VIEW TO INVESTIGATING APPROACHES TO DEALING WITH ITS INHERENT COMPUTATIONAL CONSTRAINTS. A PROBLEM APPROPRIATE FOR DEMONSTRATION WILL BE SELECTED AND A SMALL SCALE PROOF-OF-CONCEPT SYSTEM WILL BE DEVELOPED.

DECISION-SCIENCE APPLICATIONS INC
1110 N GLEBE RD - STE 400
ARLINGTON, VA 22201
CONTRACT NUMBER:
DENNIS J BERRY
TITLE:
JAMMING TECHNIQUES AGAINST FREQUENCY HOPPING SIGNALS
TOPIC# 21 OFFICE: SPAWAR IDENT#: 37394

THE TECHNICAL OBJECTIVE OF THIS RESEARCH IS TO IDENTIFY AND ANALYZE INNOVATIVE APPROACHES TO JAMMING FREQUENCY HOPPING SIGNALS. JAMMING SCHEMES AND WAVEFORMS WHICH DO NOT REQUIRE PRECISE KNOWLEDGE OF THE VICTIM SIGNAL AND WHICH MINIMIZE THE JAMMER POWER REQUIRED, SUCH AS IMPRECISE FOLLOWER JAMMING, PARTIAL-BAND BARRAGE JAMMING, AND EFFECTIVE SWEEPER JAMMING, ARE OF PARTICULAR INTEREST. TO ACHIEVE THIS GENERAL OBJECTIVE, THE PROPOSED WORK WILL FOCUS ON THE FOLLOWING SPECIFIC TECHNICAL OBJECTIVES: FIRST, WE WILL IDENTIFY JAMMING REQUIREMENTS FOR FREQUENCY HOPPERS, I.E. VICTIM SIGNAL PARAMETERS WHICH AFFECT JAMMING REQUIREMENTS. SECOND, WE WILL DERIVE INNOVATIVE APPROACHES TO JAMMING FREQUENCY HOPPERS, INCLUDING WIDEBAND, NARROW-BAND AND PARTIAL-BAND APPROACHES, AND IDENTIFY SUITABLE WAVEFORMS FOR USE WITH THESE APPROACHES, INCLUDING NOISE - AND CW- TYPE WAVE-FORMS. AND THIRD, WE WILL ANALYZE THE VARIOUS APPROACHES MATHEMATICALLY AND IN COMPUTER SIMULATION, AND PROVIDE THE GROUNDWORK FOR LABORATORY ANALYSIS.

DEFENSE GROUP INC
606 WILSHIRE BLVD - STE 707
SANTA MONICA, CA 90401
CONTRACT NUMBER:
DR RICHARD T RAUCH
TITLE:
INTEGRATED SYSTEMS ANALYSIS OF NAVAL WARFARE SYSTEMS ARCHITECTURE THE ASW MISSION
TOPIC# 17 OFFICE: SPAWAR IDENT#: 37267

SUBMITTED BY

THE INTEGRATED SYSTEMS ANALYSIS (ISA) METHODOLOGY IS INTRODUCED AS A TOOL TO ASSIST THE WARFARE SYSTEMS ARCHITECT AND ENGINEER (WSA&E) IN DEVELOPING AND EVALUATING ASW WARFARE SYSTEMS ARCHITECTURES (ASW/WSAs). THE METHODOLOGY USES "SMART" FUNCTIONAL FLOW DIAGRAMS, TO MODEL THE FUNCTIONAL INTERRELATIONSHIPS AND INTERDEPENDENCIES BETWEEN THE KEY ELEMENTS IN THE ASW/WSA. SPECIAL SOFTWARE WILL BE USED TO ASSIST IN THE DEVELOPMENT AND ANALYSIS OF THE ASW/WSA MODEL. WITH THESE TOOLS, THE ISA METHODOLOGY PROVIDES A RIGOROUS, DYNAMIC AND LOGICALLY STRAIGHTFORWARD ORGANIZATIONAL STRUCTURE THAT ENABLES UNRESTRICTED MANIPULATION OF THE ASW/WSA MODEL, ALLOWING THE WSA&E TO EXPLORE IN DETAIL THE FEATURES, VARIATIONS AND IMPLICATIONS OF ASW/WSAs. THE GOAL OF THE PROPOSED EFFORT IS TO DEMONSTRATE THE APPLICABILITY AND UTILITY OF THE ISA METHODOLOGY TO THE DEVELOPMENT AND EVALUATION OF ASW/WSAs. TO ACHIEVE THIS AN EXAMPLE ASW/WSA MODEL OF SUFFICIENT DETAIL WILL BE DEVELOPED TO: i) ENABLE THE IDENTIFICATION, ANALYSIS AND PRIORITIZATION OF CRITICAL ACQUISITIONS, FORCE STRUCTURES AND REQUIRED OPERATIONAL FUNCTIONS NECESSARY FOR FULFILLMENT OF THE TOP LEVEL WARFARE REQUIREMENTS (TLWRs); AND ii) ASSESS THE IMPACT OF MODIFYING ANY OF THE ASW/WSA ELEMENTS ON THE WSA AS A WHOLE IN TERMS OF MAINTAINING AN ASW FORCE STRUCTURE THAT IS CONSISTENT WITH TLWR FULFILLMENT.

DEFENSE GROUP INC
1901 N MOORE ST - STE 1000
ARLINGTON, VA 22209
CONTRACT NUMBER:
EDWIN M BALDWIN
TITLE:
WARFARE SYSTEMS ARCHITECTURES: STRIKE WARFARE (STW)
TOPIC# 17 OFFICE: SPAWAR IDENT#: 37270

DEFENSE GROUP INCORPORATED (DGI) IN CONJUNCTION WITH SCIENCE APPLICATIONS INTERNATIONAL CORPORATION (SAIC) PROPOSES TO USE INNOVATIVE ANALYSIS TECHNIQUES TO RELATE THE NAVY'S STRIKE WARFARE (STW) WARFIGHTING REQUIREMENTS TO STW SYSTEMS ACQUISITION. THE METHODOLOGY CONSISTS OF: (1) DEVELOPING A SET OF TIME-PHASED EVENTS THAT COMPRISE THE STW OPERATIONAL SEQUENCE, (2) FOR EACH EVENT, DESCRIBING THE REQUIRED OPERATIONAL FUNCTIONS (ROFs) IN TERMS OF

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PHYSICAL ENTITIES, TASKS TO BE PERFORMED, ORGANIZATIONAL CONNECTIVITIES OF ENTITIES AND TASKS, AND EXTERNAL SUPPORT REQUIRED FOR BOTH PROMPT AND SUSTAINED OPERATIONS. (3) EMPLOYING FORCE-LEVEL PERFORMANCE METRICS (FPM) TO EVALUATE STW TLWR MISSION SUCCESS, REQUIRED CAPABILITIES AND ARCHITECTURAL GUIDANCE. (4) IDENTIFICATION OF CONFLICTS, IN STW RESOURCE ALLOCATION THAT REDUCE STW EFFECTIVENESS. (5) ADJUSTMENT AND ITERATION OF THE PROCESS TO OPTIMIZE TLWR COMPLIANCE, AND (6) IF TIME AND MONEY PERMIT, IDENTIFY MISSING DATA PARAMETERS.

DEFENSE GROUP INC (DGI)
1901 N MOORE ST - STE 1000
ARLINGTON, VA 22209
CONTRACT NUMBER:
DONALD F DAVIS
TITLE:
QUICK RESPONSE ENGAGEMENT SYSTEM IN SUPPORT OF ADVANCED SYSTEMS A CONCEPTS FOR FUTURE NAVAL WARFARE
TOPIC# 18 OFFICE: SPAWAR IDENT#: 37212

DEFENSE GROUP INC. (DGI) IN CONJUNCTION WITH SCIENCE APPLICATIONS INTERNATIONAL CORPORATION (SAIC) PROPOSES TO EVALUATE THE EFFECTIVENESS, TECHNOLOGY APPLICATIONS, PROJECTED COST AND RISK OF A QUICK RESPONSE ENGAGEMENT SYSTEM (QRES) BY USING THE WARFARE SYSTEM ARCHITECTURE AND ENGINEERING (WSA&E) METHODOLOGY. PHASE I OBJECTIVES ARE TO DEVELOP THE QRES OPERATIONAL CONCEPT, SYSTEM ARCHITECTURE, TECHNOLOGY APPLICATIONS, TECHNICAL RISK, PROJECTED COSTS AND POTENTIAL THREAT RESPONSES TO THE QRES. THE QRES WILL GREATLY IMPROVE RESPONSE TIMES TO ENGAGE SUBMARINE CONTACTS, AND HAS APPLICATIONS IN CVBF AND OTHER FORCE ASW PROSECUTION. PHASE I WORK WILL DEVELOP PHYSICAL, FUNCTIONAL, ORGANIZATIONAL, AND CONNECTIVELY ARCHITECTURE COMPONENTS. TECHNICAL FEASIBILITY STUDIES WILL ESTABLISH AND DESIGN PARAMETERS, WITH SPECIFIC TECHNOLOGY APPLICATIONS AND RISK IDENTIFIED FOR CANDIDATE QRES CONFIGURATIONS. A PARALLEL ARCHITECTURE ASSESSMENT EFFORT WILL USE EXISTING TLWR-WSA ANALYTICAL TOOLS TO MEASURE QRES EFFECTIVENESS AND CONTRIBUTION TO FORCE ASW MISSION SUCCESS. THE PHASE I REPORT WILL IDENTIFY QRES CONFIGURATION, EFFECTIVENESS, COST AND RISK IN SUFFICIENT DETAIL FOR INCLUSION IN A SPAWAR ASW ARCHITECTURE OPTION. PHASE II EFFORTS

SUBMITTED BY

WILL BE IDENTIFIED FULLY IN THE REPORT.

DELEX SYSTEMS INC
1953 GALLOWS RD - STE 700
VIENNA, VA 22180
CONTRACT NUMBER:
DOUGLAS C GREENLAW
TITLE:
A-6E INTRUDER/HARPOON ENGAGEMENT TRAINER
TOPIC# 74 OFFICE: NAVAIR IDENT#: 36338

DELEX SYSTEMS, INC. HEREIN PROPOSES PHASE I OF A TWO PHASE RESEARCH AND DEVELOPMENT EFFORT CONCERNING THE DEVELOPMENT OF AN A-6E HARPOON SIMULATOR TO PROVIDE TACTICAL TRAIING TO THE INTRUDER AIRCREWS. DELEX PROPOSES DURING PHASE I TO DEFINE THE METHODOLOGY FOR THE DEVELOPMENT OF AN A-6E HARPOON TRAINER TO ADDRESS THE COMPLEXITIES OF HARPOON OPERATIONS IN THE VA COMMUNITY. THIS METHODOLOGY WILL FOCUS ON EXAMINING EXISTING OFF-THE-SHELF PROTOTYPE SOFTWARE FOR ITS PORTABILITY FROM HP 9836C SOURCE CODE TO EXISTING SOFTWARE SUPPORTED BY THE ZENITH Z-248 (DESKTOP II) AND FUTURE USN COMPUTER PROCUREMENTS. ADDITIONALLY, THE POSSIBILITY OF DESIGNING AN AUTOMATED TOOL FOR SOFTWARE TRANSLATION BETWEEN EXISTING HP SOURCE CODE TO ZENITH SOFTWARE WILL BE INVESTIGATED. FINALLY, A-6E HARPOON SIMULATOR DOCUMENTATION STATING SYSTEM REQUIREMENTS FOR PROGRAM DESIGN, ADAPTATION, QUALITY FACTORS, AND TRACEABILITY OF SOFTWARE CONFIGURATION WILL BE INCLUDED IN PHASE I. PROBABILITY OF A SUCCESSFUL EFFORT IS HIGH BECAUSE DELEX WILL IMPLEMENT INNOVATIVE AND PROVEN R&D TECHNIQUES AND DIRECT USER CONTACTS.

DELTA G CORP
9960A GLENOAKS BLVD
SUN VALLEY, CA 91352
CONTRACT NUMBER:
ROBERT A HOLZL
TITLE:
HYBRID PROCESS FOR RAPID CONSOLIDATION OF HIGH PERFORMANCE CARBID AND BORIDE CERAMICS
TOPIC# 146 OFFICE: NSWC IDENT#: 35995

SUBMITTED BY

A NEW METHOD OF CHEMICAL VAPOR INFILTRATION OF FIBROUS PREFORMS WILL BE INVESTIGATED USING A TWO STEP PROCESS. THE TWO STEP PROCESS WILL USE TWO ALREADY-PROVEN TECHNIQUES IN SERIES. THE OBJECTIVE WILL BE TO PRODUCE A STRONGER AND TOUGHER CERAMIC BODY CAPABLE OF OPERATING AT TEMPERATURES IN THE 4000-5000 DEG F RANGE IN AN OXIDIZING ENVIRONMENT AND 5000-6000 DEG F IN A REDUCING ENVIRONMENT. SUBSTANTIAL REDUCTION IN THE PROCESSING TIMES OVER PRESENT CVI PROCESSES TO ACHIEVE NEAR FULL DENSITY IS EXPECTED. FEASIBILITY DEMONSTRATION MODEL WILL USE HIGH STRENGTH GRAPHITE FIBERS AND ZIRCONIUM CARBIDE MATRIX.

DELTA INFORMATION SYSTEMS
300 WELSH RD
HORSHAM, PA 19044
CONTRACT NUMBER:
STEPHEN URBAN
TITLE:
DATA COMPRESSION FOR ACOUSTIC SURVEILLANCE DATA
TOPIC# 56 OFFICE: SPAWAR IDENT#: 37059

IT IS PROPOSED TO SYNTHESIZE AND ANALYZE A GENERIC UNDERWATER SURVEILLANCE SYSTEM, IDENTIFY CLASSES OF ACOUSTIC SIGNALS HAVING SIMILAR CHARACTERISTICS, SURVEY AND ANALYZE DATA COMPRESSION TECHNIQUES, SELECT AND ANALYZE COMPRESSION ALGORITHMS FOR EACH CLASS OF ACOUSTIC SIGNALS, AND DETERMINE THE IMPACT OF THE PROPOSED COMPRESSION TECHNIQUES ON THE GENERIC SURVEILLANCE SYSTEMS.

DIAMOND MATERIALS INSTITUTE INC
2820 E COLLEGE AVE
STATE COLLEGE, PA 16801
CONTRACT NUMBER:
DR RICHARD KOBA
TITLE:
SYNTHESIS OF LARGE-AREA MONOCRYSTALLINE TiC AS A SUBSTRATE FOR HETEROEPITAXIAL GROWTH OF B-SiC
TOPIC# 5 OFFICE: ONR IDENT#: 37546

SUBMITTED BY

THE OBJECTIVE OF THE PROGRAM IS TO SYNTHESIZE A LARGE-AREA, THIN-FILM OF MONOCRYSTALLINE TiC WHICH IS SUITABLE AS SUBSTRATE FOR THE HETEROEPITAXIAL GROWTH OF BETA-SiC. MONOCRYSTALLINE TiC CAN BE GROWN BY CHEMICAL VAPOR DEPOSITION ON A LATTICE-MATCHED SUBSTRATE. DIAMOND MATERIALS INSTITUTE INC (DMI) PLANS TO ACHIEVE THIS GOAL IN TWO PHASES. IN PHASE I, DMI PLANS TO DEMONSTRATE A NOVEL, STEP PROCESS FOR HETEROEPITAXIAL GROWTH OF TiC BY CVD. THE SUBSTRATE WILL BE A FREE-STANDING B-SiC SINGLE CRYSTAL HETEROEPITAXIALLY GROWN ON Si. DMI PROPOSES A NOVEL PROCESS TO GETTER CRYSTALLINE DEFECTS FROM THE B-SiC SURFACE BEFORE TiC DEPOSITION. REMOVAL OF CRYSTALLINE DEFECTS FROM THE SURFACE OF THE B-SiC SUBSTRATE SHOULD PREVENT NUCLEATION OF DEFECTS IN THE TiC. PHASE II WILL SCALE-UP THE PROCESS TO CREATE DEFECT-FREE, TiC MONOCRYSTALS AT LEAST 100 MM IN DIAMETER. PHASE II WILL INCLUDE HETEROEPITAXIAL GROWTH OF SEMICONDUCTOR-GRADE B-SiC ON THE MONOCRYSTALLINE TiC AND THE FABRICATION OF SEMICONDUCTOR DEVICES IN THE B-SiC.

DIGITAL SIGNAL CORP
8003 FORBES PL
SPRINGFIELD, VA 22151
CONTRACT NUMBER:
DR JAMES GENOVA
TITLE:
TACTICS DEVELOPMENT FOR COORDINATED USAGE OF ONBOARD/OFFBOARD ELECTRONIC WARFARE (EW) SYSTEMS
TOPIC# 120 OFFICE: NAVSEA IDENT#: 36893

THE GOAL OF THE PROPOSED EFFORT IS TO DEVELOP TACTICS FOR COORDINATED USAGE OF ONBOARD AND OFFBOARD EW SYSTEMS. THE COOPERATIVE TACTICS WILL BE AIMED AT PROVIDING THE TACTICAL COMMANDER OF THE BATTLE GROUP WITH THE MOST EFFECTIVE UTILIZATION OF ASSETS. THE PROPOSED TASKS FOR PHASE I ARE AS FOLLOWS: 1. ANALYSIS OF TYPICAL ASM'S AND REDUCTION OF THE ASM INTO BASIC FUNCTIONAL ELEMENTS. 2. ANALYSIS OF EW ASSETS AND DEVELOPMENT OF QUANTITIATIVE CRITERIA OF PERFORMANCE. 3. IDENTIFICATION AND QUANTIFICATION OF CURRENT FRIENDLY FORCE DEFICIENCIES. 4. AREAS OF POTENTIAL IMPROVED MISSION PERFORMANCE RESULTING FROM COORDINATED ONBOARD/OFFBOARD AND/OR SHIP TO SHIP TACTICS WILL BE IDENTIFIED AND PRIORITIZED. 5. TIMELY PROGRESS AND

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TECHNICAL REVIEWS SHALL BE SUBMITTED. DSC PERSONNEL ARE EXPERIENCED IN EW TACTICS AND FAMILIAR WITH PRIOR WORK IN MULTI-SHIP COOPERATIVE TACTICS. THE EXPLORATORY DEVELOPMENT OF COORDINATED TACTICS CAN BE ACCOMPLISHED THROUGH PROVEN ANALYTICAL AND EMPIRICAL TECHNIQUES UTILIZED BY DSC ON PRIOR DEVELOPMENT PROGRAMS.

DWA COMPOSITE SPECIALTIES INC
21119 SUPERIOR ST
CHATSWORTH, CA 91311
CONTRACT NUMBER:
CORY SMITH/SAM RAHEB
TITLE:
HIGH SPECIFIC STRENGTH/STIFFNESS METAL MATRIX COMPOSITE TORPEDO HULL SECTIONS
TOPIC# 110 OFFICE: NAVSEA IDENT#: 36808

THIS PHASE I EFFORT WILL SHOW THE FEASIBILITY OF THE FABRICATION OF HIGH SPECIFIC STRENGTH/STIFFNESS, B(4)C REINFORCED ALUMINUM METAL MATRIX COMPOSITE (MMC) TORPEDO HULLS. CURRENT TORPEDO HULLS ARE COMPRISED OF ALUMINUM WHICH IS EITHER CAST OR FORGED INTO RELATIVELY THICK HULL SECTIONS, WHICH TEND TO CONTRIBUTE SIGNIFICANTLY TO THE OVERALL TORPEDO WEIGHT. THESE TORPEDO HULLS ARE REQUIRED TO BE 21 INCHES IN EXTERNAL DIAMETER AND NO LESS THAN 19 INCHES INTERNAL DIAMETER. THEY MUST WITHSTAND THE HYDROSTATIC FORCES ENCOUNTERED DURING DEEP OPERATIONS AND DYNAMIC FORCES DEVELOPED DURING SHIPBOARD TESTING AND LAUNCHING. MMC'S OFFER HIGH STRENGTH-TO-WEIGHT AND STIFFNESS-TO-WEIGHT RATIOS, USING STANDARD FABRICATION TECHNIQUES AND AS A RESULT WOULD BE PERFECT CANDIDATES FOR THE CONSTRUCTION OF LIGHT WEIGHT, STRUCTURALLY STABLE, COST EFFECTIVE HYBRID TORPEDO HULLS. THIS EFFORT PROPOSES TO USE ADVANCED MATERIALS AND NOVEL SECONDARY FABRICATION TECHNIQUES TO UPGRAD CURRENT DESIGNS. EXISTING EXTRUSION TECHNIQUES SUCH AS BACK EXTRUSION OF TUBE SECTIONS COULD BE USED EFFECTIVELY TO PRODUCE MMC TORPEDO HULLS WHICH WOULD MEET THE REQUIREMENTS OF BEING COST EFFECTIVE AND BE OF REDUCED WEIGHT.

DYNAMIC ANALYSIS & TESTING ASSOCS
2231 FARADAY AVE - STE 103
CARLSBAD, CA 92008
CONTRACT NUMBER:
C THOMAS SAVELL
TITLE:
CROSS SECTION REDUCTION OF DISH ANTENNAS
TOPIC# 204 OFFICE: NOSC IDENT#: 37887

SUBMITTED BY

THE NATURAL EVOLUTION OF THE PHASE I EFFORT WILL BE TO DEVELOP A PROTOTYPE RADAR ANTENNA DESIGN FOR EVALUATION AND DEMONSTRATION IN PHASE II. THE PHASE I EFFORT WILL CONCLUDE WITH PRELIMINARY DESIGNS AND RECOMMENDATIONS FOR THE PHASE II DEVELOPMENT EFFORT.

DYNASEN INC
20 ARNOLD PL
GOLETA, CA 93117
CONTRACT NUMBER:
J A CHAREST
TITLE:
MEASUREMENTS OF TEMPERATURE AND PRESSURE IN UNDERWATER EXPLOSION BUBBLE
TOPIC# 102 OFFICE: NAVSEA IDENT#: 36700

THIS PROPOSAL IS CONCERNED WITH THE DEVELOPMENT OF TRANSDUCERS THAT ARE CAPABLE OF PRESSURE AND TEMPERATURE MEASUREMENTS IN THE EXPANDING GASEOUS PRODUCTS OF UNDERWATER EXPLOSIONS. MEASUREMENT CAPABILITIES WILL BE IN EXCESS OF 100 KBARS AND 2500 DEG K WITH 1 MSEC OR BETTER TEMPORAL RESOLUTION. THESE TRANSDUCERS ARE EXPECTED TO RESOLVE THE TIMING OF THE REACTION OF METAL ADDATIVES IN THE EXPLOSIVES, THUS PROVIDING INFORMATION ON PERFORMANCE. THE APPROACH TO DEVELOPING THE TRANSDUCERS IS TO USE THIN FILM SENSORS INCORPORATED INTO RUGGED TRANSDUCER ARRANGEMENTS THAT ARE CAPABLE OF SURVIVING AN INTENSE INITIAL SHOCK WAVE. THIS WILL PERMIT LATER TIME TEMPERATURE AND PRESSURE MEASUREMENTS. THIN FILM SHOCK PRESSURE SENSORS IS A TECHNOLOGY WHICH IS WELL DEVELOPED AND PROVEN. THIN FILM PIEZO-RESISTIVE (CARBON) AND PIEZOELECTRIC (PVF2 AND VF2/VF3) SENSORS WILL BE USED FOR THE PRESSURE MEASUREMENTS. THIN FILM THERMORESISTIVE ELEMENTS (TANTALUM OR MOLYBDENUM ON A CERAMIC SUBSTRATE) WILL BE DEVELOPED AND USED FOR THE TEMPERATURE MEASUREMENTS. DEVELOPMENT OF THESE TRANSDUCERS, CAPABLE OF PRESSURE AND TEMPERATURE MEASUREMENTS WELL BEYOND THOSE CURRENTLY AVAILABLE, WILL EXTEND THE STATE OF THE ART IN HIGH PRESSURE AND TEMPERATURE TECHNOLOGY. THIS WILL ENABLE RESEARCHERS TO FURTHER THEIR UNDERSTANDING OF HIGH EXPLOSIVE PROCESSES.

ECODYNAMICS RESEARCH ASSOCS INC
PO BOX 8172
ALBUQUERQUE, NM 87198
CONTRACT NUMBER:
PATRICK J ROACHE
TITLE:
COMPUTATIONAL MODELING OF 3-D UNSTEADY FLOW
TOPIC# 93 OFFICE: NAVSEA IDENT#: 36585

SUBMITTED BY

A USER-FRIENDLY COMPUTER CODE WILL BE DEVELOPED TO CALCULATE THE UNSTEADY AND HIGHLY 3-D COMPLEX FLOWPATHS IN EXHAUST DIFFUSERS OF MODERN MARINE GAS TURBINES, INCLUDING PRESSURE LOSSES AND NONUNIFORM FLOW LOSSES. THE VAX-VMS CODE WILL BE BASED UPON AN EXISTING 3-D TIME-DEPENDENT NAVIER-STOKES CODE ALREADY VALIDATED IN THE CALCULATION OF PITCHING OF A SWEPT WING SECTION MOUNTED IN A WIND TUNNEL, AND RECENTLY EXTENDED UNDER SEPARATE NAVY FUNDING TO INCOMPRESSIBLE FLOWS AND TO INCLUDE VARIATIONAL BOUNDARY FITTED AND SOLUTION ADAPTIVE GRID GENERATION. THE EFFICIENT IMPLICIT CODE USES AND AF (APPROXIMATE FACTORIZATION) ALGORITHM WHICH IS SECOND ORDER ACCURATE (INCLUDING CROSS DERIVATIVE TERMS). THE NEW CODE WILL INCLUDE TURBULENCE MODELING FOR STRONGLY SEPARATED RECIRCULATING FLOWS, AUTOMATIC ERROR ESTIMATION, AND USER-FRIENDLY GEOMETRY DESCRIPTION APPROPRIATE TO CONICAL (AND GENERAL) EXHAUST DIFFUSERS WITH DUMP-TYPE COLLECTOR BOXES. THE USER-FRIENDLY INTERFACE WILL UTILIZE A FORTRAN PORTABLE NAME-LIST DEVELOPED AT ECODYNAMICS.

EDGE TECHNOLOGIES INC
4455 W 62ND ST
INDIANAPOLIS, IN 46268
CONTRACT NUMBER:
GEORGE A KIM
TITLE:
IMPROVEMENTS IN SINGLE CRYSTAL DIAMOND TOOLS
TOPIC# 170 OFFICE: NWC IDENT#: 36204

THE IMPROVEMENT OF SINGLE CRYSTAL DIAMOND TOOLS VIA THE INVESTIGATION OF DESIGN ALTERNATIVES TO EXISTING EDGE TECHNOLOGIES EQUIPMENT TO IMPROVE ROUNDNESS OF TOOL NOSE RADIUS AND DETERMINATION OF OPTIMUM DIAMOND CRYSTAL ORIENTATION, EDGE PREPARATION AND TITANIUM NITRIDE COATINGS TO IMPROVE TOOL EDGE DURABILITY WHEN MACHINING HIGH PHOSPHOROUS ELECTROLESS NICKEL MATERIALS.

EDGEWOOD TELE-SERVICES INC
135 TENNYSON DR
PLAINSBORO, NJ 08536
CONTRACT NUMBER:
IRVING SUSSKIND
TITLE:
MULTIMEDIA DYNAMIC CONTROL ALGORITHMS
TOPIC# 44 OFFICE: SPAWAR IDENT#: 36979

SUBMITTED BY

THE PURPOSE OF THIS STUDY IS TO DEVELOP TECHNICAL ALGORITHMS FOR THE SELECTION AND UTILIZATION OF MULTIPLE COMMUNICATIONS MEDIA (HF, UHF-LOS, UHF-SATCOM) FOR THE PACKET SWITCHED RADIO NETWORK SELECTED FOR THE UNIFIED NETWORKING TECHNOLOGY/ADVANCED TECHNOLOGY DEMONSTRATION (UNT/ATD) OF THE COMMUNICATION SUPPORT SYSTEM (CSS). CONTROL OF THE COMMUNICATION RESOURCES AT EACH NODE REQUIRES KNOWLEDGE OF THE NETWORK CONNECTIVITY IN ORDER TO SELECT THE OPTIMUM ROUTING AND RELAYING OF PACKETS TO INSURE HIGH PROBABILITY OF RECEPTION. THIS STUDY WILL CHARACTERIZE THE NETWORK AND DETERMINE ITS COMMUNICATIONS REQUIREMENTS. ARTIFICIAL INTELLIGENCE (AI) TECHNOLOGY WILL BE EXPLORED FOR APPLICATION TO THIS PROBLEM.

EIC LABS INC
111 DOWNEY ST
NORWOOD, MA 02062
CONTRACT NUMBER:
K M ABRAHAM
TITLE:
ELECTROPOLYMERIZED METALLO-MARCOCYCLES AS CATALYSTS IN Li/SOCl(2) CELLS
TOPIC# 151 OFFICE: NSWC IDENT#: 36038

A RESEARCH AND DEVELOPMENT PROGRAM AIMED AT STUDYING ELECTROPOLYMERIZED METALLO-POR-PHYRINS, PHTHALOCYANINES AND TETRAAZANNULENES AS CATALYSTS IN THE Li/SOCl(2) CELL IS PROPOSED. THESE CATALYSTS WILL BE DEPOSITED AS CONDUCTIVE POLYMER FILMS ON THE POROUS CARBON ELECTRODES, PRIOR TO THEIR USE IN Li/SOCl(2) CELLS, BY ELECTROCHEMICAL OXIDATION OF THE CORRESPONDING MONOMERS IN A SUITABLE SOLVENT SUCH AS ACETONITRILE. POTENTIAL ADVANTAGES OF ELECTROPOLYMERIZED CATALYSTS INCLUDE EASE OF FABRICATION AND UNIFORM DISTRIBUTION OF THIN POLYMER COATINGS, STABILITY AND INSOLUBILITY IN THE LiAlCl(4)/SOCl(2) ELECTROLYTE AND CONTROL OVER THE OXIDATION STATE OF THE CENTRAL METAL ATOM. THE FOLLOWING TASKS ARE PROPOSED FOR THE PHASE I PROGRAM. SYNTHESIS AND ELECTROPOLYMERIZATION OF AMINO- AND PYRROLYL-DERIVATIVES OF COBALT TETRAPHENYL PORPHYRIN, AND NICKEL TETRAAZAANNUELEN. STUDIES TO DETERMINE THE EFFECT OF OXIDATION STATES OF THE CENTRAL METAL ATOMS OF THE ELECTROPOLYMERIZED MACROCYCLES ON THEIR CATALYTIC ACTIVITY IN Li/SOCl(2) CELLS.

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DISCHARGE OF Li/SOCl(2) CELLS CONTAINING ELECTROPOLYMERIZED CATALYSTS AT VARIOUS TEMPERATURES AND CURRENT DENSITIES.

EIC LABS INC
111 DOWNEY ST
NORWOOD, MA 02062
CONTRACT NUMBER:
TIMOTHY L ROSE
TITLE:
TRANSPARENT CONDUCTIVE ALL PLASTIC COMPOSITES FOR AIRCRAFT WINDOW
TOPIC# 75 OFFICE: NAVAIR IDENT#: 36352

EFFECTIVE DISCHARGE OF THE ELECTROSTATIC CHARGE BUILDUP ON AIRCRAFT IS NOT PRESENTLY POSSIBLE ON THOSE AREAS SUCH AS THE COCKPIT CANOPY AND WINDOWS WHERE THE NECESSITY OF TRANSPARENCY DOES NOT ALLOW USE OF METALLIC FILMS OR CONDUCTING COMPOSITES WHICH ARE OPAQUE. THE PROPOSED WORK WILL FABRICATE AND TEST POLYMER BLENDS INCORPORATING THE TRANSPARENT CONDUCTIVE POLYMER POLYISOTHIANAPHTHENE (PITN) INTO CONVENTIONAL PLASTICS USED IN WINDOWS. THE BLENDS WILL HAVE ENHANCED CONDUCTIVITY WITHOUT COMPROMISING THE OPTICAL CHARACTERISTICS. BLENDS OF PITN WITH POLYACRYLIC AND POLYCARBONATE RESINS WILL BE THERMOFORMED INTO SHEETS. IN ADDITION, SOLUTION BLENDING OF THE HOSTS WITH SOLUBLE POLYDIHYDROISOTHIANAPHTHENE (PDHITN) WILL BE USED TO MAKE FILMS OF THE BLENDS. PDHITN, WHICH IS TRANSPARENT AND CAN BE DISSOLVED IN A NUMBER OF SOLVENTS WILL BE CHEMICALLY CONVERTED TO PITN EITHER DURING THE BLENDING PROCESS OR BY TREATMENT OF THE BLEND AFTER THE FILMS ARE FORMED. THE ELECTRICAL, OPTICAL, AND MECHANICAL PROPERTIES OF THE BLENDS WILL BE MEASURED AS A FUNCTION OF THE LOADING OF PITN AND THE PROCESSING CONDITIONS.

EIC LABS INC
111 DOWNEY ST
NORWOOD, MA 02062
CONTRACT NUMBER:
L S ROBBLEE/M M CARRABBA
TITLE:
RECEPTOR-BASED SURFACE-ENHANCED RAMAN BIOSENSORS
TOPIC# 4 OFFICE: ONR IDENT#: 37534

SUBMITTED BY

BIOSENSORS DEPEND ON THE BINDING AFFINITY OF A BIOLOGICAL RECEPTOR MOLECULAR FOR A SPECIFIC CHEMICAL STRUCTURE AND A MEANS OF DETECTING THE BINDING REACTION. WE PROPOSE A RECEPTOR-BASED BIOSENSOR COUPLED WITH SURFACE ENHANCED RAMAN SPECTROSCOPY (SERS) FOR A DIRECT SPECTROSCOPIC APPROACH TO BIOSENSING. THE OBJECTIVE OF THE PHASE I PROGRAM IS TO DEMONSTRATE THE FEASIBILITY OF DETECTING SPECIFIC RECEPTOR-LIGAND (R-L) BINDING REACTIONS UTILIZING ENHANCED RAMAN TECHNIQUES. MODEL R-L BINDING SYSTEMS FOR STUDY WILL INCLUDE KNOWN AFFINITY SYSTEMS SUCH AS ANTIBODY-ANTIGEN AND LECTIN-CARBOHYDRATE COMBINATIONS. A SIX-MONTH PROGRAM OF RESEARCH WILL INVESTIGATE THE SERS SPECTRA OF MODEL RECEPTORS, LIGANDS AND R-L COMPLEXES. RE-CEPTORS MOLECULES WILL BE ABSORBED TO A SURFACE WHICH GIVES ENHANCED RAMAN ACTIVITY, AND THE RAMAN SPECTRUM RECORDED. THE LIGAND WILL THEN BE ADDED AND THE RAMAN SPECTRUM RECORDED AGAIN TO THE RECEPTOR-LIGAND COMPLEX. THE CHANGE IN SERS SIGNAL WOULD FORM THE BASIS FOR A NEW TYPE OF SENSOR IN QHICH THE R-L BINDING REACTION COULD BE OBSERVED IN REAL TIME AND RELATED TO THE CONCENTRATION OF LIGAND.

ELECTROIMPACT INC
2721 NE BLAKELEY ST
SEATTLE, WA 98105
CONTRACT NUMBER:
PETER ZIEVE
TITLE:
PERMANENT MAGNET ELECTROMAGNETIC LAUNCHER
TOPIC# 187 OFFICE: NCSC IDENT#: 37739

ELECTROIMPACT PROPOSES THAT ELECTROMAGNETIC LAUNCH BE EMPLOYED WITH A PERMANENT MAGNET PUSHER MOTOR AND A TRAVELING WAVE LAUNCH TUBE. NEODYMIUM-IRON-BORON PERMANENT MAGNETS ELIMINATE THE REQUIREMENT FOR HIGH POWER ELECTRICAL CONNECTIONS TO THE MOVING LAUNCHING DEVICE. MAGNETIC SUSPENSION TECHNOLOGY USING PERMANENT MAGNETS WILL PREVENT THEDEVICE FROM RATTLING DOWN THE LAUNCH TUBE. A PERMANENT MAGNET POTENTIAL WELL LATCH CAN SECURE THE DEVICE UNTIL THE MAGNETS ARE OVERWHELMED BY DRIVEN WINDINGS. THIS WILL ELIMINATE THE REQUIREMENT FOR RELEASING A MECHANICAL LATCH WHICH COULD CREATE NOISE. WITH THESE COMBINED TECHNOLOGIES A UNIQUELY QUIET LAUNCHER CAN BE REALIZED. MOTOR LAMINATIONS, WINDING AXIS AND PITCH AXIS ARE ALL

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SIMILAR IN CONCEPT TO A CONVENTIONAL SYNCHRONOUS MOTOR BUT ARE ROTATED TO PROVIDE LINEAR MOTION. THE PERFORMANCE DEMANDED OF THIS SYSTEM IN THIS APPLICATION IS NOT GREATER THAN THAT REALIZED BY CONVENTIONAL ROTATING MOTORS, NOR IS IT GREATER THAN COMMERCIAL LINEAR MOTORS. FOR THAT REASON THE PROBABILITY OF SUCCESS SEEMS QUITE HIGH.

ELTRON RESEARCH INC
4260 WESTBROOK DR - #111
AURORA, IL 60504
CONTRACT NUMBER:
ANTHONY F SAMMELLS
TITLE:
ADVANCED BIOSENSORS FOR AMINO ACID DETECTION
TOPIC# 4 OFFICE: ONR IDENT#: 37535

RESEARCH WILL BE DIRECTED TOWARDS CHARACTERIZING AN ADVANCED BIOSENSOR TECHNOLOGY COMPATIBLE FOR THE REAL-TIME INDIRECT OPTICAL DETECTION OF AMINO ACIDS AS TYPIFIED BY L-PHENYLALANINE, L-DOPA, L-TRYPTOPHAN AND RELATED COMPOUNDS. THE TECHNICAL STRATEGY WILL INVOLVE THE INDIRECT OPTICAL DETECTION OF AMINES AND AMINO ACIDS BY MONITORING CHANGES INDUCED IN THE VISIBLE SPECTRA OF IMMOBILIZED CHROMAGENIC ACYCLIC POLYETHER HOST MOLECULES TO WHICH THE AMINE OR AMINO ACID BECOMES ASSOCIATED. WE ANTICIPATE THAT THE AMINE OR AMINO ACID WILL BECOME INCORPORATED INTO THE CHROMAGENIC POLYETHER VIA HYDROGEN BONDING WITH PROXIMATE NITROGEN ATOMS, RESULTING IN AN INDUCED COLOR CHANGE BY THE ATTACHED AZO DYE CHROMAPHORE VIA A WITHDRAWAL OF ELECTRON DENSITY FROM THE NITROGEN ATOM LOCATED IN THE POLYETHER BACKBONE. IT IS PLANNED TO IMMOBILIZE THE CHROMAGENIC POLYETHER WITHIN A CELLULOSE ACETATE MEMBRANE ATTACHED TO THE END OF A FIBER OPTICS SENSOR. HIGH SENSITIVITY FOR THE DETECTION OF OPTICAL CHANGES INDUCED BY THE PRESENCE OF AMINO ACIDS WILL BE ACCOMPLISHED BY THE USE OF SYNCHRONOUS SAMPLE-AND-HOLD DETECTION CIRCUITRY.

EMERGING CONCEPTS
3153 SKYLINE DR
OCEANSIDE, CA 92056
CONTRACT NUMBER:
N McNEILL/G ANDERSON
TITLE:
IMPROVED ELECTRONIC WARFARE (EW) RESPONSE TIMES
TOPIC# 25 OFFICE: SPAWAR IDENT#: 37439

SUBMITTED BY

THIS PROGRAM PROVIDES A COMPREHENSIVE ANALYSIS OF CURRENT COMPUTER-AIDED SIGNAL PATTERN RECOGNITION TECHNIQUES AND THE APPLICATION OF ARTIFICIAL NEURAL NETWORKS (NEURONETS) TO THE DEVELOPMENT OF SIGNAL PATTERN RECOGNITION ALGORITHMS FOR TACTICAL NAVAL COMMUNICATIONS COUNTERMEASURES. RF COMMUNICATIONS ARE BECOMING INCREASINGLY SOPHISTICATED AND TECHNIQUES USED TO INCREASE THEIR IMMUNITY TO CONVENTIONAL SEARCH AND IDENTIFICATION ADVERSELY IMPACT CURRENT JAMMING TECHNIQUES AND TECHNOLOGY. THIS ANALYSIS EXAMINES TECHNIQUES AND METHODOLOGIES WHICH MAY BE APPLIED TO DIFFERENTIATE BETWEEN SIGNALS OF INTEREST (SOIs) AND SIGNALS NOT OF INTEREST (SNOIs) AND IMPROVE THE TIMELINESS AND ACCURACY OF COMMUNICATIONS COUNTERMEASURES IN A TACTICAL NAVAL ENVIRONMENT.

EMK TESTING CO INC
PO BOX 62 - 8432 BREWERTON RD
CICERO, NY 13039
CONTRACT NUMBER:
LOUIS ZAKRAYSEK
TITLE:
METAL MATRIX COMPOSITE HEAT SINK WITH INTEGRAL DIELECTRIC
TOPIC# 95 OFFICE: NAVSEA IDENT#: 36603

HIGH DENSITY ELECTRONIC CIRCUITS REQUIRE SPECIAL CONSIDERATIONS WITH RESPECT TO THERMAL MANAGEMENT. ALONG WITH HEAT REMOVAL, MOST ELECTRONIC ASSEMBLIES REQUIRE SUBSTRATES OF CONTROLLED THERMAL EXPANSION. ALSO, THE DESIGN OF VHSIC ASSEMBLIES USUALLY IMPOSES SIZE AND WEIGHT REQUIREMENTS. EACH OF THE DIELECTRIC MATERIALS THAT IS NOW IN USE OFFERS SOME OF THESE FEATURES, BUT NONE OFFERS A COMBINATION THAT RESPONDS TO ALL OF THESE NEEDS. WE PROPOSE THE USE OF A CLAD ALUMINUM METAL MATRIC COMPOSITE SUBSTRATE. THE METAL MATRIX COMPOSITE OFFERS A COMBINATION OF LIGHT WEIGHT, LOW COEFFICIENT OF THERMAL EXPANSION, HIGH THERMAL CONDUCTIVITY AND MECHANICAL STRENGTH. THIS UNIQUE SET OF PROPERTIES RESULTS IN A STRONG SUBSTRATE THAT SERVES AS WELL AS A HEAT SINK. THE EXPANSION COEFFICIENT OF METAL MATRIX COMPOSITES IS TAILORABLE, AND THIS ALLOWS THE USE OF CIRCUIT DESIGNS WHERE SILICON OR GaAs DEVICES CAN BE MOUNTED DIRECTLY ON THE HEAT SINK. IN THIS APPLICATION, THE CLAD LAYER ON THE METAL MATRIX COMPOSITE IS CHEMICALLY CONVERTED TO A

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DIELECTRIC, AND THIS INTEGRAL LAYER IS TREATED BY INFILTRATION, IMPREGNATION OR OVERLAYERS TO ENHANCE DIELECTRIC PROPERTIES.

ENGINEERING MANAGEMENT RESOURCES INC
5700 BALTIMORE DR - STE 3
LA MESA, CA 92042
CONTRACT NUMBER:
LLOYD R WHITE
TITLE:
NAVAL SPECIAL WARFARE FUNCTIONAL ANALYSIS
TOPIC# 17 OFFICE: SPAWAR IDENT#: 37273

THIS RESEARCH WILL FOCUS ON A FUNCTIONAL TOP LEVEL BREAK DOWN ANALYSIS OF NAVAL SPECIAL WARFARE (NSW). MISSION AREAS AND SUBORDINATE MISSION ELEMENTS WILL BE IDENTIFIED AS WELL AS THE REQUIRED OPERATIONAL FUNCTIONS FOR MISSION PLATFORMS. DATA AND RELATIONSHIPS WILL BE PRESENTED IN DECISION MODEL. THE DATA BASE AND METHODOLOGY DEVELOPED WILL FACILITATE DEFINING NSW ARCHITECTURE AND GUIDE THE DEVELOPMENT AND ACQUISITION OF NSW WEAPONS AND SUPPORT SYSTEMS.

ENGINEERING RESEARCH ASSOCS INC
1595 SPRINGHILL RD
VIENNA, VA 22180
CONTRACT NUMBER:
DR LAIRD MOFFETT
TITLE:
PARAMETRIC AND CONTEXTUAL FUNCTIONAL RADAR RECOGNITION
TOPIC# 121 OFFICE: NAVSEA IDENT#: 35754

THE PROPOSAL OUTLINES A METHOD FOR RECOGNIZING THE OPERATIONAL FUNCTION OF RADARS. THE METHOD COMBINES PARAMETER DRIVEN TECHNIQUES WITH CONTEXTUAL INFORMATION. THE PROPOSED APPROACH ADAPTS THE SITUATION ASSESSMENT TOOL, A SYSTEM UNDER DEVELOPMENT AT ERA, TO PERFORM FUNCTIONAL RADAR RECOGNITION. THE PROPOSAL DESCRIBES THE SITUATION ASSESSMENT TOOL, DESCRIBES THE CONCEPT OF OPERATION OF THE PROPOSED FUNCTIONAL RADAR RECOGNITION, AND IDENTIFIES SPECIFIC TASKS TO BE PERFORMED FOR CREATING DATA RECORDS REQUIRED FOR RECOGNIZING

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RADAR FUNCTION AND FOR MODIFYING AND ENHANCING THE SITUATION ASSESSMENT TOOL.

EWA (ELECTRONIC WARFARE ASSOCS INC)
2071 CHAIN BRIDGE RD - STE 600
VIENNA, VA 22180
CONTRACT NUMBER:
ROBERT W MARTIN JR
TITLE:
DATA BASE ARCHITECTURE FOR BATTLE FORCE TACTICAL TRAINING
TOPIC# 128 OFFICE: NAVSEA IDENT#: 35832

THE OBJECTIVE OF THIS PROJECT IS TO INVESTIGATE THE FEASIBILITY OF CAPTURING AND COLLATING DIVERSE TACTICAL DATABASES INTO A USEFUL TOOL FOR DEVELOPMENT OF BATTLE FORCE TRAINING SCENARIOS. THE APPROACH IS TO UTILIZE AN EXISTING COMMERCIALLY AVAILABLE SOFTWARE TOOL TO EXTRACT NECESSARY DATA FROM THESE DATABASES. USING A HIGHER ORDER LANGUAGE (HOL) PHASE I OF THE PROJECT WILL DEVELOP A PROOF-OF-CONCEPT DEMONSTRATION TO VALIDATE THE UTILITY OF VARIOUS DATABASES TO ENHANCE BATTLE FORCE TACTICAL TRAINING. POTENTIAL APPLICATIONS INCLUDE BATTLE FORCE INPORT TRAINING, THE BATTLE FORCE RESEARCH SIMULATOR (BFRS) AND THE UNIVERSAL THREAT SIMULATION SYSTEM (UTSS). DATABASES TO BE CONSIDERED INCLUDE THE NWTDB, NERF, ENWGS, NAVTAG AND BGTT.

EXPERT-EASE SYSTEMS INC
1301 SHOREWAY RD
BELMONT, CA 94002
CONTRACT NUMBER:
DR PARVEEN K JAIN
TITLE:
A USER FRIENDLY SOFTWARE FOR PERFORMANCE ANALYSIS OF AN AIRCRAFT ENGINE TURBINE
TOPIC# 194 OFFICE: NAPC IDENT#: 37785

THIS PROPOSAL PRESENTS A RESEARCH EFFORT TOWARDS THE DEVELOPMENT OF A USER FRIENDLY SOFTWARE FOR THE PERFORMANCE ANALYSIS OF AIRCRAFT

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ENGINE TURBINE SYSTEMS. THE SOFTWARE WILL INCLUDE SOPHISTICATED ANALYTICAL MODELS FOR ALL THE ESSENTIAL COMPONENTS OF THE ENGINE, LIKE THE COMPRESSOR, COMBUSTOR, THRUST BOOSTING EQUIPMENT, RE-CUPERATOR, ETC. IT WILL PROVIDE AN EXTENSIVE DESIGN AND OFF-DESIGN PERFORMANCE ANALYSIS CAPABILITY AT BOTH THE COMPONENT AND OVERALL SYSTEM LEVELS. THE ANALYTICAL MODEL WILL REQUIRE MINIMAL USER INPUTS FOR ITS COMPUTATIONS. THE COMPUTER RESULTS WILL INCLUDE VALUES OF THE KEY VARIABLES USED FOR PERFORMANCE EVALUATIONS. THE USER WILL INTERACT WITH THE ANALYTICAL MODEL VIA EASE+, WHICH IS AN EFFICIENT GRAPHICAL OBJECT-ORIENTED DATABASE MANAGEMENT ENVIRONMENT. THIS USER INTERFACE WILL PROVIDE AN EFFICIENT POST-PROCESSING FACILITY TO REVIEW THE RESULTS. THE SOFTWARE WILL BE IMPLEMENTED SOLELY ON IBM-PC/AT COMPATIBLE CLASS OF PERSONAL COMPUTERS. IT WILL PROVIDE A QUICK, INEXPENSIVE AND EFFECTIVE ANALYSIS FOR MOST MODERN AIRCRAFT ENGINE DESIGNS.

FLAM & RUSSELL INC
PO BOX 444 - 506 PRUDENTIAL RD
HORSHAM, PA 19044
CONTRACT NUMBER:
RICHARD P FLAM
TITLE:
NONDESTRUCTIVE EVALUATION OF COMPOSITES USING ISAR IMAGING
TOPIC# 76 OFFICE: NAVAIR IDENT#: 36371

THE PROPOSED PROGRAM WILL APPLY THE WELL-DEVELOPED TECHNOLOGY OF ISAR (INVERSE SYNTHETIC APERTURE RADAR) IMAGING TO THE DETECTION, LOCATION AND EVALUATION OF VOIDS AND VOID AGGREGATES IN RESIN-MATRIX COMPOSITE STRUCTURES. IF GOOD CORRELATION IS OBTAINED BETWEEN THE ELECTRO-MAGNETIC SCATTERING OF VOID AGGREGATES AND THE DEGRADATION OF MECHANICAL AND PHYSICAL PROPERTIES, ISAR IMAGING WILL PROVIDE AN EXCELLENT, COST-EFFECTIVE INPROCESS INSPECTION TOOL, EITHER INDEPENDTLY OR IN COMBINATION WITH OTHER NDE TECHNIQUES.

FLOW RESEARCH INC
21414 - 68TH AVE S
KENT, WA 98032
CONTRACT NUMBER:
DOUGLAS C ECHERT
TITLE:
ULTRA-HIGH PRESSURE WATERJET CLEANING OF SHIP COATINGS
TOPIC# 92 OFFICE: NAVSEA IDENT#: 36565

SUBMITTED BY

THIS PROPOSED WORK WILL EVALUATE THE USE OF ULTRA-HIGH PRESSURE (20,000 TO 55,000 psi) WATERJETS AS A METHOD OF REMOVING COATINGS FROM SHIP'S HULL SYSTEMS. ULTRA-HIGH PRESSURE (UHP) WATERJETS ARE IN DAILY COMMERCIAL USE FOR NUMEROUS CLEANING AND COATING REMOVAL TASKS. THE ADVANTAGES OF UHP WATER INCLUDE: IMPROVE PRODUCTIVITY; LOWER REACTION THRUST RESULTING IN INCREASED OPERATOR SAFETY; ABILITY TO REMOVE COATINGS THAT ARE RESISTANT TO REMOVAL AT LOWER PRESSURES, AND REDUCED WATER VOLUME FOR DISPOSAL. UNLIKE ABRASIVE BLASTING SYSTEMS IN USE TODAY, NO ABRASIVE WASTE IS GENERATED. WORK TO DATE HAS DEMONSTRATED THAT PAINT REMOVAL RATES FOR UHP WATERJET SYSTEMS CAN EXCEED THE DESIRED REMOVAL RATE OF 600 SQ FT/HR/MIL OF THICKNESS BY WELL OVER A FACTOR OF 10 MAGNITUDE. ULTRA-HIGH PRESSURE WATERJETS HAVE BEEN SHOWN TO HAVE GREAT POTENTIAL FOR SHIP'S HULL SYSTEMS COATINGS REMOVAL. THIS PROGRAM WILL ADDRESS THE FOLLOWING TASKS NEEDED TO EVALUATE THE TECHNICAL AND ECONOMICAL FEASIBILITY: (1) OPTIMIZE THE PROCESS FOR THE MANY COATINGS IN USE TODAY, (2) DEVELOP SYSTEM CONCEPTS AND PROCEDURES INCLUDING PROVISION FOR SPOILS CONTAINMENT, RECOVERY, AND DISPOSAL AND (3) EVALUATE THE COST-EFFECTIVENESS OF SUCH AN OPTIMIZED SYSTEM.

FLOW RESEARCH INC
21414 - 68TH AVE S
KENT, WA 98032
CONTRACT NUMBER:
ROGER F JOHNSON
TITLE:
ROLLER BEARING INSPECTION SYSTEM
TOPIC# 198 OFFICE: NAPC IDENT#: 37820

PHASE I OBJECTIVES ARE TO DEVELOP THE CONCEPTUAL DESIGN OF A ROLLER BEARING MEASUREMENT SYSTEM AND TO DEMONSTRATE ITS FEASIBILITY. THEN, APPROPRIATE MEASURING TECHNIQUES FOR THE VARIOUS PARAMETERS WILL BE IDENTIFIED. CANDIDATE MEASURING TECHNIQUES WILL INCLUDE HETERODYNE INTERFEROMETERS, EDDY CURRENT SENSORS, OPTICAL TRIANGULATION SENSORS, MOIRE DEFLECTOMETRY, AND LASER MICROMETERS. THE CRITICAL TECH-NOLOGIES THAT ARE PART OF THE CONCEPTUAL DESIGN WILL BE MOCKED UP AND TESTED AND THEN DEMONSTRATED TO THE NAVY. TECHNOLOGIES SELECTED WILL DEPEND UPON THE NAVY'S GAUGING REQUIREMENTS AND THE SPECIFIC

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PARAMETERS TO BE MEASURED. IT IS ASSUMED THAT SEVERAL OPTICAL AND ELECTRONIC SENSORS WILL BE COMBINED INTO ONE INSPECTION STATION. THE MECHANICAL HANDLING SYSTEM WILL ALSO BE CONSIDERED AND WILL BE INCLUDED IN THE CONCEPTUAL DESIGN FOR THE FINAL SYSTEM.

FLUOROCHEM INC
680 S AYON AVE
AZUSA, CA 91702
CONTRACT NUMBER:
KURT BAUM
TITLE:
NOVEL APPROACHES TO THE SYNTHESIS OF FLUORODINITROMETHANE AND FLUORODINITROETHANOL
TOPIC# 6 OFFICE: ONR IDENT#: 37554

FLUORODINITROETHANOL AND FLUORODINITROMETHANE ARE VERSATILE INGREDIENTS OF ADVANCED PROPELLANTS AND EXPLOSIVES, BUT HIGH COSTS RESTRICT THEIR USE. INVESTIGATION OF SEVERAL POTENTIALLY LOW-COST ROUTES TO THESE MATERIALS IS PROPOSED.

FOSTER-MILLER INC
350 SECOND AVE
WALTHAM, MA 02254
CONTRACT NUMBER:
ANTHONY A APONICK
TITLE:
HIGH TEMPERATURE SUPERCONDUCTING (BISMUTH) MILLIMETER WAVE MIXER
TOPIC# 169 OFFICE: NSWC IDENT#: 36201

HIGH TEMPERATURE SUPERCONDUCTING (HTSC) MIXERS CAN OFFER LOW-NOISE PERFORMANCE WITH GAIN AT FREQUENCIES APPROACHING 100 GHz. IF GAIN CAN BE ACHIEVED, CONVERSION LOSSES OF 2 dB CAN BE APPROACHED. THE USE OF HTSC MATERIALS OFFERS DRASTIC REDUCTION OF THE PROBLEMS IN COOLING WHEN COMPARED WITH LOW TEMPERATURE CIRCUITS, BUT THEY PRESENT CHALLENGES BECAUSE THE PRESENTLY AVAILABLE QUALITY OF THE NONLINEAR MIXING ELEMENT DOES NOT APPROACH THAT OF THEIR LOW TEMPERATURE COUNTERPARTS. IN PHASE I OF THIS EFFORT, WE PROPOSE TO TAKE

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ADVANTAGE OF ONGOING WORK ON OTHER PROGRAMS TO OBTAIN HTSC JUNCTIONS WITH IMPROVED CHARACTERISTICS AND TO OBSERVE THE CONVERSION EFFICIENCY THEY OFFER AT FREQUENCIES UP TO 3 GHz. THE SPECIFICATIONS WILL BE EXTENDED DURING PHASE II TO CONVERSION LOSSES APPROACHING 2 dB AT FREQUENCIES APPROACHING 100 GHz. THIS IS A TEAM EFFORT, WITH RF EVALUATIONS BEING CONDUCTED BY MICRILOR, INC. (ALSO A SMALL BUSINESS) AND MATERIALS BEING PROVIDED BY E.I. duPONT de NEMOURS AND COMPANY.

FOSTER-MILLER INC
350 SECOND AVE
WALTHAM, MA 02254
CONTRACT NUMBER:
RICHARD W LUSIGNEA
TITLE:
LCP-GRAPHITE COMPOSITES FOR THERMALLY CONDUCTIVE HEAT SINKS
TOPIC# 97 OFFICE: NAVSEA IDENT#: 36635

LIQUID CRYSTALLINE POLYMERS (LCP) REINFORCED BY NEWLY DEVELOPED ULTRAHIGH CONDUCTIVITY GRAPHITE FIBERS CAN MEET THE CHALLENGING REQUIREMENTS OF THERMAL MANAGEMENT AND CONTROLLED THERMAL EXPANSION FOR NAVAL SHIP, SUBMARINE, AIRCRAFT, AND SPACE-BASED ELECTRONIC DEVICES HEAT SINKS. THE PROPOSED EFFORT WILL DEMONSTRATE AN INNOVATIVE FABRICATION METHOD TO PRODUCE ELECTRONIC DEVICE SUBSTRATES FROM ORDERED LIQUID CRYSTALLINE POLYMERS WITH THERMAL CONDUCTIVITY ABOVE 250 W/m DEG K AND A CTE OF 5 ppm/DEG K (2.8 ppm/DEG F). FOSTER-MILLER WILL APPLY ITS PROPRIETARY FILM PROCESSING TECHNIQUES TO COMBINE NEW ULTRAHIGH CONDUCTIVITY GRAPHITE FIBERS INTO LCP SUBSTRATES TO PROVIDE STATE-OF-THE-ART THERMAL MANAGEMENT IN NEW HIGH PERFORMANCE ELECTRONIC PACKAGES. DURING PHASE I, LCP/GRAPHITE COMPOSITE LAMINATES WILL BE FABRICATED AND EVALUATED AGAINST CONTEMPORARY CHIP SUBSTRATE MATERIALS BASED ON THERMAL AND MECHANICAL PERFORMANCE PARAMETERS. DURING PHASE II, A SPECIFIC NAVY ELECTRONIC COMPONENT WILL BE CHOSEN FOR INTEGRATION WITH THESE NOVEL HEAT SINKS AND PARTS WILL BE FABRICATED USING THIS INNOVATIVE TECHNOLOGY. THE FABRICATION OF AN ACTUAL DEVICE SUBSTRATE COMPONENT AT POTENTIALLY LOW COST, AND THE DEMONSTRATION OF THEIR SUPERIORITY OVER CURRENT TECHNOLOGY, WILL ESTABLISH A FIRM BASIS FOR A COMMERCIALLY SUPPORTED PHASE III PROGRAM.

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FOSTER-MILLER INC
350 SECOND AVE
WALTHAM, MA 02254
CONTRACT NUMBER:
THOMAS G CAMPBELL
TITLE:
ACOUSTICALLY DAMPED TORPEDO PROPELLERS
TOPIC# 101 OFFICE: NAVSEA IDENT#: 36692

TORPEDO PROPELLERS ARE EXPOSED TO TIME VARYING UNSTEADY FORCES. THESE WATER INDUCED LOADS CREATE BLADE VIBRATIONS WHICH GENERATE NOISE. FOSTER-MILLER PROPOSES TO CHARACTERIZE AND OPTIMIZE THE HIGH DAMPING AND EXCELLENT STRUCTURAL PROPERTIES OF GRAPHITE FIBER REINFORCED MAGNESIUM METAL MATRIX COMPOSITES. AN ALIGNED, DISCONTINUOUS FIBER PREFORM WILL BE DEVELOPED TO ENHANCE THE INHERENT STRENGTH AND DAMPING CAPACITY OF THE MAGNESIUM MATRIX. AN INNOVATIVE, COST-EFFECTIVE, PRESSURIZED LIQUID METAL INFILTRATION METHOD WILL BE USED TO FABRICATE REPRESENTATIVE NEAR NET-SHAPE PROPELLER BLADES. THE PHASE I EFFORT WILL PROVE THE FEASIBILITY OF FABRICATING A FULL SCALE PROPELLER FOR UNDERWATER ACOUSTIC AND STRUCTURAL TESTING IN PHASE II.

FOSTER-MILLER INC
350 SECOND AVE
WALTHAM, MA 02254
CONTRACT NUMBER:
JOSEPH BOYCE
TITLE:
THE USE OF ELASTOMERIC INTERLEAF LAYERS TO IMPROVE THE STRENGTHS OF COMPOSITE UNDERWATER PRESSURE HULLS
TOPIC# 110 OFFICE: NAVSEA IDENT#: 36810

THICK COMPOSITE PRESSURE HULLS MADE TO DATE HAVE EXHIBITED POOR COMPRESSIVE STRENGTH WHEN COMPARED TO THIN LAMINATED ALLOWABLES. A TRANSVERSE TENSILE FAILURE MECHANISM IS THEORIZED WHICH IS CONSISTENT WITH PREVIOUS TEST RESULTS. THE USE OF ELASTOMERIC INTERLEAVES TO

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DIVIDE THE THICK LAMINATE INTO A SERIES OF THIN SUBLAMINATES IS PROPOSED AS A MEANS TO INCREASE COMPRESSIVE STRENGTH. THIN Gr-EPOXY LAMINATES WITH INTERLEAVES HAVE EXHIBITED A FOUR-SIXFOLD INCREASE IN FRACTURE TOUGHNESS. THE INTERLEAVES WILL ALSO IMPROVE THE HULL ACOUSTIC DAMPING AND WILL AID IN LAYERED DEBULKING AND CURING WHICH WILL ELIMINATE FIBER WRINKLING AND UNEVEN CURE PROBLEMS WITH THICK LAMINATES. THE PHASE I PROGRAM WILL INVOLVE DESIGN, FABRICATION, AND COMPRESSION TESTING OF 10 IN. DIAM 0.5 IN. THICK RING SPECIMENS WITH AND WITHOUT INTERLEAVES. PHASE II WOULD INVOLVE DESIGN FABRICATION AND HYDROSTATIC TESTING OF A FULL SIZE TORPEDO HULL SECTION WITH INTERLEAVES.

FOSTER-MILLER INC
350 SECOND AVE
WALTHAM, MA 02254
CONTRACT NUMBER:
LESLIE RUBIN
TITLE:
ADVANCED LIQUID CRYSTAL POLYMER COATINGS FOR HIGH STRENGTH OPTICA FIBERS FOR AIR-DEPLOYED DATA LINKS
TOPIC# 209 OFFICE: NOSC IDENT#: 37933

SMALL DIAMETER HIGH STRENGTH OPTICAL FIBERS ARE NEEDED FOR NEW HIGH SPEED AIR-DEPLOYED DATA LINKS. CURRENT FIBER COATING TECHNOLOGY HAS BEEN DEVELOPED FOR THE TELECOMMUNICATIONS INDUSTRY AND CANNOT MEET MILITARY PERFORMANCE NEEDS. FIBER COATING THICKNESS MUST BE REDUCED, BUT THIS RESULTS IN LOW TENSILE STRENGTH USING CONVENTIONAL COATING MATERIALS (UV CURABLE ACRYLATES FOR EXAMPLE). WE PROPOSE TO USE NEW HIGH PERFORMANCE LIQUID CRYSTALLINE POLYMERS (LCP) TO PROVIDE THIN HIGH STRENGTH COATINGS FOR OPTICAL FIBER DATA LINKS (LESS THAN HALF THE THICKNESS OF CURRENT MATERILS AND HIGH TENSILE STRENGTH). WE WILL USE INNOVATIVE POLYMER PROCESSING TO MAKE A BIAXIALLY ORIENTED LCP COATING WHICH WILL ACTUALLY CARRY TENSILE AND SHEAR LOADS ALONG WITH THE GLASS FIBER. THE LCP COATINGS WILL BE STRIPPABLE AND PRO-VIDE GOOD ADHESION TO THE FIBER, AND SINCE THE LCP'S ARE MELT-PROCESSABLE THEY CAN BE APPLIED TO THE FIBER ON-LINE. THEY FORM AN EXCELLENT BARRIER TO PROTECT THE FIBER FROM MOISTURE. IN PHASE I, FOSTER-MILLER INTENDS TO PRODUCE AND CHARACTERIZE BIAXIAL LCP COATINGS WHICH CAN BE EXTRUDED DIRECTLY ONTO THE PRISTINE SURFACE OF

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DRAWN OPTICAL FIBERS. OUR GOAL WILL BE DEVELOP AN OPTICAL FIBER COATING WHICH IS LIGHTER IN WEIGHT (60 PERCENT LIGHTER), SMALLER IN SIZE (25 MICRON THICK), STRONG (SHARE TENSILE LOAD OF GLASS FIBER), ADHERES STRONGLY TO GLASS, IS IMPERVIOUS TO THE EFFECTS OF WATER AND APPROACHES THE COEFFICIENT OF THERMAL EXPANSION OF GLASS.

FRACTURE ANALYSIS CONSULTANTS INC
417 MITCHELL ST
ITHACA, NY 14850
CONTRACT NUMBER:
PAUL A WAWRZYNEK
TITLE:
LIFE PREDICTION OF TURBINE BLADES BY COMPUTER MODELING
TOPIC# 199 OFFICE: NAPC IDENT#: 37839

THE CASTING PROCESS PRODUCES FLAWS OF VARIOUS TYPES AND SIZES IN TURBINE BLADES. EACH FLAW POTENTIALLY DEGRADES THE LIFE OF THE BLADE, BUT FOR ECONOMIC REASONS MANY INITIAL FLAW CLASSES ARE PERMITTED ON THE BASIS OF ACCEPTANCE CRITERIA DEVELOPED EMPIRICALLY BY ENGINE MANUFACTURERS. THE PROBLEM WITH THIS APPROACH IS THAT IT REQUIRES DATA OBTAINED FROM EXPERIENCE. IT CANNOT PREDICT BLADE LIFE IN A NEW ENGINE. MOREOVER, MANY BLADES CONTAINING A CHARACTERISTIC FLAWS CAN BE IN USE BEFORE SUCH A FLAW IS FOUND TO REDUCE SUBSTANTIALLY EXPECTED LIFE. WE PROPOSE TO CREATE A HIGHLY INTER-ACTIVE, COMPUTER-AIDED DESIGN SYSTEM TO SIMULATE THE PERFORMANCE OF A BLADE CONTAINING SPECIFIC FLAWS AND FLAW SIZES AT ARBITRARY LOCATIONS. THE SYSTEM WILL HAVE THE FOLLOWING INNOVATIVE FEATURES: SIMULATION BASED ON A TRUE GEOMETRIC REPRESENTATION OF THE BLADE VIA SOLID MODELING. A SOPHISTICATED, TOPOLOGY-BASED DATA STRUCTURE TO SUPPORT LINKAGE TO THE SOLID MODEL, FAST INTERACTION, AND ACCURATE REPRESENTATION OF EVOLVING FLAW SHAPES. THE ABILITY TO SPECIFY FLAWS TO ARBITRARY SHAPE, INCLUDING NON-PLANAR, SIZE, AND ORIENTATION AT ARBITRARY LOCATIONS IN THE GEOMETRIC MODEL. AUTOMATIC LOCAL REMESHING TO SIMULATE FLAW GROWTH. MODUALR ENCAPSULATION OF FRACTURE MECHANICS THEORIES AND GROWTH-RATE MODELS FOR PREDICTING THE EVOLUTION OF A FLAW. STATE-FO-THE-ART TECHNIQUES FOR SCIENTIFIC VISUALIZATION VIA COMPUTER GRAPHICS.

GAERTNER W W RESEARCH INC
140 WATER ST
NORWALK, CT 06854
CONTRACT NUMBER:
DR W W GAERTNER
TITLE:
LOW-COST NVG VISUAL SYSTEM
TOPIC# 185 OFFICE: NTSC IDENT#: 37724

SUBMITTED BY

LOW-COST PRODUCTION OF VISUAL SYSTEMS WILL BE ACHIEVED BY (1) LIMITING THE OUTPUT TO MONOCHROME SCENES SUITABLE FOR NVG SIMULATION AND (2) USING A NOVEL ARCHITECTURE. IT CONSISTS OF MULTIPLE IDENTICAL 3D/PERSPECTIVE TRANSFORMATION AND RENDERING MODULES THAT CAN BE MASS-PRODUCED AT VERY LOW COST, AND IT CONTAINS A MECHANISM THAT ALLOWS ONE TO OPERATE SUCH MODULES IN PARALLEL, GENERATING SCENES OF ARBITRARY COMPLEXITY. THUS IT WILL ALSO BE POSSIBLE TO MINIMIZE COST FOR EACH SPECIFIC TRAINER SYSTEM BY BUILDING INTO IT ONLY AS MANY PARALLEL MODULES AS NEEDED TO ACHIEVE THE REQUIRED SCENE COMPLEXITY. USE OF THE LATEST OFF-THE-SHELF AND CUSTOM VLSI CIRCUITRY WILL FURTHER REDUCE PRODUCTION COST.

GALAXY MICROSYSTEMS INC
10711 BURNET RD - STE 325
AUSTIN, TX 78758
CONTRACT NUMBER:
GREGORY K CASWELL
TITLE:
ASSESSMENT OF FERRITE IMPREGNATED PWBs AS A THERMAL TRANSFER MECHANISM FOR HIGH DENSITY/SPEED ELECTRONIC PACKAGING
TOPIC# 95 OFFICE: NAVSEA IDENT#: 36606

THE TREND OF SYSTEM DESIGN AND DEVELOPMENT HAS BEEN TOWARD COMPACT, LOW POWER CONFIGURATIONS THAT ARE ACHIEVABLE THROUGH THE USE OF LARGE SCALE INTEGRATION (LSI) CIRCUITS AND INCREASED PACKAGING DENSITY. RECENT ADVANCES IN INTEGRATED CIRCUIT DEVICE TECHNOLOGIES HAVE INDICATED THAT LIMITATIONS EXIST WITH MANY OF THE CURRENT INTER-CONNECTION TECHNOLOGIES. THEREFORE, CONCURRENTLY WITH THE GENERATION IF IC PACKAGING SOLUTIONS, THE TECHNOLOGICAL AREA OF THE PRINTED WIRING BOARD (PWB) CONFIGURATION MUST ALSO BE ADDRESSED. HIGH SPEED SYSTEM DESIGN PRESENTLY REQUIRE THE USE OF TRANSMISSION LINE THEORY IN THEIR LAYOUT. THE APPROACH PROPOSED HEREIN DEFINES AN APPROACH WHICH DOES NOT REQUIRE THE ROUTING OF MULTIPLE GROUND TRACES AND THUS PRODUCES A MUCH MORE EFFICIENT DESIGN. THE PROPOSED CONCEPT FOR A NEXT GENERATION PWB TECHNOLOGY WOULD STILL BE ABLE TO USE CURRENT PWB DESIGN RULE LAYOUTS FOR STANDARD PRINTED WIRING BOARDS. IN ADDITION, THE FERRITE IMPREGNATION OF THE PWB INNER LAYERS SHOULD PROVIDE A HEAT TRANSFER MECHANISM WITHOUT REQUIRING A HEAVY INTERNAL HEAT SINK.

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GENERAL ELECTRONIC SYSTEMS CORP/GENESYS
1767 BUSINESS CENTER DR - STE 300
RESTON, VA 22090
CONTRACT NUMBER:
PHILIP C FEASTER
TITLE:
ELECTRONIC WARFARE AND PLANNING ANALYSIS SUPPORT
TOPIC# 17 OFFICE: SPAWAR IDENT#: 37275

PROJECT OBJECTIVES: 1) PROVIDE THE TECHNICAL ANALYSIS AND COST/ BENEFIT/RISK ASSESSMENTS NEEDED TO DEFINE THE MOST EFFECTIVE MEANS OF MEETING EXISTING AND NEXT-GENERATION EW SYSTEM REQUIREMENTS; AND 2) DEVELOP AN EW PLANNING AND ANALYSIS SUPPORT CAPABILITY WHICH WILL ENABLE THE PLANNING PROCESS TO BE PERFORMED MORE FREQUENTLY, AT LESS COST, AND WITH MORE CONSISTENT AND OBJECTIVE RESULTS. APPROACH: 1) ANALYZE THE PROCESSING INVOLVED IN THE EW PLANNING AND ANALYSIS EFFORT; 2) DEFINE STANDARD METHODS AND PROCEDURES FOR OBJECTIVELY PERFORMING THE PLANNING AND ANALYSIS PROCESSES; 3) DEFINE PROCESS DATA REQUIREMENTS, PRODUCTS AND INTERFACES; 4) SPECIFY, DESIGN AND DEVELOP AN INTEGRATED SET OF COMPUTER MODELS, DATA BASES AND DECISION SUPPORT TOOLS FOR EW ARCHITECTURE/SYSTEM DEFINITION AND EVALUATION; 5) UTILIZE THE EW PLANNING AND ANALYSIS CAPABILITY TO: IDENTIFY EW REQUIREMENTS; DEFINE ALTERNATIVE EW ARCHITECTURES, SYSTEMS AND CAPABILITIES FOR MEETING THE REQUIREMENTS; AND EVALUATE AND RANK THE ALTERNATIVES. WORK PLAN: THE PHASE I EFFORT FOR THIS PROJECT WILL ENCOMPASS ALL OF THE FIRST THREE STEPS OF THE APPROACH OUTLINES ABOVE. ADDITIONALLY, THE CAPABILITIES AND PERFORMANCE OF THE PLANNING AND ANALYSIS SUPPORT CAPABILITY WILL BE SPECIFIED. THE PHASE II EFFORT WILL PRODUCE THE SPECIFIED CAPABILITY AND UTILIZE IT TO DEFINE EW REQUIREMENT AND EVALUATE ALTERNATIVE METHODS OF MEETING THOSE REQUIREMENTS.

GENERAL SCIENCES INC
655 S GRAVERS RD
PLYMOUTH MEETING, PA 19462
CONTRACT NUMBER:
PAUL W JUNEAU JR
TITLE:
POLYMER MATRIX COMPOSITE HEAT SINKS FOR ELECTRONIC DEVICES
TOPIC# 97 OFFICE: NAVSEA IDENT#: 36[illegible]7

SUBMITTED BY

METALLIC HEAT SINKS HAVE SERIOUS LIMITATIONS DUE TO HIGH DENSITY AND HIGH COEFFICIENT OF THERMAL EXPANSION CHARACTERISTICS. IT IS PROPOSED TO OVERCOME THESE PROBLEMS BY DEVELOPING COMPOSITE HEAT SINK MATERIALS BASED ON CRYSTALLINE GRAPHITE FIBERS, FILLERS, AND FOAMS HAVING HIGH THERMAL CONDUCTIVITIES, LOW COEFFICIENTS OF EXPANSION, AND LOW DENSITIES. THE RESULTING COMPOSITES BASED ON THESE MATERIALS AND CONVENTIONAL ORGANIC POLYMERS ARE EXPECTED TO COMBINE ADEQUATE THERMAL CONDUCTIVITY CHARACTERISTICS, GOOD MECHANICAL PROPERTIES, AND COEFFICIENTS OF THERMAL EXPANSION MATCHING CERAMIC MICROELECTRONIC COMPONENTS.

GEO-CENTERS INC
7 WELLS AVE
NEWTON CENTRE, MA 02159
CONTRACT NUMBER:
MALCOLM C SMITH
TITLE:
LOW-DRIFT FIBER OPTIC SONAR DOME PRESSURE TRANSDUCER
TOPIC# 156 OFFICE: NSWC IDENT#: 36083

THE DEVELOPMENT OF A HIGHLY RELIABLE, LOW DRIFT, FIBER OPTIC HYDROSTATIC PRESSURE SENSOR FOR SONAR DOMES IS PROPOSED. THE SENSOR IS BASED ON THE ELASTO-OPTIC EFFECT IN OPTICAL CRYSTALS. THE SENSING ELEMENT IS AN OPTICAL CRYSTAL, AND BECAUSE NO MOVING PARTS ARE INVOLVED, WEAR AND FATIGUE ARE REDUCED TO A MINIMUM. BECAUSE OF ITS INHERENT LINEARITY AND LOW DRIFT, THE PROPOSED PRESSURE SENSOR WILL BE IDEAL FOR MONITORING PRESSURE IN SHIPBOARD SONAR DOMES. PRESSURE ALTERS THE BIREFRINGENCE PROPERTIES OF CRYSTALS AND CHANGES THE STATE OF POLARIZATION OF LIGHT PASSING THROUGH THE CRYSTAL. THE GOAL OF THE PHASE I RESEARCH AND DEVELOPMENT EFFORT IS TO DEMONSTRATE THE FEASIBILITY OF THIS PRESSURE SENSING TECHNIQUE. SUITABLE OPTICAL MATERIALS WILL BE IDENTIFIED THROUGH A LITERATURE SURVEY. THE HIGHEST RANKED CRYSTAL MATERIALS WILL BE TESTED UNDER HYDROSTATIC PRESSURES. A TEMPERATURE COMPENSATION METHOD USING A SECOND ELASTO-OPTIC CRYSTAL IS PROPOSED. MATERIALS FOR THE TEMPERATURE COMPENSATION CRYSTAL WILL BE IDENTIFIED AND THE TEMPERATURE INDEPENDENCE OF THE PRESSURE READING WILL BE EXPERIMENTALLY VERIFIED.

GEO-CENTERS INC
7 WELLS AVE
NEWTON CENTRE, MA 02159
CONTRACT NUMBER:
GREGORY HOGAN
TITLE:
CLOSED LOOP MAGNETIC SIGNATURE REDUCTION SYSTEM
TOPIC# 89 OFFICE: NAVSEA IDENT#: 36534

SUBMITTED BY

GEO-CENTERS, INC. PROPOSES TO DESIGN, DEVELOP AND TEST AN ACTIVE, 3-AXIS MAGNETIC SIGNATURE REDUCTION SYSTEM CAPABLE OF CANCELING MAGNETIC SIGNATURES OF MECHANICAL/ELECTRICAL SYSTEMS TO LEVELS BELOW THAT SEEN BY MAGNETIC INFLUENCE MINES AT DISTANCES OF TENS OF FEET. THE ULTIMATE SYSTEM WILL INVOLVE NUMBERS OF INDIVIDUAL REDUCTION SYSTEMS CONSISTING OF THREE SINGLE AXIS MAGNETIC SENSOR PAIRS COUPLED VIA A DYNAMIC FEEDBACK CIRCUIT TO 3 FIELD NULLING COIL PARIS ENABLING THE GENERATION OF A REAL TIME MAGNETIC DIPOLE WITH VARIABLE POSITION, ORIENTATION, AND INTENSITY WHICH WILL EXACTLY CANCEL THE MAGNETIC SOURCE DIPOLE. EACH MAGNETIC SENSOR/FEEDBACK CIRCUIT WILL BE INTERFACED TO A 3-AXIS AMBIENT EARTH FIELD MAGNETOMETER ENSURING A DYNAMIC AND ACCURATE NULLING FIELD ALLOWING A MINESWEEPER TO TRAVEL MAGNETICALLY UNDETECTED. THE PHASE I SBIR PROGRAM WILL ANALYTICALLY DETERMINE AND EXPERIMENTALLY DEMONSTRATE THE ABILITY OF THIS CLOSED LOOP MAGNETIC SILENCING CONCEPT TO CANCEL MAGNETIC SOURCE MOMENTS AT NEAR DISTANCES IN THE LABORATORY. DATA COLLECTED FROM AN ISOLATED SYSTEM AND IN PROXIMITY TO A SECOND SYSTEM WILL DEMONSTRATE THE CAPABILITY OF THE TECHNOLOGY FOR MULTI-SOURCE SIGNATURE REDUCTION AND ANALYTIC CALCULATIONS WILL BE PERFORMED TO DETERMINE THE EFFECTS OF HIGHER ORDER SOURCE FIELDS.

GEODYNAMICS CORP
21171 WESTERN AVE - STE 100
TORRANCE, CA 90501
CONTRACT NUMBER:
PAUL J HENRIKSON
TITLE:
DUAL BAND INFRARED DISCRIMINATION TECHNIQUES
TOPIC# 153 OFFICE: NSWC IDENT#: 36047

THE SPECIFIC OBJECTIVES OF THE PHASE I WORK ARE AS FOLLOWS: a. CHARACTERIZE THE SEA AND CLOUD CLUTTER USING SEVERAL EXAMPLES FROM THE NAVY IRAMMP SENSOR IN VARIOUS SUB-BANDS OF THE 3-5 MICROMETERS AND 8-12 MICROMETERS INFRARED BANDS. CHARACTERIZATION INCLUDES, BUT IS NOT LIMITED TO 1) AMPLITUDE DENSITY FUNCTION, 2) SPATIAL CORRELATION; 3) TEMPORAL CORRELATION. b. CHARACTERIZE THE RELATIVE PERFORMANCE OF VARIOUS SIGNAL PROCESSING TECHNIQUES AGAINST REPRESENTATIVE CLUTTER SCENES SELECTED FROM THOS IN (a) ABOVE. c.

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INVESTIGATE THE USE OF SIMPLE DESCRIPTORS OR METRICS WHICH WOULD CHARACTERIZE IN A GENERAL WAY THE DETECTION CAPABILITY OF EACH BAND IN THE PRESENCE OF CLUTTER UNDER VARIOUS METEOROLOGICAL CONDITIONS, AND THE PERFORMANCE OF DUAL BAND TARGET DESCRIPTION.

GINER INC
14 SPRING ST
WALTHAM, MA 02254
CONTRACT NUMBER:
LARRY L SWETTE
TITLE:
MACROMOLECULAR CATALYSTS FOR LITHIUM/THIONYL CHLORIDE BATTERIES
TOPIC# 151 OFFICE: NSWC IDENT#: 36041

THE WORK DESCRIBED IN THIS PROPOSAL IS GEARED TOWARD UNDERSTANDING THE CATALYTIC ACTIVITY OF -N(4) MARCROCYCLIC MONONUCLEAR AND BINUCLEAR COMPLEXES OF COBALT AND RUTHENIUM AND MANGANESE. A TUNGSTEN COMPLEX WILL ALSO BE TESTED. THE RESULTS ARE EXPECTED TO THROW LIGHT ON THE ELECTROCATALYSIS OF SOCl(2) REDUCTION AS INFLUENCED BY (a) THE NATURE OF THE METAL CENTERS, (b) A COMMON REDBOX COUPLE DUE TO THE METAL, (c) THE PRESENCE OF BIMETAL SITES, (d) LIGAND ENVIRONMENT OF THE METALS, AND (e) THE STABILITY OF THE COMPLEXED IN SOCl(2) MEDIUM. ALSO, THE ANCHORING OF SOME CATALYSTS ON POLYMERIC SUPPORT WILL BE HIGHLY INFORMATIVE AS TO HOW THIS SURFACE MODIFICATION AFFECTS THE CELL PERFORMANCE.

GLOBAL ASSOCS LTD
1423 POWHATAN ST - #4 STA SQ
ALEXANDRIA, VA 22314
CONTRACT NUMBER:
DOUGLAS G HOSKINS
TITLE:
NON-ACOUSTIC SENSOR AND GUIDANCE FOR UNDERWATER VEHICLES
TOPIC# 100 OFFICE: NAVSEA IDENT#: 36676

THE WORK PROPOSED IN THIS PHASE I EFFORT WILL DETERMINE THE PERFORMANCE ENVELOPE OF TWO NON-ACOUSTIC SYSTEMS EMPLOYED FOR

SUBMITTED BY

DIFFERENT APPLICATIONS: 1) A LASER RADAR SYSTEM USED FOR UNDERWATER TARGET TRACKING, AND 2) AN EXTREMELY LOW FREQUENCY (ELF) MAGNETIC SYSTEM USED FOR UNDERWATER COMMUNICATION. PERFORMANCE TRADE-OFF STUDIES TO BE CONDUCTED WILL CONSIST OF PARAMETRIC ANALYSES OF THE PERFORMANCE VARIABLES AND COMPONENTS. THESE SYSTEM COMPONENT PERFORMANCE ANALYSES WILL BE USED TO DEFEND THE PERFORMANCE OF A COMPOSITE OPERATIONAL SYSTEM.

GLOBE RUBBER WORKS INC
BEECH HILL INDUSTRIAL PK
ROCKLAND, MA 02370
CONTRACT NUMBER:
RICHARD C SOMERVILLE
TITLE:
DEVELOPMENT OF CLOSED CELL FOAMS TO ATTENUATE UNDERWATER SHOCK WAVES
TOPIC# 109 OFFICE: NAVSEA IDENT#: 36792

LIGHTWEIGHT MATERIALS WHICH CAN PROTECT EQUIPMENT AND STRUCTURES FROM THE DAMAGING EFFECTS OF UNDERWATER EXPLOSIONS WOULD HAVE MANY APPLICATIONS ON SUBMARINES AND SURFACE SHIPS. CLOSED CELL RIGID EPOXY FOAM WITH APPROXIMATELY 55% AIR VOID CONTENT BY VOLUME HAS BEEN SHOWN TO ATTENUATE THE PEAK PRESSURE IN SHOCK WAVES DUE TO AN UNDER-WATER EXPLOSION. THE OBJECTIVE OF THIS PHASE I FEASIBILITY STUDY IS TO DEVELOP MATERIALS AND MANUFACTURING PROCESSES TO INCREASE THE VOID CONTENT OF STRUCTURAL FOAMS UP TO 75% OR 85% AND INCREASE DAMPING BOTH OF WHICH ARE EXPECTED TO ENHANCE THEIR SHOCK ATTENUATION PROPERTIES. VARIOUS MANUFACTURING PROCESSES INCLUDING CENTRIFUGAL CASTING WILL BE ADAPTED TO PRODUCE STRUCTURAL FOAM SAMPLES WITH HIGH VOID CONTENT AND DAMPING. THE SHOCK ATTENUATION PROPERTIES WILL BE ESTIMATED USING COMPUTER MODELS AND MEASURED MATERIAL PROPERTIES OF THE FABRICATED SAMPLES.

GORHAM ADVANCED MATERIALS INSTITUTE
PO BOX 250
GORHAM, ME 04038
CONTRACT NUMBER:
DR ANDREW C NYCE
TITLE:
FABRICATION OF DENSE NICKEL ALUMINIDES BY COMBINED COMBUSTION SYNTHESIS AND IN SITU HOT ISOSTATIC PRESSING
TOPIC# 96 OFFICE: NAVSEA IDENT#: 36622

SUBMITTED BY

THIS PROPOSAL DESCRIBES A NOVEL PROCESSING TECHNOLOGY WHICH HAS THE POTENTIAL TO ACCELERATE THE DEVELOPMENT OF NICKEL ALUMINIDE COMPOUNDS INTO MATURE MATERIALS FOR ADVANCED APPLICATIONS. THIS TECHNOLOGY COMPRISES A CONTINUOUS, TWO PHASE PROCESS IN WHICH CLOSED POROSITY NICKEL ALUMINIDE BODIES ARE FIRST FABRICATED BY EXOTHERMALLY-DRIVEN SELF PROPAGATING COMBUSTION SYNTHESIS FROM ELEMENTAL POWDER BLENDS OF Ni AND Al AND THEN FULLY DENSIFIED IN SITU BY RAPID HOT ISOSTATIC PRESSING (HIP). THIS PROCESS WILL BE INVESTIGATED AND ITS FEASIBILITY DEMONSTRATED FOR BOTH MONOLITHIC AND COMPOSITE (BN-COATED SILICON CARBIDE WHISKER REINFORCED) Ni(3)Al MATERIALS.

GRAMMA-TECH INC
1 HOPKINS PL
ITHACA, NY 14850
CONTRACT NUMBER:
RAY TEITELBAUM
TITLE:
LANGUAGE BASED SOFTWARE ENVIRONMENTS
TOPIC# 1 OFFICE: ONR IDENT#: 37499

THE SYNTHESIZER GENERATOR IS A WELL-KNOWN AND HIGHLY SUCCESSFUL PROTOTYPE SYSTEM FOR AUTOMATING THE IMPLEMENTATION OF LANGUAGE-BASED SOFTWARE ENVIRONMENTS. IT IS CURRENTLY LICENSED FOR RESEARCH PURPOSES TO OVER 230 SITES WORLDWIDE, INCLUDING NUMEROUS DOD CONTRACTS AND LABORATORIES, WHERE IT IS BEING USED IN THE DEVELOPMENT OF TOOLS FOR A MULTITUDE OF BOTH NEW AND EXISTING LANGUAGES. IT HAS BEEN THE SUBJECT OF SEVERAL BOOKS AND NUMEROUS Ph.D. THESES. IT CONTINUES TO SERVE RESEARCHERS AS A TESTBED IN WHICH TO STUDY NEW IMPLEMENTATION APPROACHES FOR SUCH SYSTEMS. SOFTWARE PRODUCTIVITY TOOLS ARE OF ENORMOUS ECONOMIC IMPORTANCE TO BOTH DOD AND THE COMMERCIAL WORLD. THE POTENTIAL OF THE SYNTHESIZER GENERATOR TO IMPLEMENT SUCH SYSTEMS HAS BEEN AMPLY DEMONSTRATED BY ITS PROTOTYPE USE. BUT ITS IMPLEMENTATION WAS GUIDED BY RESEARCH, NOT BUSINESS, CONSIDERATIONS. ALTHOUGH THE SYNTHESIZER GENERATOR IS NOT CURRENTLY A FULLY-ENGINEERED COMMERCIAL PRODUCT, WE BELIEVE IT TO BE AN EXCELLENT BASIS FOR ONE. FUNDS ARE REQUESTED FOR A DETAILED ENGINEERING STUDY TO (1) SPECIFY THE FUNCTIONAL REQUIREMENTS OF A PROPOSED SYNTHESIZER GENERATOR PRODUCT, (2) DESIGN THE IMPLEMENTATIONS

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AND/OR CHARACTERIZE THE RESEARCH NEEDED TO MEET THOSE REQUIREMENTS, AND (3) ESTIMATE THE COST AND OUTLINE A REALISTIC SCHEDULE FOR COMPLETING SUCH A PROJECT.

GSC ASSOCS INC
2304 ARTESIA BLVD - STE 201
REDONDO BEACH, CA 90278
CONTRACT NUMBER:
GEORGE S CARSON
TITLE:
ADDRESSING TECHNIQUES FOR NAVY TRAFFIC IN A MULTIMEDIA ENVIRONMEN
TOPIC# 37 OFFICE: SPAWAR IDENT#: 36930

MANY IMPORTANT ISSUES MUST BE CONSIDERED AS THE NAVY BEGINS TO CONVERT ITS COMMUNICATIONS TO A MULTI-MEDIA NETWORK BASED ON THE ISO LAYERED ARCHITECTURE. NAMING AND ADDRESSING TECHNIQUES REQUIRED TO MEET NAVY COMMUNICATIONS REQUIREMENTS ARE AN IMPORTANT SET OF CONSIDERATIONS. NAMING AND ADDRESSING CANNOT BE DEALT WITH IN ISOLATION BUT REQUIRES A SYSTEMS APPROACH WHICH CONSIDERS ISSUES RELATION TO DIRECTORY SERVICES, ROUTING SERVICES AND MULTIPEER DATA TRANSMISSION PROTOCOLS AND SERVICES. THE PROTOCOLS AND SERVICES DEVELOPED BY THE COMMERCIALLY MOTIVATED ISO STANDARDS COMMITTEES OFTEN REQUIRE EXTENSIONS AND/OR INTERPRETATIONS TO MEET DOD REQUIREMENTS. THIS PROJECT WILL TAKE A SYSTEM'S APPROACH TO THE PROBLEM OF NAMING AND ADDRESSING. NAVY REQUIREMENTS WILL BE DETERMINED, A LITERATURE SURVEY WILL BE CONDUCTED AND AN ANNOTATED BIBOGRAPHY PREPARED, AND TRADE STUDIES WILL BE CONDUCTED LEADING TO A RECOMMENDED STRATEGY FOR NAMING AND ADDRESSING NAVAL COMMUNICATIONS NETWORKS. THIS RECOMMENDED APPROACH WILL BE BASED UPON THE RESULTS OF FIVE SPECIAL STUDIES: NAME STRUCTURE, DIRECTORY SERVICES, ROUTING SERVICES, ADDRESS STRUCTURE AND MULTIPEER DATA TRANSMISSION.

GT-DEVICES INC
5705A GENERAL WASHINGTON DR
ALEXANDRIA, VA 22312
CONTRACT NUMBER:
NIELS K WINSOR
TITLE:
NON-LETHAL ANTI-SWIMMER SYSTEM
TOPIC# 137 OFFICE: NSWC IDENT#: 35900

SUBMITTED BY

A METHOD IS PROPOSED FOR DEFENDING SHORE ESTABLISHMENTS AND SEA VESSELS FROM ACTS OF OVERT AND COVERT INTRUSION BY HUMAN SWIMMERS ACROSS DEFENSIVE PERIMETERS. THE BASIC INTERDICTION DEVICE IS PLACED IN THE WATER AT THE FACILITY TO BE DEFENDED, AND DELIVERS A HIGH INTENSITY, DIRECTIONAL ACOUSTIC EMISSION WHICH IS CAPABLE OF DETERRIN A SWIMMER AT AN ADJUSTABLE RANGE OF FROM 20 TO MORE THAN 200 YARDS FROM THE DEVICE. ALTERNATIVE MEANS OF PRODUCING THE EMISSIONS ARE PRESENTED, WITH PROGRESSIVELY HIGHER INTENSITY, INCREASING FLEXIBILITY AND ESCALATABLE CAPABILITY FOR HUMAN INTRUDER DETERRENCE. METHODS FOR ENHANCING THE DETERRENCE EFFECTS ARE PROPOSED. THESE IMPROVEMENTS CAN EXTEND DETERRENCE CAPABILITY WELL BEYOND 1,000 YARDS. THE INTERDICTION DEVICE AND SUPPORTING EQUIPMENT, INCLUDING INTRUDER DETECTION, MONITORING AND TRACKING EQUIPMENT CAN BE PACKAGED IN LIGHT-WEIGHT PORTABLE COMPONENTS, FOR RAPID DEPLOYMENT AND QUICK RELOCATION TO A NEW FACILITY.

GUMBS ASSOCS INC
11 HARTS LN
EAST BRUNSWICK, NJ 08816
CONTRACT NUMBER:
DR RONALD W GUMBS
TITLE:
AGILE PROTECTION BY LASER-INDUCED ABSORPTION SCATTERING AND REFLECTION
TOPIC# 27 OFFICE: SPAWAR IDENT#: 37465

THERE IS A NEED FOR A SINGLE FILTER THAT WILL PROTECT THE EYES OF PERSONNEL AGAINST FREQUENCY AGILE LASERS WITHOUT DEGRADING ESSENTIAL VISUAL PERFORMANCE. DYNAMIC, REVERSIBLE AND BROADBAND OCULAR SHIELDS UNDER DEVELOPMENT AT GUMBS OPTICALLY AND PASSIVELY SWITCH FROM A TRANSPARENT STATE TO AN ABSORBING STATE IN PICOSECONDS AT INTENSITIES OF 10 mJ/cm(2) AND HIGHER. IN VIEW OF THIS CAPABILITY, THIS PROPOSAL OUTLINES A RESEARCH PROGRAM TO DEVELOP A SINGLE FILTER THAT WILL SWITCH AT 10 jJ/cm(2) AND PROVIDE PROTECTION TO THE EYES BY ABSORBING, SCATTERING AND REFLECTING THE HAZARDOUS RADIATION. THE PHOTOACTIVE SYSTEM OF THE PROPOSED DEVICE CONSISTS OF A TOP REFLECTIVE LAYER AND A BOTTOM SCATTERING LAYER. BOTH LAYERS WILL ALSO CONTAIN ABSORBING MATERIALS. THE KEY QUESTION THAT THE PHASE I

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EFFORT WILL ANSWER IS WHETHER THIS OPTICALLY SWITCHING FILTER CAN PROVIDE ADEQUATE OCULAR PROTECTION AT LOW INTENSITIES. IF PHASE I IS SUCCESSFUL, A MORE INTENSIVE STUDY OF THE KINETICS AND MECHANISM OF THE PROCESS WILL BE INITIATED WITH MORE DETAILED CHARACTERIZATION OF THE OPTICAL PROPERTIES OF THE DEVICE. WITH THE USE OF PICOSECOND RESOLUTION TECHNIQUES, DATA ON THE PHOTOPHYSICS OF THE PROCESS WILL BE OBTAINED.

HADLOCK F & ASSOCS
PO BOX 17 - RTE 14
COOKEVILLE, TN 38501
CONTRACT NUMBER:
DR FRANK HADLOCK
TITLE:
STATE-EVENT CALCULUS: A META-MODEL FOR SOFTWARE DEVELOPMENT
TOPIC# 157 OFFICE: NSWC IDENT#: 36096

THE STATE-EVENT CALCULUS (SECALC) IS A META-MODEL FOR SOFTWARE SYSTEM BEHAVIOR. STATES REFER TO SITUATIONS OF SOME DURATION WHILE EVENTS REFER TO SYSTEM ACTIONS PERFORMED BY SYSTEM ENTITIES IN RELATION TO OTHER SYSTEM ENTITIES AND EXTERNAL INPUTS. THE MAIN OBJECTIVES GUIDING THE INITIAL DEVELOPMENT OF SECALC WERE THAT: 1) IT BE COMPREHENSIBLE, 2) IT BE DERIVABLE FROM FUNCTIONAL SPECIFICATIONS (WITH A NATURAL LANGUAGE COMPONENT), AND 3) IT SERVE AS A BASIS FOR SYSTEM DESIGN, DEVELOPMENT AND TESTING. TO FACILITATE COMPREHENSION AND DERIVABILITY, THE INITIAL DESIGN OF SECALC DISPLAYS A STRONG CONCEPTUAL CORRESPONDENCE TO THE STRUCTURAL COMPONENTS OF NATURAL LANGUAGE: STATES AND EVENTS CORRESPOND TO CLAUSES, THEIR COMPONENTS TO PHRASES, AND TEMPORAL/CAUSAL RELATIONS TO CONJUNCTIONS. THIS PROPOSAL ADDRESSES: 1) FURTHER DEVELOPMENT OF THE SECALC MODEL AS A BASIS FOR DESIGN AND TESTING AND 2) AUTOMATIC OR SEMI-AUTOMATIC DERIVATION OF THE SECALC MODEL FROM RESTRICTED NATURAL LANGUAGE FUNCTIONAL SPECIFICATIONS. DELIVERABLE ARE: 1) DEMONSTRATION OF TECHNIQUES USING SECALC MODEL TO CHECK COMPLETENESS AND CONSISTENCY OF SPECIFICATIONS AND 2) A BASIC LEXICON ALOND WITH PROTOTYPE TOOLS FOR LEXICON EDITING AND AUTOMATIC OR SEMI-AUTOMATIC DERIVATION OF SECALC MODEL FROM RESTRICTED NATURAL LANGUAGE FUNCTIONAL SPECIFICATIONS.

HOLOMETRIX INC
99 ERIE ST
CAMBRIDGE, MA 02139
CONTRACT NUMBER:
DR P GREGORY DeBARYSHE
TITLE:
LASER ALTITUDE MEASUREMENT SYSTEM FOR HIGH-VELOCITY LOW-ALTITUDE VEHICLES
TOPIC# 184 OFFICE: PMTC IDENT#: 37709

SUBMITTED BY

HIGH-PERFORMANCE MILITARY AIRCRAFT AND CRUISE MISSILES REQUIRE IMPROVED CAPABILITIES FOR HIGH-VELOCITY, LOW-ALTITUDE, OVER-WATER OPERATION. THIS WILL ENABLE THEM TO ELUDE DETECTION AND INCREASE SURVIVABILITY. CURRENT ALTITUDE MEASUREMENT TECHNOLOGIES SUFFER FROM INADEQUATE ACCURACY AND EMIT RADIATION THAT CAN BE USED TO TARGET THE VEHICLE. THE USE OF A HIGH PULSE-RATE, COMPACT LASER ALTIMETER ADDRESSES ALL PERFORMANCE ISSUES BY PROVIDING CENTIMETER ACCURACY POTENTIAL OVER A WIDE ALTITUDE RANGE; HIGH SAMPLING RATES YIELDING VERY SHORT ALONG-TRACK DISTANCE INTERVALS BETWEEN EACH MEASUREMENT; AND HIGH-LEVEL COVERTNESS DUE TO MINIMIZE STRAY RADIATION (PLUS THE POSSIBILITY OF EMPLOYING ACTIVE COUNTER-COUNTERMEASURE FEATURES). THIS PULSED-LASER ALTIMETER CAN BE AS SMALL AS A SOFT-DRINK CAN. ADDITIONALLY, THE BASIC DESIGN CAN BE ENHANCED TO PROVIDE (a) EFFECTIVE THREE-DIMENSIONAL SCANNING FOR NAVIGATION AID, VEHICLE MOTION COMPENSATION TO PROVIDE TRUE ALTITUDE WHILE BANKING, LOOK-AHEAD FOR OBSTACLE AVOIDANCE AND/OR (b) SENSOR FUSION SINCE THE ELECTRONICS CAN INTEGRATE MILLIMETER-WAVE AND RADAR TRANSDUCERS. HOLOMETRIX AIRBORNE EQUIPMENT HAS MEASURED TERRAIN PROFILES TO BETTER THAN 1" ACCURACY; PHASE I EFFORTS WILL CONCENTRATE ON BRINGING THIS CAPABILITY TO SUPERSONIC MEASUREMENTS ABOVE OCEAN SURFACES.

HOPKINS SOFTWARE
1130 GOLDEN W - STE #1
ARCADIA, CA 91006
CONTRACT NUMBER:
RICHARD HOPKINS
TITLE:
LOW COST COMPUTER IMAGE GENERATOR FOR NIGHT VISION SIMULATION
TOPIC# 185 OFFICE: NTSC IDENT#: 37725

A COMPUTER IMAGE GENERATOR (CIG) WILL BE DESIGNED THAT TAKES ADVANTAGE OF THE LIMITED REQUIREMENTS OF NIGHT VISION GOGGLE SIMULATION TO PROVIDE HIGH FIDELITY IMAGES WITH A LOW COST CIG SYSTEM. THE DESIGN EFFORT WILL ADAPT AN EXISTING DESIGN FOR A LOW COST CIG SYSTEM BY ELIMINATING COLOR AND ADDING TERRAIN TEXTURE. THE IMAGE QUALITY OF THE NEW DESIGN WILL BE EVALUATED BY CREATING A VIDEO TAPE USING A VIDEO ANIMATION SYSTEM, AND A SOFTWARE SIMULATION OF THE NEW DESIGN. THE VIDEO TAPE WILL SHOW A SIMULATED FLIGHT

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THROUGH THE SAME NORFOLK CIG DATABASE THAT IS USED IN THE NAVY'S VTRS FACILITY. THE NEW CIG DESIGN WILL BE SUITABLE FOR THE SIMULATION OF OTHER MONOCHROME SENSORS, AND WILL BE A COMPACT UNIT THAT CAN BE EASILY RUGGEDIZED FOR AIRCRAFT ONBOARD, SHIPBOARD, AND EMBEDDED TRAINING APPLICATIONS.

HYDROGEN CONSULTANTS INC
12420 N DUMONT WY
LITTLETON, CO 80125
CONTRACT NUMBER:
JOHN R RITER JR
TITLE:
HEATS OF FORMATION ESTIMATES FOR NON-CARBON BASED COMPOUNDS CONTAINING B N P F O AND H
TOPIC# 133 OFFICE: NSWC IDENT#: 35863

BOND ENERGIES, OR ENTHALPIES, WILL BE DETERMINED FOR SEVERAL SUBSETS OF HIGH ENERGY-DENSITY COMPOUNDS WHICH CONTAIN ONLY THE ELEMENTS BORON, NITROGEN, PHOSPHORUS, FLUORINE, OXYGEN AND HYDROGEN. THE METHODS USED WILL BE THOSE OF THERMOCHEMISTRY, SPECTROSCOPY, AND QUANTUM MECHANICAL CALCULATIONS OF VARYING LEVELS OF SOPHISTICATION, DEPENDING UPON MOLECULAR COMPLEXITY. THE THREE SUBSETS OF COMPOUNDS SUGGESTED INITIALLY ARE DERIVATIVES OF BORAZINE (B[3]N[3]H[6]), DERIVATIVES OF POLY(PHOSPHAZENES) ([NPR(2)]n), AND ADDITIONAL DERIVATIVES OF THE KINETICALLY-STABILIZED DERIVATIVES OF THE BORON-PHOSPHORUS ANALOG OF BORAZINE (B[3]P[3]R[3]R'[3]). HERE R AND R' ARE BULKY SUBSTITUENTS. THE OXIDIZER GROUPS PROPOSED ARE NO(2), NO(3), AND NF(2). HEATS OF FORMATION WILL BE DETERMINED, FOR ALL COMPOUNDS, BY COMBINING THE BOND ENERGIES THUS DETERMINED WITH KNOWN THERMO-CHEMICAL DATA. POSSIBLE PHASE II ACTIVITIES WOULD INVOLVE SYNTHESIS OF PROMISING COMPOUNDS, WHICH IN TURN WOULD BE SUBJECTED TO CALORIMETRY, SENSITIVITY TESTS, AND THERMAL DECOMPOSITION KINETIC STUDIES. INPUT FROM NSWC WILL BE SOUGHT AT SEVERAL STAGES OF THE WORK.

HYPER-L INC
2071 INDIGO DR
DUNEDIN, FL 34698
CONTRACT NUMBER:
SIMON W LU
TITLE:
PASSIVE RANGING SYSTEM/ALGORITHM USING ELECTRO-OPTIC DATA
TOPIC# 116 OFFICE: NAVSEA IDENT#: 36875

SUBMITTED BY

THE PROPOSED PROJECT WILL INVESTIGATE FOUR DIFFERENT SYSTEMS/ALGORITHMS FOR PASSIVELY RANGING SHIPS AND OTHER FLOATING OBJECTS OF INTEREST USING ELECTRO-OPTIC SENSORS. THIS INNOVATIVE RESEARCH PROJECT INCLUDES THREE PARTS: 1) EVALUATION OF FOUR APPROACHES: DUAL-CAMERA SYSTEM, SPECTRUM ANALYSIS AUTO-FOCUS SYSTEM, DUAL-SENSOR SCANNING SYSTEM, AND SINGLE-CAMERA SCANNING SYSTEM. 2) FEASIBILITY STUDY OF DUAL-CAMERA SYSTEM. 3) FEASIBILITY STUDY OF SINCLE-CAMERA SCANNING SYSTEM. THE DUAL-SENSORS AND SINGLE-CAMERA APPROACHES ARE INVENTED BY THE PRINCIPAL INVESTIGATORS AND THE PATENT APPLICATIONS ARE PENDING. THE PROPOSED PROJECT WILL CONCENTRATE ON THE FEASIBILITY STUDY FOR NAVAL APPLICATIONS INCLUDING THE COMPENSATION OF UNCERTAINTIES IN THE VERTICAL REFERENCE, OBJECTS OF UNKNOWN SIZE, GEOMETRY, AND MANEUVERING OF BOTH THE SHIP PLATFORM AND THE VIEWED OBJECT. THE FEASIBILITY STUDY OF FULL-VIEW 3-D INFORMATION AND DISPLAY WILL ALSO BE CONDUCTED IN THIS PROJECT.

I-MATH ASSOCS INC
PO BOX 560788
ORLANDO, FL 32856
CONTRACT NUMBER:
TIMOTHY J THEIS
TITLE:
DUAL BAND INFRARED DISCRIMINATION TECHNIQUES
TOPIC# 153 OFFICE: NSWC IDENT#: 36048

I-MATH AND OUR SUBCONTRACTOR, QUEST RESEARCH CORPORATION, HAVE PROPOSED AN APPROACH FOR DETERMINING THE OPTIMAL SUB-BANDS WITHIN THE 3-5 AND 8-12 MICROMETERS REGIONS WHICH IS BASED ON A METHODOLOGY KNOWN AS DIFFERENTIAL IRRADIANCE. THIS TECHNIQUE IS PART OF A PATENT DISCLOSURE AUTHORED BY QUEST AND NRL WHILE PERFORMING ON OPTIMAL DUAL BAND SELECTION FOR A NRL IR SYSTEM. THIS TECHNIQUE RESULTED IN DEMONSTRATED PERFORMANCE IMPROVEMENTS WHICH ALLOW THRESHOLDS FROM 10 TO 70 TIMES LOWER THAN TRADITIONAL METHODS FOR COLOR DISCRIMINATION. I-MATH WILL DESIGN AND IMPLEMENT THE REQUIRED SIGNAL PROCESSING ALGORITHMS. DUAL MODE DISCRIMINATION PERFORMANCE IN AN OPERATIONAL ENVIRONMENT WILL BE EVALUATED BY I-MATH USING THE ELECTRO-OPTICAL SENSOR SIMULATION (EOSSIM) MODEL., A PC BASED, IMPROVED VERSION OF THE INFRARED SEARCH AND TRACK EVALUATION MODEL

SUBMITTED BY

(IRSTEM).

I-MATH ASSOCS INC
PO BOX 560788
ORLANDO, FL 32856
CONTRACT NUMBER:
ALEXANDER AKERMAN III
TITLE:
MEASUREMENT OF THE ULTRAVIOLET SIGNATURE OF AN OBJECT
TOPIC# 181 OFFICE: PMTC IDENT#: 37676

THE VULNERABILITY OF A LOW OBSERVABLE AIRCRAFT TO AN ULTRAVIOLET (UV) SEEKING MISSILE CAN BE DETERMINED BY AN END-TO-END DIGITAL SIMULATION WHICH CONCATENATES EXISTING I-MATH COMPUTER PROGRAMS. THE "VISUAL AND LASER ULTRAVIOLET TO ELECTRO OPTICAL (VALVE)" CODE PRODUCES HIGH FIDELITY 3D SHAPE AND SPECTRAL RADIANCE IMAGES OF AIRCRAFT AND SKY/TERRAIN BACKGROUNDS IN THE 0.1 - 1.0 MICRON SPECTRAL REGION. SIGNIFICANT INPUTS TO VALUE INCLUDE BIDIRECTIONAL REFLECTANCE FUNCTION (BDRF) MEASUREMENTS TO BE MADE BY SURFACE OPTICS, INC. AND UV ATMOSPHERIC SCATTERING CHARACTERIZATIONS PROVIDED BY SAIC. THE LATTER WILL INCLUDE BOTH PREDICTIONS FROM THE "DAVE" CODE PLUSE MEASUREMENTS WITH A UV CAMERA WHICH IS CALIBRATED TO NBS-TRACEABLE STANDARDS. UV IMAGES OF A NAVY AIRCRAFT/HELICOPTER AT VARIOUS RANGES, SUN ANGLES, AND OTHER SCENARIO CONDITIONS WILL ALSO BE TAKEN BY SAIC. THESE CALIBRATED IMAGES WILL BE USED TO MODIFY THE VALUE AND DAVE CODES AS NECESSARY, SO THAT THE UV MODELS WILL BE VALIDATED. IN PHASE II, THE VALUE-GENERATED SPECTRAL IMAGES WILL BE INPUT TO THE GENERIC EO SENSOR SIMULATOR, PARAMETERIZED TO REPRESENT AN IMAGING MISSILE TRACKER. IN TURN, AIRCRAFT VULNERABILITY--IN TERMS OF PROBABILITY OF HIT AND MISS DISTANCES-- WILL BE PREDICTED USING A MICOM-DEVELOPED 6DOF MISSILE SIMULATION.

IAP RESEARCH INC
2763 CULVER AVE
DAYTON, OH 45429
CONTRACT NUMBER:
JOHN P BARBER
TITLE:
LINEAR MOTOR CURRENT COLLECTORS FOR SEA WATER USE
TOPIC# 88 OFFICE: NAVSEA IDENT#: 36532

SUBMITTED BY

BRUSH COMMUTATING LINEAR MOTORS ARE BEING INVESTIGATED FOR USE IN A TORPEDO LAUNCHING ROLE. TWO KEY PROBLEMS ARE UNCERTAINTY ABOUT THE LIFE OF THE COLLECTOR SYSTEM AND OPERATION OF THE COLLECTORS WHILE SUBMERGED IN SEA WATER. THE LIFE OF THE COLLECTOR SYSTEM DEPENDS ON THE TYPE OF COMMUTATION. MOST DC COMMUTATING COLLECTOR SYSTEMS RELY ON AN ARC TO COMMUTATE THE CURRENT. EROSION OF THE COLLECTOR SYSTEM ACCOMPANIES THE ARC. THE EROSION CAN LIMIT THE LIFE OF THE SYSTEM TO A FEW SHOTS. OPERATION IN SEA WATER IMPOSES CORROSION, BIOFOULING, AND VOLTAGE STANDOFF DESIGN ISSUES NOT NORMALLY ENCOUNTERED IN COLLECTOR SYSTEM DESIGN. THESE ISSUES MUST BE ANALYZED AND UNDERSTOOD. IN ADDITION, OPERATING THE SLIDING CONTACT SYSTEM IN WATER WILL CREATE A HYDRODYNAMIC LIFTING FORCE THAT MUST BE ACCOUNTED FOR. THE LIFTING FORCE WILL TEND TO UNLOAD THE ELECTRICAL CONTACTS, AND INCREASE THE COMMUTATION EROSION. WE PROPOSE TO DEVELOP THE DESIGN OF A NON-ARCING, RESISTIVE COMMUTATION CURRENT COLLECTOR SYSTEM. THIS SYSTEM WILL ELIMINATE BRUSH EROSION AND WILL BE CAPABLE OF OPERATING IN SEA WATER.

IKONIX INC
2302 HORSE PEN RD
HERNDON, VA 22070
CONTRACT NUMBER:
ROBERT L STITES
TITLE:
NEURAL NETWORKS FOR ADVANCED AAW TACTICAL DISPLAYS
TOPIC# 98 OFFICE: NAVSEA IDENT#: 36653

THE AEGIS WEAPONS SYSTEM, WHICH BOASTS HIGHLY AUTOMATED DETECTION, TRACKING, AND ENGAGEMENT CAPABILITIES, PUSHED THE STATE OF THE ART IN 1980'S NAVAL AAW TECHNOLOGY. THE COMPLEXITIES OF NAVAL WARFARE IN THE COMING DECADE WILL ALMOST CERTAINLY REQUIRE THE INCLUSION OF ARTIFICIAL INTELLIGENCE (AI) TECHNIQUES IN FUTURE NAVAL SYSTEMS, A CAPABILITY THAT AEGIS LACKS. NEURAL NETWORK TECHNOLOGY, WITH ITS ABILITY TO RAPIDLY PROCESS NOISY MULTIVARIATE DATA, HOLDS GREAT PROMISE IN ENHANCING THE PROCESSING OF TACTICAL INFORMATION FOR LATER DISPLAY TO THE NAVAL DECISION MAKER. THIS PROPOSAL DESCRIBES A METHODOLOGY FOR USING A HYBRID NEURAL NET/EXPERT SYSTEM ENVIRONMENT TO CREATE AN INTELLIGENT TACTICAL DISPLAYS PREPROCESSOR. THE

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PROPOSED SYSTEM WILL INTEGRATE INFORMATION RECEIVED FROM MULTIPLE SENSORS, FILTER, AND PRIORITIZE THE INFORMATION PRIOR TO DISPLAY. THE SYSTEM WILL BE ABLE TO CORRELATE MULTIPLE TRACK FILES AND TO AUTOMATICALLY GROUP FORMATIONS OF AIRCRAFT TO DECLUTTER THE DISPLAY. ADDITIONALLY, INTELLIGENT THREAT PRIORITIZATION WILL BE IMPLEMENTED IN A CONTEXT-SENSITIVE MANNER. A COMPLETE PROTOTYPE SIMULATION OF THIS PROCESS WILL BE PROGRAMMED IN THE C LANGUAGE ON A MINICOMPUTER.

IMAGINATION WORKS
18622 SATICOY ST
RESEDA, CA 91335
CONTRACT NUMBER:
STEVEN CASSELMAN
TITLE:
FULLY RECONFIGURABLE COPROCESSOR FOR USE IN PARALLEL COMPUTERS
TOPIC# 155 OFFICE: NSWC IDENT#: 36063

WITH THE REVOLUTION IN REPROGRAMBLE GATE-ARRAYS, ADVANCES IN LOGIC SYNTHESIS, AND A CUSTOM "ROUTING" ASIC, THE IMAGINATION WORKS PROPOSES A NEW AND INNOVATIVE SOLUTION TO THE HARDWARE/SOFTWARE BOUNDARY PROBLEM, ENABLING A COPROCESSOR TO BE BUILT THAT IS TOTALY RECONFIGURABLE AT THE HARDWARE LEVEL. THIS COPROCESSOR IS TO BE CONSTRUCTED OF THOUSANDS OF SMALL "RECONFIGURABLE PROCESSORS".

INFORMATION SYSTEMS LABS INC
8130 BOONE BLVD - STE 500
VIENNA, VA 22182
CONTRACT NUMBER:
JOHNM E DON CARLOS
TITLE:
TECHNIQUES FOR RECONNECTING PARTITIONED NETWORKS
TOPIC# 35 OFFICE: SPAWAR IDENT#: 36923

THE NAVAL BATTLE GROUP RELIES ON NETTED COMMUNICATIONS FOR TACTICAL COMMUNICATIONS. THE COMMUNICATIONS ASSETS ARE PLANNED TO BE INTEGRATED INTO AN INTERNETWORK OF RF SUBNETWORKS WHICH IS SHARED BY VOICE, NTDS, AND DATA USERS. ISL PROPOSES CONCEPTS FOR BRIDGING

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AMONG FRAGMENTS OF RF NETWORKS WHICH HAVE BEEN PARTITIONED BY LOSS OF A NODE OR LINKS. FEASIBILITY OF THE CONCEPTS WILL BE SHOWN BY SIMULATION IN PHASE I.

INFORMATION SYSTEMS LABS INC
8130 BOONE BLVD - STE 500
VIENNA, VA 22182
CONTRACT NUMBER:
JOHN E DON CARLOS
TITLE:
ANALYTICAL TOOLS FOR COMMUNICATION SUPPORT SYSTEMS
TOPIC# 38 OFFICE: SPAWAR IDENT#: 36939

THE NAVAL BATTLE GROUP RELIES ON NETTED COMMUNICATIONS FOR TACTICAL COMMUNICATIONS. THE COMMUNICATIONS ASSETS ARE PLANNED TO BE INTEGRATED INTO AN INTERNETWORK OF RF SUBNETWORKS WHICH IS SHARED BY VOICE, NTDS, AND DATA USERS. THE PERFORMANCE OF ALTERNATIVE PROTOCOLS AND ALGORITHMS WITHIN THE INTERNET BECOME DIFFICULT TO EVALUATE AND VERIFY AS THE NETWORK SIZE AND COMPLEXITY INCREASES. A FAST, FLEXIBLE, EXPANDABLE NETWORK ANALYSIS WORKSTATION IS NEEDED. ISL PROPOSES TO DEVELOP A NOVEL NETWORK EMULATION WORKSTATION INCORPORATING MULTIPLE TRANSPUTERS WHICH FITS THIS NEED EXACTLY.

INNOVATIVE TECH ASSOCS/DIG SYS RESOURCES
12450 FAIR LAKES CIR - STE 500
FAIRFAX, VA 22033
CONTRACT NUMBER:
RICHARD W CARROLL
TITLE:
HIGH RESOLUTION ACTIVE SONAR WAVEFORMS
TOPIC# 58 OFFICE: SPAWAR IDENT#: 37081

THERE IS A REQUIREMENT FOR WAVEFORM DESIGNS WHICH HAVE BEEN SPECIFICALLY DESIGNED, DEVELOPED, OR ADAPTED TO THE LONG RANGE ACOUSTIC SURVEILLANCE ENVIRONMENT. THIS ENVIRONMENT PRESENTS US WITH UNIQUE TRANSMISSION CHANNEL AND CLUTTER CHARACTERISTICS. THE LOW FREQUENCIES, TO ACHIEVE LONG RANGES, AND BANDWIDTH RESTRICTIONS

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IMPOSED BY PRESENTLY AVAILABLE HIGH POWERED SOURCES, PRESENT ADDED RESTRICTIONS TO WAVEFORM SELECTION. IN THE PROPOSED PROJECT WE SHALL TAKE A THREE PRONGED APPROACH TO THIS PROBLEM. FIRST, WE WILL LOOK FOR IMPROVEMENTS IN THE DESIGN AND IN THE PROCESSING OF WAVEFORMS OF THE TYPES BEING EXPLORED ON THE CST AND LFA PROGRAMS. SECOND, WE WILL INVESTIGATE THE WIDE SELECTION OF WAVEFORMS WHICH HAVE BEEN DEVELOPED FOR RADAR AND WE WILL LOOK AT THE WAVEFORMS USED IN COMMUNICATIONS TECHNOLOGY FOR THE REDUCTION OF MUTUAL INTERFERENCE BETWEEN MULTIPLE SIGNALS. THIRD, WE WILL USE OPTIMIZATION THEORIES BASED ON THE CRAMER-RAO LOWER BOUND (CRLB) AND THE THEORY OF STATISTICAL EXPERIMENTAL DESIGN TO GENERATE NEW TYPES OF WAVEFORMS.

INRAD INC
181 LEGRAND AVE
NORTHVALE, NJ 07647
CONTRACT NUMBER:
DR WARREN RUDERMAN
TITLE:
DEVELOPMENT OF A SINGLE CRYSTAL TITANIUM CARBIDE GROWTH PROCESS
TOPIC# 11 OFFICE: ONT IDENT#: 37382

A RESEARCH PROGRAM IS PROPOSED TO DEVELOP A GROWTH PROCESS FOR HIGH QUALITY TITANIUM CARBIDE SINGLE CRYSTALS FOR USE AS SUBSTRATES FOR THE DEPOSITION OF SILICON CARBIDE THIN FILMS. HIGH PURITY TiC WILL BE PRODUCED BY THE SELF-PROPAGATING HIGH TEMPERATURE SYNTHESIS SINCE FEED STOCK OF ADEQUATE PURITY IS NOT COMMERCIALLY AVAILABLE. THE FLOAT ZONE TECHNIQUE WITH ZONE LEVELING TO MAINTAIN UNIFORM COMPOSITION WILL BE USED. A HIGH PRESSURE CRYSTAL GROWTH CHAMBER WILL BE USED TO MINIMIZE EVAPORATION DURING GROWTH. THE TiC CRYSTALS THAT ARE GROWN WILL BE CHARACTERIZED AND CRYSTAL PERFECTION DETERMINED BY ROCKING CURVES OBTAINED WITH A PRECISION DOUBLE CRYSTAL X-RAY SPECTROMETER. ATTEMPTS WILL BE MADE TO ADJUST THE TiC CRYSTAL COMPOSITION SO THAT ITS LATTICE CONSTANT CLOSELY MATCHES THAT OF SiC. REPRESENTATIVE TiC CRYSTALS WILL BE WAFERED, POLISHED AND CHARACTERIZED AND DELIVERED TO THE SPONSORING AGENCY.

INTEGRATED DEFENSE CONCEPTS
PO BOX 8347
NORTHFIELD, IL 60093
CONTRACT NUMBER:
TERRENCE LEE
TITLE:
CAN U.S. NAVY'S CARRIER BATTLE FORCE (CVBF) ASSIST THE GROUND FOR COMMANDER WITHOUT LOSING ABILITY TO DEFEND ITSELF AGAINST INCOME.
TOPIC# 17 OFFICE: SPAWAR IDENT#: 37983

SUBMITTED BY

ONE OF THE MOST IMPORTANT ISSUES CONFRONTING THE U.S. ARMED FORCES TODAY IS THE CONCEPT OF JOINT OPERATIONS AND INTEROPERABILITY. SUPPORT OF THE GROUND FORCE COMMANDER (IN A NON-AMPHIBIOUS ROLE) BY NAVAL FORCES COMES UNDER THE MISSION AREA DEFINED AS STRIKE WARFARE. THE CARRIER BATTLE FORCE IS THE MOST POWERFUL AND FLEXIBLE OF ALL NAVAL FORMATIONS. HOWEVER, WHEN IT COMES TO SPECIFYING THE CAPABILITIES OF A CARRIER BATTLE FORCE, INEVITABLY THE FOCUS IS ONLY ON THE CARRIER BASED AVIATION EXECUTING THE STRIKE MISSION. BUT THE CARRIER BATTLE FORCE IS MORE THAN JUST A CARRIER. ARMED WITH TOMAHAWK CRUISE MISSILES, THE SURFACE ESCORT SHIPS AND SUBMARINES ACCOMPANYING THE CARRIER CAN BOTH EXECUTE MISSIONS IN SUPPORT OF THE GROUND FORCE COMMANDER. BEFORE ANY APPROACH IS TAKEN TO ASSESS WHETHER A PARTICULAR NAVAL ARCHITECTURE CAN SUPPORT TOF LEVEL WARFARE REQUIREMENTS TO PERFORM STRIKE MISSIONS IN SUPPORT OF THE GROUND FORCE COMMANDER, AN ANALYSIS NEEDS TO BE UNDERTAKEN TO IDENTIFY THE LIMITATIONS ON THE CAPABILITY OF THE CARRIER BATTLE FORCE TO ACCOMPLISH BOTH MISSIONS - SUPPORT THE GROUND FORCE COMMANDER AND PROTECT ITSELF.

INTERNATIONAL TECHNICAL ASSOCS
2281 CALLE DE LUNA
SANTA CLARA, CA 95054
CONTRACT NUMBER:
LEONARD REED
TITLE:
DEVELOPMENT OF ALL SAPPHIRE RAMAN CELLS
TOPIC# 31 OFFICE: SPAWAR IDENT#: 36901

THE OBJECTIVE OF THIS INVESTIGATION IS TO PRODUCE A TECHNIQUE FOR JOINING A SAPPHIRE WINDOW OF OPTICAL QUALITY TO A BODY, ALSO COMPOSED OF SAPPHIRE, BY A BONDING PROCESS SUCH THAT SUBSTANTIALLY NO FOREIGN MATERIALS ARE INCLUDED IN THE JOINT. THE IDEAL RESULTING PROCESS WILL PRODUCE A SINGLE CRYSTAL JOINT THAT WILL NOT DEGRADE AFTER PROLONGED EXPOSURE TO 1300 DEG C TEMPERATURES IN CONCERT WITH LEAD VAPOR. THE METHOD CHOSEN TO ACHIEVE THIS OBJECTIVE IS TO HOT PRESS THE SAPPHIRE SURFACES TOGETHER WITH AND WITHOUT A SMALL QUANTITY OF VARY LOW VAPOR PRESSURE MATERIALS SUCH AS COLLOIDAL Al(2)O(3), MgO, ThO(2) OR A SOL-GEL MADE OF THESE MATERIALS. THE PROCESS WILL BE

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DESIGNED SUCH THAT THIS MATERIAL ENTERS INTO SOLID SOLUTION IN THE ALUMINA AND CATALYSES THE FORMATION OF A SINGLE CRYSTAL ACROSS THE JOINT. THE PROCESS IS CARRIED OUT IN A DRY HYDROGEN ATMOSPHERE IN THE TEMPERATURE REGION OF 1400 - 1800 DEG C.

INTERNATIONAL TECHNICAL ASSOCS
2281 CALLE de LUNA
SANTA CLARA, CA 95054
CONTRACT NUMBER:
LEONARD REED
TITLE:
SEALED TUBE TECHNOLOGY FOR METAL VAPOR LASERS
TOPIC# 16 OFFICE: MCRDAC IDENT#: 37309

THE OBJECTIVE OF PHASE I IS TO DEFINE THE MATERIALS AND TECHNIQUES REQUIRED TO FABRICATE SEALED CVL TUBES. A SELECTION OF THE MATERIALS AND TECHNIQUES THOUGHT TO BE USEFUL IN THE MANUFACTURE OF SUCH TUBES WILL BE MADE BASED ON PRIOR EXPERIMENTAL DATA AND THEORETICAL PREDICTIONS. SCREEN TESTING, INCLUDING MoR AND VACUUM LEAK AFTER 1500 DEG C EXPOSED TO COPPER VAPOR WILL BE MADE TO DETERMINE MATERIALS COMPATIBILITY AND TO SELECT THE JOINING PROCESS. THE USE OF A 1300 DEG C DEVITRIFYING HIGH TEMPERATURE GLASS SEALANT WILL BE STUDIED AS A COST REDUCTION MEASURE. A PROCEDURE FOR ADDITIONAL SCREENING AS A PHASE II TASK WILL BE DEVISED AND PRELIMINARY TESTS WILL BE MADE IN THIS PHASE IF FUNDS ALLOW. IN ALL CASES TESTS WILL FOLLOW PROCEDURES ALREADY FULLY DEVELOPED FOR COMPARABLE SITUATIONS. CVL'S, OFFERS A UNIQUE TOOL FOR HIGH SPEED IMAGING. FOR EXAMPLE THEY FIND USES IN BALLISTICS, FLOW VISUALIZATION AND COMBUSTION RESEARCH. DYE LASER PUMPING FOR ISOTOPE SEPARATION IS ANOTHER APPLICATION.

INTREPID COMMUNICATIONS INC
1 SEA GATE - STE 1680
TOLEDO, OH 43604
CONTRACT NUMBER:
DR D L TRAUTMAN
TITLE:
STANDARD SOFTWARE ENVIRONMENT FOR LOCAL AREA NETWORK (LAN) INTEGRATION
TOPIC# 26 OFFICE: SPAWAR IDENT#: 37455

SUBMITTED BY

MORE EFFECTIVE COMMUNICATION AMONG SHIPBOARD ELECTRONICS APPLICATIONS AND INSULATION FROM VENDOR-SPECIFIC PROTOCOLS REQUIRES STANDARDIZATION OF NEW COMMON MESSAGE STRUCTURE, ENCODING AND ENGAGEMENT PROTOCOLS BELONGING TO OSI LEVELS 7-5 (APPLICATION, PRESENTATION, SESSION). PROJECT EMPHASIS IS FIRST PLACED ON A NEW ABSTRACT MESSAGE STRUCTURE AT LEVEL 7, EMBRACING FIVE MESSAGE TYPES: INFORMATION UPDATE, FILE TRANSFER, COMMAND/ACTION, QUERY AND ACKNOWLEDGEMENT/REPORT. THE SMALL SUITE OF EVENTS WHICH TRIGGER MESSAGES WILL BE IDENTIFIED AND MAY INCLUDE FOR EXAMPLE: REPORT SIGHTINGS, FIRE WEAPONS, REQUET STATUS, CHANGE SHIP MOVEMENT. THE PROPOSED COMMON ENCODING PROTOCOL OF LEVEL 6 IS RECORD ORIENTED WITH STANDARD DATA FIELDS DEFINED BY THEIR SPECIFICATIONS AND ORDER WITHIN THE RECORD. ALSO, EACH RECORD IDENTIFIES ITS TYPE AND THE CODES USED FOR DELIMITERS AND CONTROLS. WITH THIS STANDARDIZATION OF SHIPBOARD OSI LEVELS 7-5, CUSTOM INTERFACING OF MULTIPLE PAIRS OF APPLICATIONS WILL BE REDUCED FROM n(n-1) UNITS TO (n+1) STANDARD VENDOR-FURNISHED INTERFACES. THIS PROJECT ORIENTATION IS BASED ON A SIMILAR NATIONWIDE UPPER-LEVEL STANDARDIZATION EFFORT FOR HOSPITAL COMPUTER COMMUNICATIONS (HL-7) IN WHICH THE PROJECT PRINCIPALS ARE PROMINENT PARTICIPANTS.

JAMAR TECHNOLOGY CO
3956 SORRENTO VALLEY BLVD - STE D
SAN DIEGO, CA 92121
CONTRACT NUMBER:
DR HARRY SHIELDS
TITLE:
STUDY OF DEGRADATION MECHANISMS IN HIGH-TEMPERATURE FRIT-SEALED OPTICAL COMPONENTS FOR Pb-VAPOR RAMA CELLS
TOPIC# 34 OFFICE: SPAWAR IDENT#: 36918

IT IS PROPOSED TO DESIGN, BUILD AND TEST AN EXPERIMENT TO DETECT AND MEASURE THE MIGRATION OF FRIT SEALING MATERIALS TO THE WINDOWS OF HOT-WINDOW Pb-VAPOR RAMAN CELLS. THE PROPOSED EXPERIMENT CONSISTS OF A FRIT-SEALED WINDOW ON A SMALL TEST CELL (SUPPLIED BY NORTHROP ELECTRONICS DIVISION) PLACED IN THE HOT ZONE OF A SMALL FURNACE AT TEMPERATURES UP TO 1500 DEG C. THE FRIT MIGRATION WILL BE MONITORED BY OBSERVING DECREASED TRANSMISSION OF A HeNe LASER THROUGH THE TEST

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PIECE. FOLLOWING DEMONSTRATION OF FEASIBILITY OF THIS EXPERIMENT, A TEST PLAN FOR RAMAN CELLS WILL BE PREPARED FOR MORE DETAILED STUDIES IN PHASE II. IN ADDITION TO FRIT MIGRATION, PHASE II WILL STUDY OTHER LONG-TERM LIFE LIMITING ISSUES SUCH AS HIGH TEMPERATURE DAMAGE THRESHOLD, FORMATION OF STRIATIONS ON WINDOWS, ETC.

JB SYSTEMS
3 HUTTON CENTRE DR - STE 920
SANTA ANA, CA 92707
CONTRACT NUMBER:
DR JACQUES BESER
TITLE:
USING DIFFERENTIAL GLOBAL POSITIONING SYSTEM FOR TRUTH REFERENCE
TOPIC# 20 OFFICE: SPAWAR IDENT#: 37390

ROCKEWELL-COLLINS 3S GPS RECEIVERS WILL BE INTEGRATED ON SEVERAL NAVY SURFACE PLATFORMS. THESE RECEIVERS PROVIDE A POSITION ACCURACY OF 16m (1 SIGMA). IF THEY HAD A DIFFERENTIAL GPS CAPABILITY, THE ACHIEVABLE ACCURACY WOULD BE BETTER THAN 5m (1 SIGMA). THIS EFFORT IDENTIFIES THE NAVY MISSIONS THAT WOULD BENEFIT FROM SUCH AN IMPROVED ACCURACY, DEFINES SYSTEM-LEVEL REQUIREMENTS FOR A DIFFERENTIAL CAPABILITY, ASSESSES SEVERAL IMPLEMENTATIONS USING THE 3S RECEIVER, PERFORMS A COST, PERFORMANCE AND EASE OF IMPLEMENTATION TRADEOFF AMONG THESE IMPLEMENTATIONS, AND SIMULATES THE PREFERRED IMPLEMENTATION ON OUR EXISTING, HIGH-FIDELITY COLLINS RECEIVER/GPS ENVIRONMENT SIMULATOR.

JOHNSON ENGINEERING CORP
3055 CENTER GREEN DR
BOULDER, CO 80301
CONTRACT NUMBER:
ARNOLD J FARSTAD
TITLE:
DYNAMIC REAL-TIME RADIO FREQUENCY TAG NETWORK
TOPIC# 63 OFFICE: NSSC IDENT#: 36223

THE FEASIBILITY OF A DYNAMIC REAL-TIME RADIO FREQUENCY TAG NETWORK

SUBMITTED BY

WILL BE DETERMINED AS IT APPLIES TO NAVY APPLICATIONS. USING AN INNOVATIVE GRID ANTENNA NETWORK WITHIN A FACILITY, ITEMS BEARING RF TAGS CAN BE TRACKED IN DYNAMIC REAL-TIME MONITORING WITH THE LATEST STATE-OF-THE-ART ELECTRONIC TECHNOLOGY. THIS TECHNICAL APPROACH INTEGRATES THREE TECHNOLOGIES; UHF RADIO COMMUNICATIONS, DISTRIBUTED ANTENNA SYSTEMS AND COMPUTER TECHNOLOGY. THE RF TAGS ARE THE SIZE OF A SMALL TRANSISTOR, ATTACHED TO THE ITEMS TO BE TRACKED. THE LOCATION OF EACH ITEM CAN BE MONITORED IN REAL TIME AND IS KNOWN WITH HIGH RESOLUTION. THIS SOLVES THE PROBLEM EXPERIENCED BY THE NAVY WHERE THE RF TAGS MOVE OUTSIDE THE DETECTABLE RANGE AND DATA IS LOST.

JRS RESEARCH LABS INC
1036 W TAFT AVE
ORANGE, CA 92665
CONTRACT NUMBER:
ROBERT J SHERAGA
TITLE:
IC DESIGN HARDWARE/SOFTWARE COMMUNICATIONS PROTOCOLS
TOPIC# 171 OFFICE: NWC IDENT#: 36208

ONE OF THE MOST DIFFICULT PROBLEMS FACING SENIOR DESIGNERS AND DESIGN MANAGERS TODAY IS THAT OF INTERFACING BETWEEN THE VARIOUS TOOLS AND SYSTEMS THAT HAVE PROLIFERATED OVER THE PAST FEW YEARS TO AID IN THE PROCESS OF DESIGNING AND DEVELOPING LSI AND VLSI CHIPS, INCLUDING VHSIC AND ASIC. THE NUMBER OF WORK STATIONS, COMPUTERS, SOFTWARE PACKAGES, DATA FORMATS, FILE TRANSFER STANDARDS, PLOTTER INTERFACES, PRINTER INTERFACES, AND TESTER INTERFACES THAT HAVE COME INTO BEING IS FRIGHTENING AND GROWING. OVER THE PAST TWO YEARS, THE DOD HAS SPONSORED THE EIS PROGRAM AND INDUSTRY HAS INITIATED THE CAD FRAMEWORK INITIATIVE, BOTH HAVING THE GOAL OF ESTABLISHING SOME ORDER AND DEVELOPING STANDARDS FOR ADDRESSING THE COMMUNICATION PROTOCOL PROBLEMS, IN ADDITION TO OTHER ISSUES. THIS PROPOSAL IS TO ADDRESS THE COMMUNICATIONS PROTOCOL PROBLEM DIRECTLY AND TO RELATE THE ACTIVITY TO THE EIA AND CFI EFFORTS SO AS TO CAPITALIZE ON WORK THAT THEY HAVE ALREADY DONE AND TO INSURE THAT THIS EFFORT DOES NOT GO OFF IN DIRECTIONS THAT WILL LIMIT ITS UTILITY AND APPLICABILITY.

K.C. RESEARCH
11231 MAIN RANGE TRAIL
LITTLETON, CO 80127
CONTRACT NUMBER:
TODD A CERNI
TITLE:
PARALLEL PROCESSING FOR INFRARED RADIOMETERS
TOPIC# 143 OFFICE: NSWC IDENT#: 35980

SUBMITTED BY

CONVENTIONAL MEASUREMENT TECHNIQUES USED IN INFRARED RADIOMETRY LACK THE SPEED REQUIRED FOR MEASURING THE INFRARED SIGNATURE OF DYNAMIC TARGETS. THE SPEED OF CONVENTIONAL TECHNIQUES CAN BE INCREASED, BUT AT THE SACRIFICE OF SIGNAL-TO-NOISE PERFORMANCE. AN INFRARED RADIOMETER BASED ON PARALLEL SAMPLING AND PROCESSING TECHNIQUES CAN PROVIDE THE SAME SIGNAL-TO-NOISE PERFORMANCE AS CONVENTIONAL HIGH PERFORMANCE RADIOMETERS, WHILE SIMULTANEOUSLY PROVIDING A 64 FOLD INCREASE IN SPEED. HENCE INFRARED SIGNATURE MEASUREMENTS CAN BE ACCOMPLISHED IN 1/64TH THE TIME, WITHOUT SACRIFICE OF ACCURACY. THE PHASE I WORK PLAN INCLUDES RESEARCH ON ALL RELEVANT INFRARED RADIOMETER DESIGN OPTIONS, DEVELOPMENT OF A DETAILED DESIGN FOR A PHASE II RADIOMETER SYSTEM, DEVELOPMENT OF A NUMERICAL MODEL FOR REALISTIC PREDICTION OF RADIOMETER PERFORMANCE, AND TWO DESIGN REVIEWS AT NSWC. THROUGHOUT THE PROPOSED PHASE I RESEARCH EFFORT AND POTENTIAL PHASE II RESEARCH AND DEVELOPMENT EFFORT, WORK WILL BE CLOSELY COORDINATED WITH THE NAVY TECHNICAL STAFF TO INSURE COMPLIANCE WITH NAVY REQUIREMENTS.

KETRON INC
350 TECHNOLOGY DR
MALVERN, PA 19355
CONTRACT NUMBER:
T GRADEL
TITLE:
ZENITH 248 HARPOON ENGAGEMENT TRAINER
TOPIC# 71 OFFICE: NAVAIR IDENT#: 36310

KETRON INC. PROPOSES TO DESIGN AN ALL PURPOSE HARPOON MISSILE TRAINER THAT TAKES FULL ADVANTAGE OF THE NAVY'S STANDARD DESK-TOP COMPUTER, THE ZENITH 248. KETRON'S APPROACH ELIMINATES THE NEED FOR A MAN-IN-THE-LOOP BY INCORPORATING THE FOLLOWING COMPONENTS TO AUTOMATE COMPUTER-BASED HARPOON TRAINING: INTERROGATOR, ADVISOR, INSTRUCTOR, AND EVALUATOR. THE INSTRUCTOR COMPONENT PROVIDES A DYNAMIC TUTORIAL ON HARPOON EMPLOYMENT, AN EXERCISE GENERATOR THAT PROVIDES FLEXIBILITY IN PLANNING HARPOON MISSION SCENARIOS, AND A SIMULATION MODULE THAT CAN BE UNIQUELY TAILORED TO ANY ONE OF THREE PLATFORM APPLICATIONS, NAMELY P-3, S-3, AND A-6. KETRON INC. IS A TRAIL BLAZER IN THE DESIGN AND IMPLEMENTATION OF PC-BASED TRAINING

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AIDS OWING TO PREVIOUS DEVELOPMENTS OF PC-BASED PROCESS MAP (PRO-MAP) AND MAVERICK ENGAGEMENT DECISION AID (MEDA) SYSTEMS. MEDA IS DISTINGUISHED AS THE FIRST ALL-PURPOSE MISSILE TRAINER TO BE DESIGNED SPECIFICALLY FOR THE ZENITH 248.

KMS FUSION INC
PO BOX 1567 - 3852 RESEARCH PARK DR
ANN ARBOR, MI 48106
CONTRACT NUMBER:
JOEL S KOLLIN
TITLE:
REAL-TIME HOLOGRAPHIC DATA DISPLAY
TOPIC# 105 OFFICE: NAVSEA IDENT#: 36748

KMS PROPOSES TO DEVELOP A REAL-TIME DISPLAY OF PROJECTING A HOLOGRAPHIC IMAGE COMPUTED DIRECTLY FROM RANGE TRACKING DATA. DURING THE PHASE I EFFORT, KMS WILL RESEARCH AND EXAMINE THE LIMITATIONS OF THE STATE-OF-THE-ART, PROVIDE A CONCEPTUAL DESIGN OF A PROJECTED HOLOGRAPHIC DISPLAY AND COMPARE IT TO EXISTING AUTO-STEROSCOPIC 3-D DISPLAY TECHNOLOGIES. REAL-TIME HOLOGRAPHIC DISPLAYS HAVE LONG BEEN CONSIDERED IMPRACTICAL DUE TO THE EXTREMELY HIGH BANDWIDTH AND RESOLUTION REQUIREMENTS INVOLVED. THESE ARE BASED ON PAST ANALYSES OF CONVENTIONAL TRANSMISSION HOLOGRAMS, WHICH PROVIDE MUCH MORE INFORMATION THAN A HUMAN OBSERVER CAN USE. MORE RECENT STUDIES HAVE CONCLUDED THE INFORMATION CONTENT OF HOLOGRAMS CAN BE DRASTICALLY REDUCED WITHOUT SIGNIFICANT EFFECT UPON THE VISUAL IMPACT OF THE IMAGE. THE REQUIRED SPACE-BANDWIDTH PRODUCT CAN BE REDUCED TO THAT AVAILABLE WITH COMMERCIAL SPATIAL VIEWING SPACE. WITH THE ADVENT OF HIGH-SPEED PARALLEL ARCHITECTURE COMPUTERS, IT WILL SOON BE POSSIBLE TO UPDATE THE CONTENT OF SUCH HOLOGRAMS ON THE FLY, ESPECIALLY FOR DISPLAY OF PRECOMPUTED OBJECTS OR ICONS.

KTECH CORP
901 PENNSYLVANIA NE
ALBUQUERQUE, NM 87110
CONTRACT NUMBER:
JAMES A JOHNSON
TITLE:
SHOCK HARDENED ON-BOARD DATA ACQUISITION SYSTEM
TOPIC# 139 OFFICE: NSWC IDENT#: 35925

SUBMITTED BY

THE OBJECTIVE OF THIS PROGRAM IS TO DEVELOP A COMPACT, RUGGED, TWELVE-CHANNEL (MINIMUM) DIGITAL DATA ACQUISITION SYSTEM CAPABLE OF MEASURING AND RECORDING SHOCK EXPERIENCES ASSOCIATED WITH WEAPON DELIVERY AND USE. THE SYSTEM MAY BE MODULAR, BUT EACH MODULE MUST CONTAIN FOUR DATA CHANNELS AND BE NO LONGER THAN 2.5 INCHES MAXIMUM DIMENSION. MECHANICAL DESIGN OF THE SYSTEM MUST BE SUCH THAT IT WILL OPERATE UNDER EXTREMES OF SHOCK, VIBRATION, PRESSURE, TEMPERATURE, AND HUMIDITY. SAMPLE RATES OF 10 KHz AND 200 Hz ARE REQUIRED WITH SUFFICIENT MEMORY TO RECORD 400 ms OF 12-BIT DATA PER CHANNEL AT THE MAXIMUM SAMPLE RATE (I.E., 4000 SAMPLES OF 12 BITS EACH). EACH DATA CHANNEL SHALL HAVE INDEPENDENT, SOFTWARE-SELECTABLE TRIGGERING CRITERIA. PRE-TRIGGER DATA CAPTURE OF REFERENCE BASELINE IS REQUIRED. DATA RETRIEVAL SHALL BE COMPATIBLE WITH AN IBM PC/AT OR COMPATIBLE MICROCOMPUTER. THE SYSTEM SHALL BE POWERED BY INTERNAL BATTERIES AND BE CAPABLE OF RETAINING ACQUIRED DATA FOR A MINIMUM OF ONE MONTH. THE PROPOSED SYSTEM SHALL DIGITIZE ANALOG SIGNALS TO 12-BIT DIGITAL WORDS AT PROGRAMMABLE SAMPLE RATES FROM 200 SAMPLES PER SECOND (OR LESS) TO 10,000 SAMPLES PER SECOND (OR MORE).

KVH INDUSTRIES INC
850 AQUIDNECK AVE
MIDDLETOWN, RI 02840
CONTRACT NUMBER:
A H KITS van HEYNINGEN
TITLE:
AUTOMATIC CALIBRATION ELECTROMAGNETIC FLUXGATE AIRCRAFT SENSOR SYSTEM
TOPIC# 78 OFFICE: NAVAIR IDENT#: 36412

KVH INDUSTRIES PROPOSES TO DEVELOP A TOP LEVEL DESIGN FOR AN ELECTROMAGNETIC FLUXGATE AIRCRAFT SENSOR, WITH AN AUTOMATIC CALIBRATION CAPABILITY. THE PROPOSED ELECTROMAGNETIC SENSOR WILL CONNECT TO AN INTERFACE BOX COMPATIBLE WITH MIL-STD 1553 REQUIREMENTS. IT WILL FUNCTIONALLY AND PHYSICALLY REPLACE THE MAGNETIC SENSORS ON THE U.S. NAVY'S MA-1, S/AHRS, EXISTING AIR FORCE SYSTEMS AND THE PROPOSED C/AHRS. THE MAGNETIC HEADING REFERENCE SYSTEM WILL HAVE A SYSTEM HEADING ACCURACY OF .5 DEGREES. THE SYSTEM WILL BE INHERENTLY

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DIGITAL IN DESIGN WITH BUILD-IN-TEST CAPABILITY AND A SENSOR CONCEPT WHICH INCORPORATES DUAL SIMULTANEOUS CIRCUITS FOR COMPENSATION; A HELMHOLTZ CAGE FOR HARD IRON FIELD COMPENSATION, AND SOFTWARE TO COMPENSATE FOR SOFT IRON AND OTHER EFFECTS. RESEARCH WILL FOCUS ON DETERMINING THE MAGNITUDE AND ORIENTATION OF COMPENSATION VECTORS FOR THE HELMHOLTZ CAGE AND SOFTWARE COMPENSATION CIRCUITS (1) FOR TOTALLY MAGNETIC COMPENSATION REQUIRING ONLY A 360 DEGREE TURN OF THE AIRCRAFT (2) THROUGH COMPARISON WITH THE AIRCRAFT'S PRIMARY INERTIAL NAVIGATION SYSTEM. A PRINCIPAL DESIGN OBJECTIVE OF THIS EFFORT WILL BE TO ELIMINATE THE REQUIREMENT FOR AN AIRCRAFT TO BE TAKEN TO A SURVEYED COMPASS ROSE TO ACCOMPLISH COMPENSATION.

L.N.K. CORP INC
6811 KENILWORTH AVE - STE 306
RIVERDALE, MD 20737
CONTRACT NUMBER:
DR JOSEPH N CRAIG
TITLE:
TRANSIENT ACOUSTIC ANALYSIS UTILIZING QUADRATIC SIGNAL REPRESENTATIONS AND NEUTRAL NETWORKS
TOPIC# 85 OFFICE: NAVSEA IDENT#: 36508

RECENT SOVIET ADVANCES IN ACOUSTIC QUIETING OF SUBMARINES IS PLACING INCREASED EMPHASIS ON THE EXPLOITATION OF PASSIVE INTERMITTENT AND TRANSIENT EMISSIONS. TRANSIENT SIGNALS CAN BE DESCRIBED EFFICIENTLY IN THE TIME--FREQUENCY PLANE USING THE WIGNER DISTRIBUTION OR IN THE CYCLIC SPECTRUM. BOTH OF THESE REPRESENTATIONS OFFER DISTINCT ADVANTAGES OVER SHORT-TIME FOURIER OR SPECTRAL ANALYSIS FOR TRANSIENT SIGNALS. NEURAL NETWORK TECHNOLOGY HAS EMERGED RECENTLY AS A PROMISING TOOL FOR BUILDING SIGNAL CLASSIFICATION SYSTEMS. NEURAL NETWORKS HAVE THE ABILITY TO GENERATE THE COMPLEX (AND OFTEN NON-LINEAR) FEATURE TO SIGNAL CLASS MAPPINGS THAT ARE REQUIRED TO SOLVE ALL BUT THE SIMPLEST PROBLEMS. NEURAL NETWORKS ARE CAPABLE OF SELF ORGANIZATION TO CONSTRUCT DECISION FUNCTIONS, AND TO HAVE THE ABILITY TO LEARN ON-LINE. LNK PROPOSES TO USE QUADRATIC SIGNAL REPRESENTATIONS SUCH AS THE WIGNER DISTRIBUTION AND THE CYCLIC SPECTRUM TO PROVIDE INPUTS TO NEURAL NETWORKS THAT WILL CLASSIFY TRANSIENT SIGNALS TYPICAL OF THOSE ENCOUNTERED IN THE UNDERSEA ENVIRONMENT. THE OVERALL SYSTEM CONCEPTS AND TECHNIQUES WILL BE DEVELOPED AND

SUBMITTED BY

TESTED IN PHASE I. A COMPLETE PROTOTYPE SYSTEM WILL BE DEVELOPED IN PHASE II.

LAGUNA RESEARCH LAB
3015 RAINBOW GLEN
FALLBROOK, CA 92028
CONTRACT NUMBER:
HENDRICUS G LOOS
TITLE:
SEAWATER SPRAY NOZZLE
TOPIC# 91 OFFICE: NAVSEA IDENT#: 36550

A NOVEL APPROACH TO A NON-CLOGGING SEAWATER SPRAY NOZZLE IS PROPOSED. IN THIS APPROACH, THE ORIFICE IN THE USUAL SENSE IS ELIMINATED, AND ANOTHER MECHANISM IS USED TO GIVE THE WATER BODY THE SMALL DIMENSION NECESSARY FOR THE PRODUCTION OF DROPLETS OF THE DESIRED SIZE. DURING PHASE I THE FEASIBILITY OF THE APPROACH WILL BE INVESTIGATED, AND A BASIS WILL BE LAID FOR FURTHER RESEARCH AND DEVELOPMENT IN PHASE II. A BREADBOARD WILL BE DESIGNED AND BUILT, AND PROOF OF CONCEPT TESTS WILL BE CONDUCTED. SINCE THE NON-CLOGGING FEATURE IS ASSURED BY THE ABSENCE OF NARROW FLOW PASSAGES IN THE DEVICE, THE PHASE I PROOF OF CONCEPT TEST WILL CONCERN THE CAPABILITY OF THE BREADBOARD TO PRODUCE THE DESIRED AVERAGE DROP SIZE AT THE DESIRED WATER FLOW RATE.

LASER-GENIC CORP
PO BOX 611330
SAN JOSE, CA 95161
CONTRACT NUMBER:
DR RICHARD SCHLECHT
TITLE:
FIBER SENSORS FOR EXPLOSIVE ENVIRONMENTS
TOPIC# 102 OFFICE: NAVSEA IDENT#: 36702

EXTREMELY HARSH ENVIRONMENTS EXIST IN UNDERWATER EXPLOSIVES RESEARCH AND TESTING. IN ORDER TO MONITOR KEY PHYSICAL PARAMETERS IN THESE ENVIRONMENTS, IT WILL BE NECESSARY TO DEVELOP NEW CONCEPTS IN SENSOR DESIGN TO MEASURE SUCH THINGS AS TEMPERATURE AND ACOUSTIC PRESSURE.

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PRESENT DAY SENSORS WILL NOT OPERATE RELIABLY IN THIS ENVIRONMENT. FIBER OPTIC SENSORS OFFER A POSSIBLE SOLUTION TO THIS PROBLEM. HOWEVER, PRESENT FIBERS OF GLASS OR SILICA ARE NOT ABLE TO WITHSTAND THE TEMPERATURES AND PRESSURES THAT EXIST. LASER-GENICS CORPORATION IS PROPOSING TO INVESTIGATE SINGL CRYSTAL FIBERS OF SAPPHIRE AND YAG FOR THIS APPLICATION. THESE MATERIALS CAN WITHSTAND THE HARSH ENVIRONMENT THAT WILL EXIST IN THIS RESEARCH. WE ARE PROPOSING A UNIQUE APPROACH THAT WOULD ALLOW THE MEASURMENT OF BOTH TEMPERATURE AND ACOUSTIC PRESSURE WITH A SINGLE FIBER OPTIC. THIS CONCEPT WILL BE TESTED DURING THE PHASE I EFFORT. FOR THE PHASE II EFFORT WE WILL DETERMINE SENSOR AND DATA TRANSMISSION LINK DESIGN CHARACTERISTICS USABLE IN EXPLOSIVE EXPERIMENTS.

LIFE-CELL CORP
3606-A RESEARCH FOREST DR
THE WOODLANDS, TX 77381
CONTRACT NUMBER:
DR S RANDOLPH MAY
TITLE:
HUMAN RED BLOOD CELL FREEZING WITH AND WITHOUT METABOLIZABLE CRYOPRESERVATIVES MOLECULAR DISTILLATION DRYING STORAGE AND...
TOPIC# 69 OFFICE: NSSC IDENT#: 36256

A GOAL OF ERYTHROCYTE HYPOTHERMIC PRESERVATION IS TO DEVELOP A NONTOXIC, METABOLIZABLE CRYOPROTECTANT TO DECREASE THE INHERENT CYTOTOXICITY AND TO MINIMIZE OR ELIMINATE THE COSTLY AND TIME CONSUMING CELL WASHING PROCEDURES POSTTHAW. WE PROPOSE THAT CRYOPROTECTANTS BE ELIMINATED OR USED AT MINIMAL CONCENTRATIONS BY VITRIFYING (FREEZING WITHOUT ICE CRYSTALS) RED CELLS BY ULTRARAPID COOLING, AND THEN BY ELIMINATING THE AMORPHOUS PHASE WATER BY MOLECULAR DISTILLATION DRYING AT 10 MINUS 8 MBAR VACUUM WITH SLOW PROGRAMMED TEMPERATURE INCREASES TO YIELD DRY, ROOM TEMPERATURE RED CELLS SUITABLE FOR REHYDRATION AND TRANSFUSION. EXPERIMENTS WILL BE UNDERTAKEN TO DETERMINE THE OPTIMUM METHOD OF CELL VITRIFICATION AND WHETHER CRYOPROTECTION AND DRYING PROTECTION IS NEEDED, WHETHER UNIFORMITY OF MEMBRANE COMPOSITION CAN BE MAINTAINED AND OSMOTIC STRESS MINIMIZED, AND WHETHER PRESTRESSING THE CELLS THERMALLY OR OSMOTICALLY MIGHT AID THEIR ABILITY TO SURVIVE DRYING. ALTERNATIVE PRESERVATION CONDITIONS WILL BE TESTED, AND THEN THE MORPHOLOGY AND

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STRUCTURE OF THE CELLS WILL BE DETERMINED BY LIGHT MICROSCOPY AND TRANSMISSION ELECTRON MICROSCOPY OF WHOLE SAMPLES AND SCANNING ELECTRON MICROSCOPY OF WHOLE AND FREEZE-FRACTURED SAMPLES. TESTS WILL ALSO BE MADE OF MEMBRANE INTEGRITY AND BIOCHEMICAL FUNCTIONALITY OF THE CELLS POSTPRESERVATION.

LIGHTBUS TECHNOLOGY INC
600 GOODWIN DR
RICHARDSON, TX 75081
CONTRACT NUMBER:
PETER R FENNER
TITLE:
AN ADDRESSING TECHNIQUE FOR U.S. NAVY TRAFFIC IN A MULTIMEDIA ENVIRONMENT
TOPIC# 37 OFFICE: SPAWAR IDENT#: 36933

PROPOSES DEVELOPMENT OF A ROUTINE TABLE ACCESS METHOD WHICH TREATS NETWORK ADDRESSES AS VARIABLE LENGTH OCTET STRINGS WITHOUT INTERNAL STRUCTURE 0 I.E. AS FLAT ADDRESSE - TO SIMPLIFY THE HANDLING OF MOBIL END-SYSTEM SIMULTANEOUSLY CONNECTED TO MULTIPLE ACCESS POINTS. SPECIFIC ROUTING TABLE ACCESS AND MANAGEMENT TECHNIQUES ARE PROPOSED WHICH ALLOW RAPID ACCESS IN A SINGLE PROBE WHILE LIMITING THE SIZE OF THE TABLE TO THE CURRENTLY ACTIVE NETWORK ADDRESSES. HIERARCHICAL, FLAT, PHYSICAL, LOGICAL OR A MIXTURE OF ADDRESS STRUCTURES ARE ALL ACCESSED WITH EQUAL EASE USING THE SAME PROCESS. MULTI-CAST MESSAGE ROUTING IS EFFICIENTLY PROCESSED.

LIN-COM CORP
300 W MAIN ST - STE 215
NORTHBORO, MA 01532
CONTRACT NUMBER:
DAVID CHASE
TITLE:
ARCHITECTURE DEFINITION FOR THE MULTINET CONTROLLER
TOPIC# 46 OFFICE: SPAWAR IDENT#: 36989

THE OBJECTIVES OF THIS PROJECT ARE TO PROVIDE A COMPLETE HARDWARE

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AND SOFTWARE SPECIFICATION FOR A MULTINET CONTROLLER TO MEET THE NEEDS OF THE UNT AND CSS PROGRAMS. THE MULTINET CONTROLLER (MC) UNIT REQUIREMENTS WILL BE ESTABLISHED THROUGH AN EVALUATION OF OVERALL UNT SYSTEM REQUIREMENTS. THESE UNIT REQUIREMENTS WILL THEN BE USED TO DEFINE AN ARCHITECTURE WHICH IS ABLE TO MEET CURRENT UNT PERFORMANCE GOALS AND CAN BE EASILY EXTENDED TO SUPPORT FUTURE GROWTH AND ADAPTATION TO NEW REQUIREMENTS. OFF-THE-SHELF HARDWARE AND SOFTWARE DEVELOPMENT TOOLS WHICH MEET THE ESTABLISHED PERFORMANCE AND ENVIRONMENTAL REQUIREMENTS WILL BE SELECTED TO SUPPORT A PHASE II MC DEVELOPMENT EFFORT. PRELIMINARY SOFTWARE SPECIFICATIONS WILL BE GENERATED FOR ALL EMBEDDED SOFTWARE FUNCTIONS TO BE DEVELOPED USING THE ADA PROGRAMMING LANGUAGE. A COMPLETE DEVELOPMENT PLAN FOR THE PHASE II HARDWARE AND SOFTWARE DEVELOPMENT OF THE MC WILL BE GENERATED.

LINKNET
710 SILVER SPUR RD - STE 285
ROLLING HILLS EST, CA 90274
CONTRACT NUMBER:
DR JAMES R YEE
TITLE:
ADAPTIVE INTERNET GATEWAY LOCATION ALGORITHMS FOR NAVAL COMMAND AND CONTROL SYSTEMS
TOPIC# 36 OFFICE: SPAWAR IDENT#: 36927

THE OBJECTIVE OF THE PROPOSED EFFORT IS TO DEVELOP ADAPTIVE GATEWAY LOCATION ALGORITHMS FOR NAVAL COMMAND AND CONTROL SYSTEMS. THE ALGORITHMS ARE APPLICABLE TO EFFICIENTLY LINK THE EXISTING OPERATIONAL HIGH-FREQUENCY (HF) NETWORKS WITH THE ULTRA-HF (UHF) SATELLITE NETWORK. THE INNOVATION CONTAINED IN THIS PROPOSAL LIED IN TWO AREAS. FIRST THE ALGORITHMS DETERMINE A SET OF GATEWAYS THAT MINIMIZES THE END-TO-END AVERAGE DELAY BETWEEN THE INTERNET ORIGIN-DESTINATION PAIRS FOR A GIVEN LEVEL OF OVERHEAD TRAFFIC. SECOND THE COMPUTATIONAL EFFICIENCY OF THE ALGORITHMS INDICATES THAT THEY CAN BE IMPLEMENTED IN REAL-TIME FOR TACTICAL NAVAL ENVIRONMENTS. TO THE BEST OF OUR KNOWLEDGE, THESE ARE THE ONLY AVAILABLE GATEWAY LOCATION ALGORITHMS THAT ARE DIRECTLY APPLICABLE TO THE NAVAL PROBLEM. THE MATHEMATICAL MODEL LEADING TO THE ALGORITHMS WILL INCLUDE THE CASES WHERE THE DELAYS ARE MONOTONICALLY INCREASING CONVEX FUNCTIONS OF

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THE TRAFFICE ON THE LINKS AND THAT THE CAPACITIES OF THE GATEWAYS ARE DESIGN VARIABLES. SPECIFIC RESEARCH DIRECTIONS ARE INDICATED TO SUPPORT COMPLICATED SCENARIOS SUCH AS DISTRIBUTED COMPUTATION FOR SURVIVABILITY.

LINKNET
710 SILVER SPUR RD - STE 285
ROLLING HILLS EST, CA 90274
CONTRACT NUMBER:
DR EZIO BIGLIERI
TITLE:
MULTIDIMENSIONAL SIGNALS AND HIGHLY PARALLEL DECODING ARCHITECTUR FOR SATELLITE COMMUNICATIONS
TOPIC# 57 OFFICE: SPAWAR IDENT#: 37074

BANDWIDTH- AND POWER-EFFICIENT CODING/MODULATION SCHEMES ARE REQUIRED TO INCREASE THE RELIABLE COMMUNICATIONS THROUGHPUT OF NAVAL UHF SATELLITE COMMUNICATIONS SYSTEMS. THE OBJECTIVE OF THIS EFFORT IS TO DEVELOP SUCH SCHEMES BASED ON A TRELLIS CODED MODULATION APPROACH USING A MULTIDIMENSIONAL SIGNAL SET. THE CAPACITY INCREASE DERIVED FROM LARGER CODING GAINS IS MAXIMIZED BY EFFICIENT USE OF THE AVAILABLE POWER AND BANDWITH. THE HIGHER DECODING COMPLEXITY IS HANDLED BY DEVELOPING HIGH THROUGHPUT PARALLEL SYSTOLIC ARRAY DECODER ARCHITECTURES THAT ARE SUITABLE FOR VLSI IMPLEMENTATION.

LJF CORP
411 S LONDON AVE
EGG HARBOR CITY, NJ 08215
CONTRACT NUMBER:
JAMES L FOY
TITLE:
LOW COST NIGHT VISION GOGGLES FOR SIMULATION
TOPIC# 186 OFFICE: NTSC IDENT#: 37732

WE WILL STUDY AVAILABLE DISPLAY DEVICES TO PROVIDE LOW COST SIMULATION CAPABILITY FOR NIGHT VISION GOGGLE (NVG) TRAINING. THE STUDY WILL INCLUDE, BUT WILL NOT BE LIMITED TO MINIATURE CRTS,

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OPTICAL SIMULATION SUING VIDEO PROJECTED IMAGERY, AND THE USE OF OPERATIONAL NVGS IN CONJUNCTION WITH THE LJF-DESIGN RUSCHE-INTANO PROJECTOR (RIP). THE RIP IS PRESENTLY USED TO PROJECT NEAR-IR VIDEO IMAGES WHICH LOOK VERY REALISTIC WHEN VIEWED THROUGH SECOND OR THRID GENERATION NVGS.

LNR COMMUNICATIONS INC
180 MARCUS BLVD
HAUPPAUGE, NY 11788
CONTRACT NUMBER:
R GORDON
TITLE:
TRANSPORTABLE RF SIMULATOR FOR ESM TEST/TRAINING APPLICATION
TOPIC# 115 OFFICE: NAVSEA IDENT#: 36872

AN RF SIMULATION SYSTEM THAT CAN BOTH TEST ELECTRONIC SUPPORT MEASURE (ESM) RECEIVING SYSTEMS AND TRAIN ESM OPERATORS WOULD HAVE MANY ADVANTAGES. THE EQUIPMENT WOULD HAVE TO PRODUCE MULTIPE RF SIGNALS TO TEST RECEIVER FRONT ENDS AS WELL AS SIMULATE A RADAR THREAT ENVIRONMENT TO TRAIN THE OPERATORS. THE NAVY NOW USES THE TRAINING AND MAINTENANCE SYSTEM (TRAMS) FOR THE LATTER PURPOSE. THIS SYSTEM IS ONLY CAPABLE OF DELIVERING BASEBAND VIDEO OUTPUTS WITH DIGITAL SIGNAL INFORMATION. IT CAN TRAIN OPERATORS, BUT IT CANNOT TEST RECEIVER FRONT ENDS. A TRANSPORTABLE RF SIMULATOR IS PROPOSED TO COMPLIMENT TRAMS AND RESULT IN A COMPLETE RF TEST/TRAINING SYSTEM. THIS TRANSLATABLE RF SIMULATOR WILL OPERATE ON ONE OR MORE BASEBAND SIGNALS AND TRANSLATE THEM INTO THE 2 TO 28 GHz RANGE. IT WILL BE A TRANSPORTABLE SYSTEM THAT CAN BE PROGRAMMABLE, WITH RESPECT TO SIGNAL TYPE, QUANTITY LEVEL AND FREQUENCY. THE PROPOSED PHASE I TRANSPORTABLE RF SIMULATOR PROGRAM WILL ENTAIL THE GENERATION AN COMPARISON OF ALTERNATIVE ARCHITECTURES AS WELL AS SPECIFIC MODULATION AND FREQUENCY CONVERSION ELEMENTS, CONTROLS AND DISPLAYS, LEADING TO A PREFERRED CONFIGURATION AND DESIGN SPECIFICATION WHICH WILL FORM THE BASIS OF A PHAS II FOLLOW ON PROPOSAL.

LOGI-TECH ENGINEERING RESOURCES INC
2231 CRYSTAL DR - STE 707
ARLINGTON, VA 22202
CONTRACT NUMBER:
JOHN H HURD JR
TITLE:
WARFARE SYSTEMS ARCHITECTURE (COMMAND AND CONTROL)
TOPIC# 17 OFFICE: SPAWAR IDENT#: 37279

SUBMITTED BY

DRAMATIC INCREASES IN INFORMATION SYSTEM CAPABILITIES AND SUBSTANTIAL REDUCTIONS IN THEIR COSTS COMPARED TO REMOTE WIRELESS COMMUNICATIONS IS A POWERFUL ARGUMENT FOR A REVISED ARCHITECTURE CONCEPT FOR C2 INFORMATION MANAGEMENT. REDUCING ON-LINE, INTER-PLATFORM DATA TRANSMISSION REQUIREMENTS THROUGH COST-EFFECTIVE MANAGEMENT OF INFORMATION IS NOW POSSIBLE. APPLICATION OF THE INFORMATION MANAGEMENT METHODOLOGY TO THE STORAGE, RETRIEVAL, AND TIMELY PRESENTATION OF COHERENT TACTICAL PICTURES WILL BE IMPORTANT BY-PRODUCTS OF THE EFFORT TO REDUCE THE COMMUNICATIONS LOADING. PROPER INFORMATION MANAGEMENT CAN ELIMINATE THE REDUNDANT USE OF INFORMATION IN DATA FUSION AND CAN OFTEN FLAG INFORMATION NON-AVAILABILITY WHEN IT OCCURS. THE OBJECTIVES ARE: FIRST, TO ESTABLISH C2 INFORMATION REQUIREMENTS THAT SATISFY THE C2 NEEDS OF THE WARFARE MISSION AREAS; AND SECOND, TO CREATE AND PLAN THE IMPLEMENTATION OF PHASED ARCHITECTURE OPTIONS TO MANAGE THAT INFORMATION. THE PROCESS FOR ACHIEVING THE OBJECTIVES IS: TO ESTABLISH A CONCEPT FOR A SET OF TIME-PHASED ARCHITECTURE OPTIONS THAT LEAD TO THE SATISFACTION OF TOP-LEVEL WARFARE REQUIREMENTS FOR C2 INFORMATION MANAGEMENT; AND TO CREATE A PLAN THAT WILL PROVIDE FOR THE TRANSITION FROM THE BASELINE ARCHITECTURE TO THE PREFERRED ARCHITECTURE OPTIONS.

LUXTRON CORP
1060 TERRA BELLA AVE
MOUNTAIN VIEW, CA 94043
CONTRACT NUMBER:
DR MEI H SUN
TITLE:
FIBEROPTIC SONAR DOME PRESSURE TRANSDUCER
TOPIC# 156 OFFICE: NSWC IDENT#: 36084

THE HIGHEST PERFORMANCE PRESSURE SENSORS PRESENTLY IN USE UTILIZE A VIBRATING QUARTZ CRYSTAL TUNING FORK AS THE SENSOR. THE TUNING FORK IS DRIVEN ELECTRICALLY AT ITS RESONANT FREQUENCY WHICH SHIFTS IN PROPORTION TO PRESSURE APPLIED TO IT. QUARTZ TUNING FORKS ARE ALSO USED AS TIMING ELEMENTS IN ELECTRONIC WATCHES. STANDARD MICRO-ELECTRONIC FABRICATION TECHNIQUES ARE WELL DEVELOPED AND HIGHLY REPRODUCIBLE QUARTZ OSCILLATORS CAN BE FABRICATED AT REASONABLE COST. PRESSURE SENSORS OF THIS TYPE EXHIBIT EXTREME STABILITY, WIDE DYNAMIC

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RANGE, EXCELLENT LINEARITY AND VERY HIGH PRECISION. SUCH SENSORS ARE PRESENTLY MANUFACTURED FOR RUGGED USES SUCH AS IN DEEP SEA, AEROSPACE AND DOWNHOLE MEASUREMENTS. THE PROPOSED FIBEROPTIC SENSOR IS THE OPTICAL ANALOG OF THIS PRESSURE SENSOR. IT'S OSCILLATOR CIRCUITRY IS POWERED BY LIGHT FROM AN LED. A SECOND LIGHT BEAM, SHUTTERED BY THE VIBRATING TINES OF THE TUNING FORK, DETECTS THE SHIFT IN FREQUENCY OF OSCILLATION. SINCE THE MEASUREMENT IS INHERENTLY "DIGITAL", IT IS INSENSITIVE TO INTENSITY CHANGES. THE PROGRAM WILL FOCUS ON OPTICAL AND MECHANICAL DESIGN OF THE SENSOR AND DESIGN OF THE OPTOELECTRONICS PACKAGE TO POWER AND MEASURE THE FREQUENCY SHIFT OF THE SENSOR.

MACH I INC
346 E CHURCH RD
KING OF PRUSSIA, PA 19406
CONTRACT NUMBER:
CHARLES B CRINER
TITLE:
PRODUCTION AND COATING OF PURE BORON POWDERS
TOPIC# 7 OFFICE: ONR IDENT#: 37564

THIS PROJECT COMBINES TWO INNOVATIVE TECHNOLOGIES. IT PROPOSES A NEW METHOD TO SYNTHESIZE HIGH PURITY BORON POWDER AND ALSO APPLIES ITS PROPRIETARY PROCESS OF COATING BORON WITH MAGNESIUM USING PHYSICAL VAPOR TECHNOLOGY. THE HIGHEST PURITY BORON CURRENTLY AVAILABLE FOR MILITARY AND AEROSPACE USE COMES FROM A WEST GERMAN SUPPLIER. A DOMESTIC SOURCE FOR THIS POTENTIALLY STRATEGIC FEEDSTOCK WOULD BE IN THE STRATEGIC BEST INTEREST OF THE UNITED STATES. THE USE OF BORON AS A METAL FUEL COMPONENT IN EXPLOSIVES, SOLID ROCKET PROPELLANTS OR SOLID RAMJET COMBUSTION ENGINES IS INHIBITED BY BORON OXIDE FORMED ON ITS SURFACE. A THIN COAT OF REACTIVE MAGNESIUM METAL ON THE BORON PARTICLES SURFACE WILL ASSIST ITS COMBUSTION PARAMETERS. IN UNDERWATER EXPLOSIVES, THE MAGNESIUM WILL ALSO CONTRIBUTE TO THE FORMATION OF THE GAS BUBBLE WHICH PROVIDES SHOCK AND PRESSURE EFFECTS. THE MAGNESIUM COATED BORON WOULD BE ADDED TO OR PARTIALLY REPLACE THE ALUMINUM FUEL. THE COATING OF BORON WITH MAGNESIUM MAY CREATE A MORE EFFICIENT FUEL THAN BORON/MAGNESIUM POWDER ENERGY MIXTURE. THE REACTIVELY, BURNING RATE AND COMBUSTION OF THE BORON POWDER SHOULD BE IMPROVED BY A THIN PROTECTIVE COATING OF METALLIC

SUBMITTED BY

MAGNESIUM.

MARK RESOURCES INC
2665 - 30TH ST/STE 200
SANTA MONICA, CA 90405
CONTRACT NUMBER:
RICHARD L MITCHELL
TITLE:
ALTITUDE MEASUREMENT IN HIGH-VELOCITY LOW-ALTITUDE VEHICLES
TOPIC# 184 OFFICE: PMTC IDENT#: 37998

WE DESCRIBE TWO APPROACHES FOR MEASURING THE ALTITUDE OF A LOW-FLYING, HIGH-VELOCITY MISSILE ABOVE THE OCEAN SURFACE WITH A REMOTE RADAR. THE MEASUREMENTS ARE MADE BY FIRST RESOLVING THE DIRECT RETURN FROM THE MISSILE AND THE REFLECTIONS FROM THE OCEAN SURFACE. BECAUSE THE OCEAN SURFACE IS NOT A STATIONARY AND IDEAL MIRROR REFLECTOR, IT WILL NOT BE POSSIBLE TO USE CONVENTIONAL RADAR SIGNAL PROCESSING TO MAKE THESE MEASUREMENTS. HOWEVER, MARK RESOURCES HAS DEVELOPED NEW PROCESSING TECHNOLOGIES THAT ARE ESPECIALLY WELL SUITED FOR THIS PROBLEM. THE FIRST EXTENSION TO CONVENTIONAL RADAR SIGNAL PROCESSING IS TARGET MOTION RESOLUTION (TMR) PROCESSING, WHICH IS ESSENTIALLY SLIDING-WINDOW DOPPLER PROCESSING. IT ALLOWS ONE TO STABILIZE TARGET MOTION AND TO RESOLVE INDIVIDUAL SCATTERERS ON THE TARGET. IT IS VERY POWERFUL FOR TRACKING AND IMAGING SIMPLER TARGETS, SUCH AS MISSILES. THE DEVELOPMENT OF OUR SECOND EXTENSION TO RADAR SIGNAL PROCESSING BEGAN EIGHT YEARS AGO UNDER FUNDING BY AIR FORCE WRIGHT AERONAUTICAL LABORATORY (AFWAL) AND LATER DARPA. ALTHOUGH THIS ADAPTIVE SCATTERER MEASUREMENTS (ASM) TECHNOLOGY HAS BEEN DIRECTED TOWARDS TARGET IDENTIFICATION, IT IS COMPLETELY GENERAL, SO THAT IT APPLIES TO ALL RADAR PROBLEMS WHERE HIGH RESOLUTION IS INVOLVED, SUCH AS THE SUBJECT OF THIS SOLICITATION. WE HAVE ALREADY DEMONSTRATED VERY HIGH MEASUREMENT PERFORMANCE WITH BOTH TMR AND ASM IN SIMILAR APPLICATIONS. DURING PHASE I WE PLAN TO DEMONSTRATE THE POTENTIAL PERFORMANCE FOR MEASURING TARGET ALTITUDE BY PROCESSING ACTUAL RADAR DATA.

MARKO MATERIALS INC
144 RANGEWAY RD
NORTH BILLERICA, MA 01862
CONTRACT NUMBER:
DR T ARUL MOZHI
TITLE:
AUTOMATED HULL POTENTIAL MEASUREMENT SYSTEM USING A Ag/AgCl REFERENCE ELECTRODE AND A MICROCOMPUTER
TOPIC# 189 OFFICE: NCSC IDENT#: 37752

SUBMITTED BY

NAVY IS SEEKING DEVELOPMENT OF A PORTABLE, SELF-CONTAINED HULL POTENTIAL MEASUREMENT SYSTEM THAT CAN BE MOUNTED BY A DIVER WHILE THE SHIP IS IN PORT AND THAT MEASURES ELECTROLYSIS ACTIVITY WHILE THE SHIP IS UNDERWAY. MONITORING THE CORROSION POTENTIAL OF A CORRODING METAL/SOLUTION INTERFACE CAN GIVE INFORMATION ON THE RATE AND MECHANISM OF THE LOSS OF METAL AT THAT INTERFACE. BUT TRANSIENT GALVANIC ACTIVITY ASSOCIATED WITH THE PROCESSING OF CLEANING TO BARE METAL, MAKES CORROSION POTENTIAL MEASUREMENTS ON MARINE STRUCTURES DIFFICULT. IN ADDITION, POTENTIAL FIELDS ARE KNOWN TO RESPOND TO FLUID VELOCITIES, THEREFORE, MEASUREMENTS TAKEN IN PORT WILL NOT REFLECT THE SHIPS CONDITION WHILE IT IS UNDERWAY. WE PROPOSE TO MONITOR THE CORROSION POTENTIAL OF CARBON STEEL USED AS THE HULL IN 3.5 WT% NaCl USING A Ag/AgCl INTERNAL REFERENCE ELECTRODE USING A MICROCOMPUTER. WE WILL ALSO DETERMINE THE CORROSION POTENTIAL AS A FUNCTION OF SPEED (0-20 FT/S), SALINITY (0-04 WT% NaCl) AND TEMPERATURE (0-100 DEG C). WE WILL USE THIS DATA, ALONG WITH EXISTING DATA-BASE ON THE CARBON STEEL-SEAWATER SYSTEM AND THEORETICAL EQUATIONS TO WRITE AN INTERACTIVE COMPUTER PROGRAM TO RUN IN THE MICROCOMPUTER. THIS PROGRAM WILL DETERMINE WHETHER ELECTROLYSIS ACTIVITY ARE WITHIN ACCEPTABLE LIMITS BASED ON THE MEASURED CORROSION POTENTIAL, AND KNOWN SPEED, SALINITY AND SEAWATER TEMPERATURE. THE PROPOSED WORK WILL BE PERFORMED IN COLLABORATION WITH DR. DIGBY MACDONALD OF SRI INTERNATIONAL.

MARTINGALE RESEARCH CORP
100 ALLENTOWN PKWY - STE 211
ALLEN, TX 75002
CONTRACT NUMBER:
DR ROBERT L DAWES
TITLE:
TARGET RECOGNITION TRACKING AND RESPONSE WITH NEURAL NETWORK KALMAN-BUCY FILTERS
TOPIC# 160 OFFICE: NSWC IDENT#: 36132

THE PROPOSED RESEARCH WILL INCORPORATE THE PARAMETRIC AVALANCHE NEURAL NETWORK ARCHITECTURE INTO A MAXIMUM LIKELIHOOD DETECTION AND TRACKING ALGORITHM FOR USE IN AUTONOMOUS WEAPON SYSTEMS. THE PARAMETRIC AVALANCHE WILL PERFORM O(1) SEARCH IN ITS STORED PATTERN

SUBMITTED BY

FEATURES TO IDENTIFY THE TARGET AND ITS MOTION EQUATIONS, AFTER WHICH IT WILL TRACK THE TARGET. A SECOND PARAMETRIC AVALANCH WILL USE THE STATE ESTIMATES FROM THE FIRST, TOGETHER WITH A REFERENCE TRAJECTORY SUPPLIED PERHAPS BY AN EXPERT SYSTEM, TO GENERATE CONTROL SIGNALS FOR GUIDANCE OF THE AUTONOMOUS WEAPON SYSTEM. THE PARAMETRIC AVALANCHE IS A RECURRENT TWO-LAYER NEURAL NETWORK WHICH EMPLOYS A PROPRIETARY TECHNIQUE FOR UNSUPERVISED LEARNING OF AN INTERNAL MODEL OF OBSERVED DYNAMICAL SYSTEMS AND SUBSEQUENTLY EMPLOYING THAT MODEL IN A CONTINUOUS BAYESIAN ESTIMATOR (GENERALIZING THE KALMAN-BUCY FILTER). THE ARCHITECTURE EMPLOYS A NOVELTY FILTER TO WHITEN THE PREDICTABLES IN THE SCENE, AND IT NEEDS NO A-PRIOR KNOWLEDGE OF STRUCTURE IN THE SCENE, SO THAT IT CAN IN PRINCIPLE INTEGRATE SENSOR INPUTS FROM VARIOUS SOURCES. TRACKING TAKES PLACE SUBLIMINALLY UNTIL CONTINUOUS LIKELIHOOD REINFORCEMENT TRIGGERS DETECTION.

MASSA PRODUCTS CORP
280 LINCOLN ST
HINGHAM, MA 02043
CONTRACT NUMBER:
DONALD P MASSA
TITLE:
ACTIVE SONAR RANGE DOPPLER NORMALIZATION FOR LARGE CONTINUOUS WAV (CW) TRANSMISSION
TOPIC# 52 OFFICE: SPAWAR IDENT#: 37033

AN ACTIVE SONAR SYSTEM IS PROPOSED THAT WILL ELIMINATE THE ADVERSE EFFECTS OF REVERBERATION IN LONG CONTINUOUS WAVE (CW) ACOUSTIC TRANSMISSIONS. THE UNIQUE SYSTEM EMPLOYS A CIRCLE DETECTOR PROCESSOR THAT WILL DETECT A TARGET WITH A SMALL DOPPLER SHIFT EVEN WHEN IT IS BURIED IN REVERBERATIONS WITH THE SIGNAL TO NOISE RATIO AS LOW AS -26 dB.

MATERIALS SCIENCES CORP
GWYNEDD PLAZA II - BETHLEHEM PIKE
SPRING HOUSE, PA 19477
CONTRACT NUMBER:
SAILENDRA N CHATTERJEE
TITLE:
CRITICAL DEFECT ASSESSMENT FOR NEW COMPOSITE AND HYBRID MATERIALS
TOPIC# 176 OFFICE: NAVAIR IDENT#: 37637

SUBMITTED BY

COMPOSITES HAVE MATURED TO A POINT WHERE DIFFERENT FORMS OF HYBRIDS ARE BEING MANUFACTURED SO THAT THE BEST CHARACTERISTICS OF EACH CONSTITUENT MAY BE UTILIZED FOR CRITICAL APPLICATIONS. FAILURE MODES AND CHARACTERISTICS OF HYBRID COMPOSITES AND LAMINATES ARE INFLUENCED BY THE CONSTITUENTS WITHIN EACH COMPONENT MATERIAL AS WELL AS RESIDUAL PROCESSING STRESSES WITHIN THE COMPONENTS OR THEIR CONSTITUENTS. THESE PHENOMENA AND THE BEHAVIOR OF DEFECTS IN HYBRID MUST BE ADDRESSED SO THAT THERMOMECHANICAL RESPONSE AND DAMAGE TOLERANCE CHARACTERISTICS OF HYBRID MAY BE PREDICTED AND PERHAPS EVEN CONTROLLED THROUGH CAREFUL DESIGN OF THE HYBRID ITSELF. PHASE I EFFORTS WILL BE DIRECTED TO STUDY RESPONSE OF METAL FIBER REINFORCED RESIN MATRIX COMPOSITE LAMINATES WITHOUT AND WITH DELAMINATIONS, THRU CRACKS, SLITS OR HOLES AS WELL AS EXAMINE NDT METHODS FOR QUANTIFYING RESIDUAL STRESSES AND SIZE AND LOCATION OF DEFECTS. OTHER PROMISING HYBRIDS AND NEW COMPOSITES WILL BE IDENTIFIED FOR STUDIES IN THE FOLLOWING PHASES IN AN EFFORT TO DEFINE HYBRID MATERIAL DESIGN CRITERIA WHICH WILL IMPROVE DESIRED MATERIAL RESPONSE AND DAMAGE TOLERANCE CHARACTERISTICS OF THE NEW CLASS MATERIALS.

MAXIM TECHNOLOGIES INC
3000 PATRICK HENRY DR
SANTA CLARA, CA 95054
CONTRACT NUMBER:
DR CHARLES S WEAVER
TITLE:
ACOUSTIC CLASSIFICATION WITH NEURAL NETWORKS
TOPIC# 3 OFFICE: ONR IDENT#: 37521

A TIME DELAY NEURAL NETWORK (TDNN) IS A TYPE OF BACK PROPAGATION NEURAL NETWORK THAT HAS BEEN USED TO RECOGNIZE TRANSIENT SPEECH PHONEMES. WE PROPOSE TO DEVELOP A TDNN FOR THE RECOGNITION OF NON-SPEECH ACOUSTICAL SIGNALS WHERE THE SOUNDS MAY RUN TOGETHER AND MAY BE IN BACKGROUND NOISE. WHEN TRAINED TO RECOGNIZE PHONEMES, TDNN'S HAVE SHOWN A REMARKABLE ABILITY TO LEARN TO SEGMENT CONNECT PHONEMES. WE BELIEVE THAT THIS IS A GENERAL PROPERTY OF THESE NETWORKS THAT CAN BE USED WITH NON-SPEECH CONNECTED SOUNDS. IF THIS PROVES THAT FOR THE TDNN THAT WE WILL DEVELOP, WE WILL HAVE SOLVED A MAJOR (AND OFTEN INTRACTABLE PROBLEM IN AUTOMATIC SOUND CLASSIFICATION. BACK

SUBMITTED BY

PROPAGATION NETWORKS FREQUENTLY RECALL EXCESSIVE TRAINING TIMES OR DO NOT CONVERGE AT ALL WHEN THE TRAINING SET IS LARGE AND COMPLEX. A NEW CLASS OF NEURA; NETWORKS CALLED ADAPTIVE TREES THAT REQUIRES NO MULTIPLICATION AND THAT HAS TRAINING CONVERGENCE RATES THAT ARE ONE OR MORE MAGNITUDES GREATER THAN THE RATES OF EQUIVALENT BACK PROPAGATION NETWORKS HAS BEEN DEVELOPED. WE WILL CONSTRUCT AN ADAPTIVE TREE NETWORK THAT ALSO WILL DO SEGMENTATION, BUT WHICH WE BELIEVE WILL ADAPT MUCH FASTER. THE INTERACTION BETWEEN THE NETWORKS AND A HUMAN OPERATOR DURING AND AFTER TRAINING WILL BE STUDIED.

MEMORY METALS INC
83 KELLER AVE
NORWALK, CT 06854
CONTRACT NUMBER:
DR L McD SCHETKY
TITLE:
SHOCK-RESISTANT CIRCUIT BREAKERS
TOPIC# 131 OFFICE: NSWC IDENT#: 35852

TRANSIENT SHOCKS CAN CAUSE NUISANCE TRIPPING OF CIRCUIT BREAKERS AND INTERRUPT THE POWER SUPPLY VITAL TO COMMUNICATION AND COMPUTER EQUIPMENT. SHOCK-RESISTANT STABILITY OF CIRCUIT BREAKER COMPONENTS CAN BE IMPROVED BY UTILIZING THE SUPERIOR MECHANICAL CHARACTERISTICS OF SHAPE MEMORY ALLOY. THE DESIGN, CONSTRUCTION AND TESTING OF A SHAPE MEMORY ACTUATED MECHANISM IS EXPECTED TO SHOW LARGE IMPROVE-MENTS TO SHOCK RESISTANCE WHEN COMPARED TO OTHER THEMO-MECHANICAL DEVICES. THE PERSONNEL CHOSEN FOR THIS PROJECT ARE SPECIALISTS IN THE DESIGN OF SHAPE MEMORY DEVICES AND MECHANISMS AND HAVE EXPERIENCE IN CIRCUIT BREAKER DESIGN. MARINE, AEROSPACE, TRANSPORTATION AND DEFENSE INDUSTRIES SHARE A NEED FOR COMMERCIAL DEVELOPMENT OF SHOCK-RESISTANT CIRCUIT BREAKER MECHANISMS.

MEMORY METALS INC
83 KEELER AVE
NORWALK, CT 06854
CONTRACT NUMBER:
L McD SCHETKY
TITLE:
NOVEL ACOUSTIC DAMPING MATERIALS
TOPIC# 8 OFFICE: ONR IDENT#: 37578

SUBMITTED BY

COMPOSITE MATERIALS WITH RESIN, METAL AND CERAMIC MATRICES ARE ASSUMING A LEADING ROLE IN AEROSPACE, AIRCRAFT, TRANSPORTATION AND MARINE STRUCTURAL DESIGN. ALTHOUGH POSSESSING HIGH STRENGTH AND STIFFNESS TO WEIGHT RATIOS, THEY DO NOT EXHIBIT DAMPING AT A LEVEL REQUIRED FOR MANY OF THESE APPLICATIONS. THE STATE-OF-THE-ART HIGH DAMPING METALLIC SYSTEMS, ON THE OTHER HAND, THOUGH EXHIBITING EXTRODINARY DAMPING, DO NOT HAVE THE MECHANICAL CHARACTERISTICS WHICH ARE REQUIRED FOR HIGHLY STRESSED COMPONENTS. THE PROPOSED R&D WILL EXAMINE WAYS OF MARRYING THESE TWO CLASSES OF MATERIALS TO PRODUCE A HYBRID WHICH HAS GOOD DAMPING AS WELL AS THE STIFFNESS AND STRENGTH CHARACTERISTICS OF STRUCTURAL COMPOSITES. THE PROGRAM SEEKS TO DEVELOP DESIGN AND PROPERTY INFORMATION WHICH WILL PROVIDE THE METHODOLOGY FOR PRODUCING DAMPED COMPOSITES WITH BOTH RESIN AS WELL AS METALLIC MATRICES.

METATHERM INC
PO BOX 137
BERWYN, PA 19312
CONTRACT NUMBER:
LOUIS HABEL
TITLE:
SEALED TUBE TECHNOLOGY AND LONGITUDINAL DISCHARGE METAL VAPOR LASERS
TOPIC# 16 OFFICE: MCRDAC IDENT#: 37311

THIS EFFORT IS DIRECTED TOWARD SOLVING THE PROBLEMS ASSOCIATED WITH CONTAINMENT OF THE METAL VAPOR IN A LONGITUDINAL DISCHARGE LASER IN ORDER TO EXTEND IT'S LIFETIME. THE PRESENT STATE OF THE ART METAL VAPOR LASERS HAS NOT DEMONSTRATED A LONG LIFE SOLUTION TO THE VAPOR CONTAINMENT PROBLEM, LARGELY DUE TO THE DIFFICULTIES ASSOCIATED WITH HIGH TEMPERATURE BONDED DEALS. METATHERM HAS DEVELOPED A DESIGN THAT PERMITS CONSTRUCTION OF THE CONTAINMENT AND DISCHARGE VOLUME WITHOUT THE USE OF SUCH SEALS. THE PROPOSED EFFORT WILL DEMONSTRATE THE ADEQUACY OF THE LASER VAPOR CONTAINMENT DESIGN BY MAINTAINING THE METAL VAPOR PARTIAL PRESSURE AT THE REQUIRED VALUE FOR A LONGITUDINAL DISCHARGE OPERATION FOR A TIME SUFFICIENT TO PROJECT THE LIFE TIME OF A LASER BASED ON THESE DESIGN PRINCIPLES.

METRATEK INC
5205 LEESBURG PIKE - STE 1300
FALLS CHURCH, VA 22041
CONTRACT NUMBER:
RAYMOND L HARRIS
TITLE:
MULTI-MODE RANGE INSTRUMENTATION RADAR SYSTEM
TOPIC# 213 OFFICE: NATC IDENT#: 37976

SUBMITTED BY

THE PROPOSED PROGRAM WILL ESTABLISH FOR THE FIRST TIME A LINK BETWEEN INSTRUMENTATION RANGE TRACKING RADARS OF THE TYPE USED AT NATC AND HIGH-TECHNOLOGY MULTIMODE, MULTIFREQUENCY RADAR THAT HAS BEEN USED UP UNTIL NOW ONLY FOR SPECIALIZED MEASUREMENT TASKS. THIS LINK WILL PERMIT A MAJOR ADVANCEMENT IN THE TYPES OF TASKS THAT WILL BE POSSIBLE WITH INSTRUMENTATION RANGE RADARS, AND WILL EXPAND THE CURRENT CAPABILITIES OF NATC TO EFFECTIVELY SUPPORT EXPANDED TARGET, ECM, ECCM, AND PHENOMENOLOGY EFFORTS. THE RESULTING RADAR COULD THEN BE DUPLICATED TO SERVE THE NEEDS OF OTHER GOVERNMENT FACILITITES AND PROGRAMS.

METRON INC
1479 CHAIN BRIDGE RD
McLEAN, VA 22101
CONTRACT NUMBER:
DR W K STEVENS
TITLE:
AUTOMATED OBJECT ORIENTED CODE GENERATION USING CASE TOOL OUTPUTS TO ASSIST IN THE WSA&E ARCHITECTURAL EVALUATION PROCESS
TOPIC# 17 OFFICE: SPAWAR IDENT#: 37281

THE PROPOSED RESEARCH HAS THE GENERAL OBJECTIVE OF INVESTIGATING INNOVATIVE IDEAS WHICH COULD LEAD TO IMPROVEMENTS IN THE NAVY'S WSA&E PROCESS. IN PARTICULAR, THE AIM OF THIS EFFORT IS THE DEVELOPMENT OF AN AUTOMATED CODE GENERATION PROGRAM WHICH CAN BE USED IN SUPPORT OF SPAWAR ARCHITECTURAL EVALUATION EFFORTS. THE PROPOSED CODE GENERATION OR TRANSLATION PROGRAM WILL PROVIDE A LINK BETWEEN COMPUTER-ASSISTED SOFTWARE ENGINEERING (CASE) TOOL ARCHITECTURAL DESCRIPTIONS AND OBJECT ORIENTED ARCHITECTURAL SIMULATION PROGRAMS. WE WILL DEVELOP A PROTOTYPE LISP TRANSLATION PROGRAM WHICH WILL ACCEPT CASE TOOL OUTPUT FILES AND AUTOMATICALLY GENERATE A LISP SIMULATION SHELL CONTAINING THE ARCHITECTURAL ELEMENTS DESCRIBED IN THE CASE TOOL DATA.

MICROCOM CORP
965 THOMAS DE
WARMINSTER, PA 18974
CONTRACT NUMBER:
CHARLES ROSEN
TITLE:
HIGH DENSITY ELECTRONIC PACKING CONCEPTS
TOPIC# 82 OFFICE: NAVAIR IDENT#: 36465

SUBMITTED BY

MICROCOM PROPOSES TO STUDY A VERY HIGH SPEED (100 TO 800 MBITS/SEC) DATA LINK WHICH WILL SAMPLE AND STORE PARALLEL DATA AND CONTROL INPUTS AND TRANSMIT THEM SERIALLY TO A REMOTE DESTINATION WHERE THE INFORMATION WILL BE REASSEMBLED IN ORIGINAL FORMAT. THUS A ONE MEDIUM LINK WILL REPLACE HIGH DENSITY MULTIPIN CONNECTORS. STUDY WILL HIGHLIGHT ENVIRONMENTAL CONSIDERATIONS AND COST EFFECTIVENESS.

MILLIMETER WAVE TECHNOLOGY INC
1395 MARIETTA PKWY - BLDG 700
MARIETTA, GA 30067
CONTRACT NUMBER:
J H RAINWATER
TITLE:
LOW NOISE MILLIMETER WAVE RECEIVER
TOPIC# 168 OFFICE: NSWC IDENT#: 36198

IN THE PAST 10 YEARS MUCH PROGRESS HAS BEEN MADE IN THE DEVELOPMENT OF LOW NOISE RECEIVERS WHICH CAN SERVE AS IMAGING MILLIMETER WAVE DEVICES. THE APPLICATION OF QUASI-OPTICAL TECHNIQUES HAS BEEN ONE SOURCE OF HELP TO MILLIMETER WAVE SYSTEMS. DEVELOPMENTS IN SUPERCONDUCTOR-INSULATOR-SUPERCONDUCTOR (SIS) TUNNEL JUNCTIONS AND HIGH ELECTRON MOBILITY TRANSISTOR (HEMT) TECHNOLOGY HAVE ALSO BEGUN TO PRODUCE LOW NOISE MIXERS AND AMPLIFIERS AT MILLIMETER WAVE FREQUENCIES. COOLED MIXERS, USED FOR EVERAL DECADES IN RADIO ASTRONOMY APPLICATIONS, ARE ALSO CANDIDATES FOR IMPROVING SYSTEM NOISE FIGURES. MILLIMETER WAVE TECHNOLOGY PROPOSES TO EVALUATE THE CURRENT STATE OF LOW NOISE TECHNOLOGY AND PRODUCE AN OPTIMUM SYSTEM DESIGN AT 35 AND 95 GHz.

MIMD SYSTEMS INC
1301 SHOREWAY RD - STE 420
BELMONT, CA 94002
CONTRACT NUMBER:
DR ROBERT E LARSON
TITLE:
DISTRIBUTED REAL-TIME OPERATING SYSTEM WITH TASK MIGRATION
TOPIC# 49 OFFICE: SPAWAR IDENT#: 37006

SUBMITTED BY

THE INTERCONNECTION OF THE COMPUTING RESOURCES AVAILABLE ON-BOARD A COMBAT SHIP VIA A LOCAL AREA NETWORK (LAN) CREATES THE OPPORTUNITY TO MIGRATE CRITICAL TASKS FROM ONE CENTRAL PROCESSING UNIT (CPU) TO ANOTHER. THIS CAPABILITY IS ESSENTIAL TO MAINTAINING PERFORMANCE AND PREVENTING THE CORRUPTION OF STATE VARIABLES IN THE DATABASE DURING CPU FAILURES AND/OR DESTRUCTION. TASK MIGRATION CAN ALSO BE EFFECTIVE IN IMPROVING PERFORMANCE AND OBTAINING OTHER BENEFITS DURING NORMAL OPERATION. THE OBJECTIVE OF THE PROPOSED PROJECT IS TO APPLY DYNAMIC RESOURCE ALLOCATION (DRA) TECHNIQUES, IN WHICH THE PROPOSAL AUTHORS ARE WORLD-RECOGNIZED LEADERS, TO PRODUCING AN INNOVATIVE AND POWERFUL DISTRIBUTED REAL-TIME OPERATING SYSTEM FOR COMBAT SHIP COMPUTER NETWORKS. THE EXPERIENCE OF THE PROJECT TEAM IN APPLYING THESE TECHNIQUES TO THE DRTO/S IN OTHER DEFENSE SYSTEMS WILL PROVIDE A STRONG FOUNDATION FOR THE RESEARCH.

MITECH INC
600 MARYLAND AVE SW - STE 695
WASHINGTON, DC 20024
CONTRACT NUMBER:
CARL J FREEMAN
TITLE:
AAW WARFIGHTING CAPABILITIES EVALUATION MODEL
TOPIC# 17 OFFICE: SPAWAR IDENT#: 37282

THE OBJECTIVE OF THIS PROJECT IS TO DEVELOP A HIGH LEVEL COMPUTERIZED EVALUATION MODEL THAT WILL PREDICT THE WARFIGHTING CAPABILITIES OF A GIVEN DEFINED ARCHITECTURE AGAINST A GIVEN THREAT WITH RESPECT TO ANTI-AIR WARFARE (AAW). THE AAW FORCE LEVEL ATTRIBUTES/DRIVERS AS DEFINED BY SPAWAR 314, AAW DIVISION OF WARFARE SYSTEMS ARCHITECTURE AND ENGINEERING DIRECTORATE, WILL BE ADDRESSED IN TERMS OF THE AAW MISSION SUCCESS CRITERIA AS CITED IN THE AAW TOP LEVEL WARFARE REQUIREMENT DOCUMENTS. THESE AAW FORCE ATTRIBUTES (WARFIGHTING CAPABILITIES) ARE: BATTLE SPACE; BATTLE MANAGEMENT; FIREPOWER, COUNTERMEASURES (CM)/COUNTER-COUNTERMEASURES (CCM); SUSTAINABILITY/ SURVIVABILITY; MOBILITY AND READINESS. THE EFFORT INVOLVES IDENTIFY-ING THE MODEL INPUTS THAT ADEQUATELY DEFINE THE ARCHITECTURE AND THE THREAT, DEFINING THE MODEL OUTPUTS THAT PROVIDE THE ASSESSMENT OF THE ATTRIBUTES, AND DEVELOPING THE PROPER RELATIONSHIPS TO ENABLE THE

SUBMITTED BY

COMPUTATION OF THE OUTPUT VALUES FROM THE INPUT DATA. IT IS ANTICIPATED THAT CURVES, OBTAINED FROM THE MORE DETAILED MODELS, WILL BE EMPLOYED AND DATA VALUES WILL BE DETERMINED THROUGH INTERPOLATIO/EXTRAPOLATION AS NECESSARY. THE EFFORT INCLUDES DEVELOPING A COMPUTERIZED MODEL THAT WILL BE USER FRIENDLY.

MONGER INDUSTRIES INC & BIGGER THAN LIFE
3021 ELLIOTT ST
SAN DIEGO, CA 92106
CONTRACT NUMBER:
MARK BACHMAN
TITLE:
EXPENDABLE SHIP REPLICA
TOPIC# 182 OFFICE: PMTC IDENT#: 37684

THE TEST AND EVALUATION OF WEAPONS SYSTEMS, PARTICULARLY SMART WEAPONS, IS DEPENDENT ON TARGETS WHICH ACCURATELY REPRESENT SURFACE SHIPS TO DETERMINE HOW THE WEAPON RESPONDS ON ITS FINAL APPROACH TO THE TARGET. OLD, OBSOLETE SHIPS HAVE BEEN USED AS TARGETS, BUT THE INVENTORY IS DEPLETED AND SUITABLE ALTERNATIVE TARGETS ARE REQUIRED. THIS STUDY INVESTIGATES THE EMPLOYMENT OF LARGE, SHIP-SHAPE METALIZED BALLOONS AS AN ALTERNATIVE METHOF OF REPLICATING A SHIP AT SEA. THE STUDY IDENTIFIES MATERIALS FOR DURABILITY, EASE OF MANUFACTURE, AND ELECTROMAGNETIC RESPONSE. DESIGN CRITERIA AND FABRICATION METHODS ARE ESTABLISHED IN CONJUNCTION WITH STABILITY REQUIREMENTS AND ATTACHMENT OF SIMULATED EMITTERS. ALTERNATIVES FOR PROPULSION POTENTIAL, STATIONKEEPING AND SUPPORTING AUXILIARY ELECTRICAL POWER DEMANDS ARE EXPLORED. STORAGE/SHIPPING CONTAINERS, DEPLOYMENT METHODS, AND REPAIR/REUSE REQUIREMENTS ARE IDENTIFIED. THE CONCEPT OF USE AS A SHIP'S DEFENSIVE DECOY IS PRESENTED. THIS INCLUDE VERY RAPID DEPLOYMENT METHODS AND IMPLICATIONS FOR APPLICATION AGAINST ATTACK IN VARIOUS WAR-AT-SEA SCENARIOS.

MTL SYSTEMS INC
5481 DAYTON-XENIA RD
DAYTON, OH 45431
CONTRACT NUMBER:
DAVID J KELCH
TITLE:
INFRARED SCENE GENERATION MODEL
TOPIC# 211 OFFICE: NATC IDENT#: 37959

SUBMITTED BY

MTL PROPOSES TO ESTABLISH THE FEASIBILITY OF IMPLEMENTING AN IR SCENE GENERATOR AT NATC BY OBTAINING AN EXISTING USAF IR SCENE GENERATOR, INSTALLING IT UPON THE NATC COMPU-SCENE SYSTEM, AND DESIGNING THE MODIFICATIONS NECESSARY FOR NATC'S REQUIREMENTS. THE SPECIFIC TECHNICAL OBJECTIVES WILL BE: (1) SPECIFY MODIFICATIONS TO THE USAF IR SCENE GENERATOR, (2) RE-HOST THE USAF IR SCENE GENERATOR ON THE NATC SYSTEM, AND (3) VERIFY THE RE-HOSTED IR SCENE GENERATOR. THE USAF IR SCENE GENERATOR IS PARTICULARLY APPLICABLE TO THE EFFORT SINCE IT IS PRESENTLY OPERATING WITH A COMPU-SCENE IV SYSTEM AND HAS BEEN VALIDATED AGAINST TABILS DATA. THE PROJECT TEAM INCLUDES THE ORIGINAL DESIGNERS AND INSTALLERS OF THE USAF VERSION. THE RESULT OF THE PHASE I EFFORT WILL BE AN OPERATIONAL IR SCENE GENERATOR ON THE NATC SYSTEM AND AN EXPLICIT DESIGN OF THE MODIFICATIONS REQUIRED FOR COMPLETE INTEGRATION INTO THE NATC COMPU-SCENE SYSTEM.

McQ ASSOCS INC
515 WESTWOOD OFFICE PK
FREDERICKSBURG, VA 22401
CONTRACT NUMBER:
RAYMOND E WIERSMA
TITLE:
SPACE WARFARE SYSTEM ARCHITECTURE
TOPIC# 17 OFFICE: SPAWAR IDENT#: 37280

THIS EXPLORATORY DEVELOPMENT WILL PRODUCE A WORKING MODEL OF NAVAL SPACE OPERATIONS AS THEY PERTAIN TO THE SUPPORT OF FLEET OPERATIONS AND SUPPORTING THE PRIMARY WARFARE AREAS. THIS MODEL ARCHITECTURE WILL CONFORM TO THE STRUCTURES AND CONVENTIONS WHICH HAVE BEEN SUCCESSFULLY USED IN DEVELOPING THE PRIMARY WARFARE AREA WSA&E FUNCTIONS. THEY WILL REPRESENT A COMPLETE SET OF REQUIRED OPERATIONAL FUNCTIONS FOR THE NAVAL SPACE WARFARE AREA AS DEFINED IN THE NAVAL SPACE MISSION STATEMENT. THESE ROF WILL FORM THE FOUNDATION FOR THE ENSUING ASSESSMENT AND EVALUATION ANALYSIS WHICH IS THE ESSENCE OF WSA&E.

NETROLOGIC INC
4241 JUTLAND DR
SAN DIEGO, CA 92117
CONTRACT NUMBER:
DAN GREENWOOD
TITLE:
A LEARNING ENVIRONMENT FOR NEURAL NETWORKS AND TRANSIENT ACOUSTIC
TOPIC# 3 OFFICE: ONR IDENT#: 37522

SUBMITTED BY

THE PROPOSED RESEARCH IS CONCERNED WITH DEVELOPING AN INTELLIGENT TUTOR WHICH GOES BEYOND STATIC CONTEXT-SENSITIVE HELP SCREENS. NETROLOGIC'S PROPOSED SYSTEM WILL JUDGE THE EPISTEMIC STATE OF A USER AND DEVISE ALTERNATIVE GOAL-DIRECTED STRATEGIES. THE EXPERTISE OF THE INTELLIGENT TUTOR WILL COVER NEURAL MODELS AND TRANSIENT ACOUSTICS. SEVERAL NEW LEARNING MODELS WILL BE INCORPORATED IN THE TUTOR, SUCH AS KOHONEN LEARNING, ADAPTIVE VECTOR QUANTIZATION, TABER'S NEURON RING AND HEBBIAN LEARNING. THE PROPOSED AUTOMATED DECISION SUPPORT AID WILL ENABLE AN ACCELERATION IN THE DEVELOPMENT OF FINELY TUNED, HIGHLY EFFECTIVE SONAR SIGNAL CLASSIFIER. PHASE I OF THE RESEARCH WILL BE BOTH A THEORETICAL AND DEVELOPMENTAL STUDY. NEURAL NETWORK EXPERIMENTS WILL BE RUN ON NETROLOGIC'S IN-HOUSE NEUROCOMPUTER.

NIAGARA SYSTEMS & SOFTWARE INC
3960 HARLEM RD
SNYDER, NY 14226
CONTRACT NUMBER:
DR B J ORZECHOWSKI
TITLE:
AUTONOMOUS COMPUTER AIDED INTEGRATED NAVIGATION (ACAIN) PROTOTYPE DEVELOPMENT
TOPIC# 159 OFFICE: NSWC IDENT#: 36110

NAVIGATIONAL SENSORS AND RADAR/SONAR DEVICES UTILIZED BY MILITARY UNDERWATER VEHICLES AND SURFACE SHIPS ARE RELIABLE AND ACCURATE UNDER IDEAL CONDITIONS. HOWEVER, SENSOR PERFORMANCE IS OFTEN SUBJECT TO DEGRADATION AND SPURIOUS FAULTS IN A REAL, NONCONTROLLABLE ENVIRONMENT. USE OF INTEGRATED NAVIGATION SUBSYSTEMS WHICH EXPERTLY VALIDATE, FILTER, AND FUSE NAVIGATION, RADAR, AND/OR SONAR DATA INPUTS FROM INDIVIDUAL SENSORS CAN GREATLY INCREASE THE ACCURACY AND THE RELIABILITY OF NAVIGATION, ESPECIALLY WHEN THE FUSED SENSOR DATA IS USE TO PILOT AN AUTONOMOUS NAVIGATION CONTROLLER OR COLLISION AVOIDANCE SYSTEM. THE AUTONOMOUS COMPUTER AIDED INTEGRATED NAVIGATION (ACAIN) PROTOTYPE DEVELOPMENT PROGRAM WILL YIELD A MODULAR, MICROPROCESSOR CONTROLLED, INTEGRATED NAVIGATIONAL SUBSYSTEM DESIGNED TO BE INSERTED INTO SURFACE SHIP OR UNDERWATER VEHICLE ENVIRONMENTS. THE ACAIN SMART INTERFACE PROTOTYPE SYSTEM DESIGNED AND DEVELOPED

SUBMITTED BY

DURING PHASE I EFFORTS AND IMPLEMENTED DURING PHASE II EFFORTS WILL INTERFACE TO INDEPENDENT NAVIGATIONAL SENSORS AND WILL DIGITIZE, VALIDATE, FILTER, AND FUSE NAVIGATIONAL DATA USING AN EXPERT KALMAN FILTER TECHNIQUE. THE ACAIN SYSTEM PROTOTYPE INSTALLED DURING PHASE II WILL INTERFACE TO AN UNDERWATER AUTO-NAVIGATION CONTROL SYSTEM AND WILL USE THE HIGHLY-ACCURATE AND RELIABLE FUSED DATA TO GENERATE AUTO-NAVIGATION CONTROL VECTORS.

NIAGARA SYSTEMS & SOFTWARE INC
3960 HARLEM RD
SNYDER, NY 14226
CONTRACT NUMBER:
DR B J ORZECHOWSKI
TITLE:
NAVY HEALTH CARE PROVIDER INTELLIGENT PORTABLE WORKSTATION DEVELOPMENT
TOPIC# 70 OFFICE: NAV/MRDC IDENT#: 36284

AN INEXPENSIVE LAPTOP OR MICRO-COMPUTER BASED NAVY HEALTH CARE PROVIDER INTELLIGENT PORTABLE (PIP) WORKSTATION WILL OPTIMIZE DELIVERY OF HEALTH CARE BY ALLOWING DIRECT COMMUNICATION AMONG PHYSICIANS, OTHER HEALTH CARE PROFESSIONALS, CLINICS, HOSPITALS, AND SHIPBOARD HEALTH CARE FACILITIES. CURRENT TECHNOLOGIES PERMIT THE DEVELOPMENT OF A PIP WORKSTATION WHICH CAN BE CARRIED TO THE PATIENT'S BEDSIDE AND USED AS AN INDEPENDENT COMPUTER AID OR WHICH CAN BE CONNECTED DIRECTLY TO A COMPUTER AT A LARGE MEDICAL FACILITY, UTILIZING THE MORE EXTENSIVE PATIENT MEDICAL INFORMATION AVAILABLE TO COMPUTER NETWORKS. THE PHASE I OBJECTIVE OF THIS PROGRAM IS TO RESEARCH AND DOCUMENT THE SPECIFIC REQUIREMENTS OF NAVY HEALTH CARE PROVIDERS, TO INVESTIGATE AND EVALUATE CURRENT AND PLANNED BIOMEDICAL INFORMATION SYSTEMS AND INFORMATION TECHNOLOGY, AND TO DESIGN A COST-EFFECTIVE PIP WORKSTATION USED TO (a) DISPLAY HEALTH RELATED INFORMATION AND SCHEDULES, (b) RECORD PATIENT HISTORIES, EXAMINATIONS, DIAGNOSES, AND TREATMENT PROTOCOLS, (c) REPORT TREATMENT COMPLIANCE, PROCEDURES, PROGRESS, RESULTS, AND OBSERVATIONS, AND (d) COMMUNICATE WITH OTHER HEALTH CARE PROVIDERS AND/OR FACILITIES IN ORDER TO DIRECT PATIENT HEALTH CARE. PHASE I EFFORTS WILL GENERATE A PROGRAM PLAN FOR PHASE II PIP IMPLEMENTATION AND ALPHA TESTING AT A SELECTED NAVY MEDICAL FACILITY AND PHASE II BETA TESTING WITH PARTICIPATING

SUBMITTED BY

NAVY PHYSICIANS AND HEALTH CARE PROFESSIONALS.

NIELSEN ENGINEERING & RESEARCH INC
510 CLYDE AVE
MOUNTAIN VIEW, CA 94043
CONTRACT NUMBER:
MICHAEL R MENDENHALL
TITLE:
PREDICTION OF TORPEDO GUIDANCE WIRE POSTLAUNCH INTERFERENCE WITH MANEUVERING SUBMARINES
TOPIC# 112 OFFICE: NAVSEA IDENT#: 36851

A PROGRAM OF WORK LEADING TO AN ANALYTICAL CAPABILITY TO PREDICT THE POSTLAUNCH BEHAVIOR OF TORPEDO GUIDANCE WIRES IN THE VICINITY OF MANEUVERING SUBMARINES IS DESCRIBED. AN EXISTING METHOD TO PREDICT THE COMPLEX UNSTEADY FLOW FIELD NEAR THE LAUNCH VEHICLE WILL BE COMBINED WITH A METHOD TO PREDICT THE MOTION OF A FREE CABLE OR WIRE IN AN ARBITRARY FLOW FIELD. THE RESULTING METHOD WILL INCLUDE APPROXIMATE BOUNDARY CONDITIONS ON BOTH THE SUBMARINE AND THE WIRE TO PREVENT WIRE PENETRATION THROUGH THE SUBMARINE BOUNDARY, A COMMON PROBLEM WITH CURRENT CALCULATION METHODS. THE SUBMARINE FLOW FIELD CONSISTS OF NONLINEAR EFFECTS CAUSED BY FLOW SEPARATION FROM THE HULL AND TRAILING VORTICITY ASSOCIATED WITH APPENDAGE LOADINGS. THIS FLOW MODEL WILL BE APPLICABLE TO TYPICAL SUBMARINE CONFIGURATIONS IN VARIOUS MOTIONS, INCLUDING STEADY TURNS AND UNSTEADY MANEUVERS; THEREFORE, THE METHOD CAN BE USED TO PREDICT WIRE FOULING FOR A WIDE RANGE OF POSTLAUNCH CONDITIONS.

NKF ENGINEERING INC
12200 SUNRISE VALLEY DR
RESTON, VA 22091
CONTRACT NUMBER:
DR MICHAEL P PAKSTYS
TITLE:
MATERIALS FOR UNDERWATER EXPLOSION SHOCK WAVE ATTENUATION (UNDEX SHIELD)
TOPIC# 109 OFFICE: NAVSEA IDENT#: 36793

SUBMITTED BY

AN ANALYTICAL STUDY AND TEST PROGRAM TO DETERMINE THE FEASIBILITY OF USING PLASTIC FOAM MATERIALS TO ATTENUATE THE SHOCK WAVES PRODUCED BY UNDERWATER EXPLOSIONS IS PROPOSED. PHASE I OF THE PROJECT WILL VERIFY THAT SUCH MATERIALS CAN SIGNIFICANTLY DECREASE THE INTENSITY OF SHOCK WAVES REACHING SUBMARINE AND SURFACE SHIP HULLS. AN INITIAL SELECTION OF CANDIDATE MATERIALS WILL BE MADE AND A NEAR OPTIMUM INTERNAL STRUCTURE OF THE AIR CELLS WILL BE ESTABLISHED.

OCEAN & ATMOSPHERIC SCIENCE INC
145 PALISADE ST
DOBBS FERRY, NY 10522
CONTRACT NUMBER:
ROSS E WILLIAMS
TITLE:
BISTATIC CONSIDERATIONS FOR ACTIVE/SONAR SURVEILLANCE OPERATIONS IN THE YEAR 2000
TOPIC# 144 OFFICE: NSWC IDENT#: 37997

OAS PROPOSES A BRIEF EVALUATION OF BISTATIC OPERATIONAL MISSIONS FOR THE YEAR 2000 BECAUSE THESE WILL DICTATE BISTATIC SYSTEM CONFIGURATIONS AND MODES OF USE. FOR SIGNIFICIANT MISSIONS, THE OPERATING SCENARIOS AND SYSTEM DESIGNS WILL BE SPECIFIED IN CONCEPT FORM AND MAJOR COMPONENTS IDENTIFIED. CHOICES WILL BE SPECIFIED FOR PROJECTORS, RECEIVING ARRAYS, SHIP EVOLUTIONS, AND SIGNAL DESIGN AND DATA PROCESSING TECHNIQUES FOR BISTATIC CONFIGURATIONS. PARTICULAR EMPHASIS ATTACHES TO REVERBERATION AND INTERFERENCE SUPPRESSION THROUGH ADAPTIVE PROCESSING METHODS. OPERATIONAL OPPORTUNITIES AND CONSTRAINTS (E.G. SECTOR INSONIFICATION, TIME AND FREQUENCY MULTIPLEXING OF TRANSMISSIONS FROM MULTIPLE SOURCES, CLUSTERS OF ORTHOGONAL SIGNALS, ETC.) WILL BE EVALUATED. SIGNAL CHOICES ADAPTED TO PARTICULAR OBJECTIVES AND OPERATING MODES WILL BE SPECIFIED. USE OF EXISTING RECEIVING ARRAY ASSETS WILL BE ASSESSED. EXISTING MONOSTATIC ACTIVE SONAR PREDICTION MODELS MODIFIED TO BISTATIC GEOMETRIES WILL PREDICT TARGET ECHO DETECTABILITY, BOTTOM, SURFACE AND TOTAL REVERBERATION, SIGNAL EXCESS, ALL AS A FUNCTION OF TARGET RANGE, FOR APPROPRIATE SIGNAL CHOICES AND RECEIVER PROCESSING TECHNIQUES. FACTORS THAT LIMIT BISTATIC PERFORMANCE WILL BE EVALUATED, AND THEIR IMPACT UPON MISSION ACCOMPLISHMENT ASSESSED.

SUBMITTED BY

ODYSSEY RESEARCH ASSOCS INC
301A HARRIS B DATES DR
ITHACA, NY 14850
CONTRACT NUMBER:
MAUREEN STILLMAN
TITLE:
GRAPHIC DISPLAY FOR MULTIMEDIA NETWORK MANAGEMENT
TOPIC# 42 OFFICE: SPAWAR IDENT#: 36967

THE INNOVATION DESCRIBED IN THIS PROPOSAL IS THE DESIGN OF GRAPHICAL DISPLAYS FOR MULTIMEDIA NETWORK MANAGEMENT TAILORED TO NAVY REQUIREMENTS. THESE DISPLAYS ARE DESIGNED TO ANSWER QUESTIONS CONCERNING THE NETWORK'S STATUS THAT THE NAVY NETWORK OPERATOR FORMULATES IN THE PROCESS OF MANAGING THE NETWORK. INCORPORATING HUMAN FACTORS PRINCIPLES AND A GOOD USER INTERFACE ARE KEY TO THE DESIGN OF GOOD GRAPHICS DISPLAYS. THE NETWORK OPERATOR WILL BE ABLE TO SELECT GLOBAL VIEWS OF THE NETWORK AS WELL AS EXAMINE LOCAL PARTS OF THE NETWORK IN DETAIL. THE GRAPHICS DISPLAYS DESIGNED IN THE PHASE I EFFORT WILL SHOW NETWORK GEOGRAPHIC LOCATION, NETWORK CONNECTIVITY, NETWORK TRAFFIC PATTERNS, AND WILL HELP THE OPERATOR TO ISOLATE TROUBLE SPOTS WITHIN THE NETWORK, FOR EXAMPLE, NETWORK CONGESTION OR A FAILED COMMUNICATION LINK OR NETWORK COMPONENT. SPECIFIC NAVY REQUIREMENTS DISCUSSED IN DETAIL INCLUDE THE DISPLAY OF CONNECTIVITY AND GEORGRAPHIC LOCATION OF NETWORK COMPONENTS, TRAFFIC METRICS, AND RELIABILITY METRICS. ALSO INCLUDED IS A DISCUSSION OF HOW TO DISPLAY NETWORK HISTORY, WHICH GIVES THE OPERATOR A SENSE OF NETWORK PERFORMANCE OVER TIME. FOR ILLUSTRATIVE PURPOSES, WE HAVE INCLUDED THE DESIGN OF NETWORK CONNECTIVITY AND GEOGRAPHIC LOCATION DISPLAY, AND A DISPLAY OF COMMUNICATION LINK THRUPUT.

OPTICS 1 INC
3625 THOUSAND OAKS BLVD - STE L
WESTLAKE VILLAGE, CA 91362
CONTRACT NUMBER:
BRIAN D COHN
TITLE:
LOW COST NIGHT VISION GOGGLES (NVG) FOR SIMULATION
TOPIC# 186 OFFICE: NTSC IDENT#: 37734

SUBMITTED BY

THERE IS A DEMONSTRATED NEED TO DEVELOP A LOW COST DISPLAY SYSTEM FOR TRAINING PURPOSES WHICH WILL SIMULATE AN OPERATIONAL NIGHT VISION GOGGLE. THE SYSTEM TO BE DESIGNED IN THIS PHASE I PROGRAM WILL PROVIDE SIMILAR FUNCTIONAL PERFORMANCE TO CURRENT GOGGLES, YET WILL BE LOWER IN COST. THIS SBIR PROGRAM WILL CONVER THE DESIGN AND DEVELOPMENT OF THE OPTICAL DISPLAY SYSTEM, THE DEFINITION OF THE DISPLAY ELECTRONICS, AND THE OVERALL PACKAGING OF THE END PRODUCT. THIS PROGRAM WILL NOT ONLY SATISFY THE TRAINING NEEDS OF THE NTSC, BUT COULD VERY EFFECTIVELY LEAD TO FAR LOWER COST NIGHT VISION GOGGLES AND OTHER DISPLAY SYSTEMS IN THE FUTURE. TYPICALLY NIGHT VISION GOGGLES ARE SOMEWHAT CUMBERSOME AS WELL AS COSTLY. WHAT WE WILL BE DEVELOPING IN THIS PROGRAM IS A LOW COST AND FAR SIMPLIFIED DESIGN FORM FOR SUCH A GOGGLE. AND THIS COULD HAVE FAR REACHING POTENTIALS IN THE CONSUMER WORLD AS WE MOVE CLOSER TO FULL IMPLEMENTATION OF VIRTUAL WORLD DISPLAY SYSTEMS AND OTHER FORMS OF IMAGE DISPLAYS.

OPTRA INC
66 CHERRY HILL DR
BEVERLY, MA 01915
CONTRACT NUMBER:
GEERT WYNTJES
TITLE:
LASER OPTICAL DETECTION OF DYNAMIC IN-PLANE MECHANICAL DISPLACEME
TOPIC# 130 OFFICE: NSWC IDENT#: 35846

OPTRA PROPOSES TO DEVELOP A SMALL LASER-BASED NON-CONTACTING INSTRUMENT FOR MEASURING THE THREE CARTESIAN COMPONENTS OF THE DISPLACEMENT OF A SURFACE AT A SINGLE POINT OF OBSERVATION. THE TARGETED MEASUREMENT SENSITIVITY IS IN THE 1 TO 10 NANOMETER RANGE, WITH A MEASUREMENT BANDWIDTH OF 1 MHz. THE INSTRUMENT USES AN INEXPENSIVE BUT POWERFUL LASER DIODE, AND WILL BE DESIGNED TO BE MANUFACTURED AT A LOW ENOUGH COST TO GIVE IT A VERY COMPETITIVE POSITION IN THE MARKET. IF POSSIBLE, ALL OF THE ELECTRONICS WILL BE ON PLUG-IN CARDS FOR A PC/386 COMPUTER WHICH WILL BE USED FOR DATA LOGGING, PROCESSING AND DISPLAY, AS WELL AS FOR OVERALL CONTROL OF THE MEASUREMENT.

OPTRON SYSTEMS INC
3 PRESTON CT
BEDFORD, MA 01730
CONTRACT NUMBER:
JEFFREY BOUNDS
TITLE:
ERASABLE REAL-TIME HOLOGRAPHIC OPTICAL STORAGE ELEMENT
TOPIC# 138 OFFICE: NSWC IDENT#: 35915

SUBMITTED BY

CONVENTIONAL HOLOGRAPHIC RECORDING MEDIA DO NOT PROVIDE REAL-TIME WRITE OR ERASE CAPABILITIES. SPATIAL-LIGHT MODULATORS CAN BE WRITTEN AND ERASED IN REAL TIME, BUT CANNOT PROVIDE THE HIGH RESOLUTION REQUIRED FOR HOLOGRAPHIC STORAGE (> 1000 LINES/mm). WE PROPOSE A MAGNETO-OPTIC HOLOGRAPHIC RECORDER (MOHR) CAPABLE OF SUBMICRON RESOLUTION AND FRAME TIMES ON THE ORDER OF 1 sec/cm(2). THE MOHR MAKES USE OF A MAGNETO-OPTIC LAYER SIMILAR TO THAT USED IN ERASABLE OPTICAL DISK MEMORY. CONFIGURED FOR SERIAL ACCESS, THE MOHR CAN BE USED AS A HOLOGRAPHIC DISPLAY OR AS A HIGH-RESOLUTION, COMPUTER-CONTROLLED OPTICAL FILTER. CONFIGURED FOR PARALLEDL ACCESS, THE MOHR IS AN ELECTRONIC REPLACEMENT FOR PHOTOGRAPHIC FILM. OPTRON SYSTEMS' EXPERIENCE WITH THE DESIGN AND CONSTRUCTION OF DIVERSE SPATIAL LIGHT MODULATORS MAKES US UNIQUELY QUALIFIED TO CONSTRUCT THE MOHR.

OPTRON SYSTEMS INC
3 PRESTON CT
BEDFORD, MA 01730
CONTRACT NUMBER:
IRA FARBER
TITLE:
ELECTRON-BEAM ADDRESSED FERROELECTRIC LIQUID CRYSTAL SPATIAL LIGH MODULATOR
TOPIC# 163 OFFICE: NSWC IDENT#: 36170

THIS PROPOSAL PRESENTS A DEVELOPMENT PROGRAM FOR A LOW-COST, ELECTRICALLY-ADDRESSED FERROELECTRIC LIQUID CRYSTAL LIGHT MODULATOR CALLED THE ELECTRON-BEAM FERROELECTRIC LIQUID CRYSTAL SPATIAL LIGHT MODULATOR (e-FLCM) AND EXPLORES ITS PERFORMANCE LIMITATIONS. THE DEVICE INCORPORATES A HIGH RESOLUTION ELECTRON GUN CAPABLE OF 36 CYCLES/MM, WHOSE BEAM IS AMPLIFIED BY AN OPTRON SYSTEMS PROPRIETARY DEVICE CALLED A POWER MICROCHANNEL PLATE (PMCP). AN INNOVATIVE FEATURE OF THE DESIGN IS THE INCORPORATION OF A HIGH RESOLUTION CHARGE-TRANSFER PLATE (CTP) TO TRANSFER CHARGE FROM THE INSIDE TO THE OUTSIDE OF THE EVACUATED ELECTRON-GUN ASSEMBLY. THE CTP IS INTEGRAL WITH THE LIQUID-CRYSTAL CELL AND SERVES AS A PROGRAMMABLE ELECTRODE ARRAY. PERFORMANCE CHARACTERISTICS TO BE INVESTIGATED INCLUDE: SPATIAL RESOLUTION, FRAMING SPEED, CONTRAST RATIO, AND SPATIAL

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UNIFORMITY. THE PROPOSED PROGRAM WILL INVESTIGATE THE FEASIBILITY OF A NEW TYPE SPATIAL LIGHT MODULATOR THAT IS: 1) POTENTIALLY MUCH MORE RELIABLE AND LESS COSTLY THAN EXISTING SLM'S, 2) SCALABLE TO ACTIVE AREAS UP TO 50mm IN DIAMETER, 3) CAPABLE OF FAST FRAMING SPEEDS, 4) ABLE TO SERVE AS A PRECISE, PROGRAMMING HIGH-SPEED, BINARY FOURIER FILTER, AND, 6) EASILY CONTROLLED WITH A PERSONAL COMPUTER. PROPRIETARY OPTRON TECHNOLOGY HAS BEEN EMPLOYED TO OPTIMIZE PERFORMANCE AND REDUCE THE COST OF THE DESIGN. THE PHASE II TASKS WILL INCLUDE THE DEVELOPMENT OF AN OPTIMIZED e-FLCM AND A COMPATIBLE COMPUTER CONTROL SYSTEM.

OPTRON SYSTEMS INC
3 PRESTON CT
BEDFORD, MA 01730
CONTRACT NUMBER:
IRA FARBER
TITLE:
E-BEAM LIQUID CRYSTAL INFRARED TARGET SIMULATION SYSTEM
TOPIC# 212 OFFICE: NATC IDENT#: 37967

WE PROPOSE TO DEVELOP A NEW, LOW-COST, HIGH-PERFORMANCE INFRARED TARGET SIMULATION SYSTEM BASED ON AN ELECTRON-BEAM-ADDRESSED FABRY-PEROT LIQUID CRYSTAL LIGHT MODULATOR. THIS NEW DEVICE DIRECTLY MODULATES AN INFRARED READOUT SOURCE, AND SO NO AUXILIARY OPTICAL DEVICE REQUIRED. THE PROPOSED MODULATOR INTERFACES WITH A COMPUTER AND IS EXPECTED TO OFFER REAL-TIME, FLICKERLESS SCENE SIMULATION WITH LARGE DYNAMIC-RANGE RATIO, HIGH CONTRAST, HIGH RESOLUTION, AND LARGE NUMBERS OF STATIC AND FAST-MOVING TARGETS. THIS DEVICE OVER-COMES THE LOW RESOLUTION, SLOW FRAME RATES AND DYNAMIC-RANGE LIMITATIONS OF THERMAL DEVICES SUCH AS THE BLY CELL AND RESISTOR ARRAYS, AND THE STRUCTURAL AND OPERATIONAL COMPLEXITIES OF THE E-BEAM DKDP LIGHT VALVE. SINCE LOW-RESOLUTION VISIBLE LIGHT MODULATION HAS ALREADY BEEN DEMONSTRATED WITH A CRUDE E-BEAM-ADDRESSED LIQUID LIGHT MODULATOR, THE PHASE I OBJECTIVES ARE TO ESTABLISH THE FEASIBILITY OF DEVELOPMENT OF A MODIFIED PROTOTYPE FOR THE 3-5 MICRON AND 8-12 MICRON WAVELENGTH RANGES. THE PROPOSED PROGRAM, THEREFORE, INCLUDES MODULATOR DESIGN AND MODELLING, AND COMPONENT DEVELOPMENT AND TESTING. THE PHASE I PROTOTYPE MODULATOR IS EXPECTED TO EXHIBIT 250x250 RESOLUTION ELEMENTS, FRAMING RATES OF ABOUT 30HZ, AND A

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DYNAMIC RANGE RATIO OF ABOUT 1000. THE BASIC DEVICE DESIGN CHOSEN IS SUCH THAT THE MODULATOR CAN SIMULATE TARGETS OVER A WIDE TEMPERATURE RANGE (UV TOMID IR). THE PERFORMANCE OF THE MODULATOR CAN BE IMPROVED IN THE PHASE II PROGRAM TO REALIZE A SYSTEM OF 25MM ACTIVE AREA WITH 10 TO THE 6TH POWER PIXELS, AND A DYNAMIC RANGE RATIO OF 10 TO THE FOURTH POWER.

ORINCON CORP
9363 TOWNE CENTRE DR
SAN DIEGO, CA 92121
CONTRACT NUMBER:
GERALD C MOONS
TITLE:
INTERMITTENT CONTACT EVALUATION FEASIBILITY DEMONSTRATION SYSTEM
TOPIC# 104 OFFICE: NAVSEA IDENT#: 36737

TIMELY IDENTIFICATION, CLASSIFICATION, AND TRACK ASSOCIATION OF INFREQUENT ACTIVE AND PASSIVE SONAR DETECTIONS CONTINUE TO IMPACT ON THE ABILITY OF ASW MISSION COMMANDERS TO RAPIDLY CORRELATE AND CONVERT SUCH DETECTIONS INTO POSITIONAL ESTIMATES FOR CONTACTS OF INTEREST. CONTINUSED ADVANCES IN THE REDUCTION OF THREAT TARGET SOUND PRESSURE LEVELS AND IMPROVED UNDERSTANDING AND EXPLOITATION OF THE ACOUSTIC ENVIRONMENT WILL CONTINUE TO FRUSTRATE COMMANDERS DURING TACTICAL PROSECUTIONS OF SUBSURFACE CONTACTS. TO COUNTER THESE ADVANCES NEW TECHNIQUES AND SYSTEMS FOR CORRELATION OF SPORADIC PASSIVE AND ACTIVE SONAR DETECTIONS MUST BE DEVELOPED AND EVALUATED. THE PURPOSE OF THIS PROJECT IS TO DEVELOP A FEASIBILITY DEMONSTRATION OF A SPORADIC ACTIVE/PASSIVE SONAR DETECTION, TRACKING, AND CLASSIFICATION SYSTEM. THIS SYSTEM WILL COMBINE MODIFIED APPLICATIONS OF OPERATIONALLY PROVEN PASSIVE SONAR DATA ASSOCIATION TECHNIQUES WITH EXPERT SYSTEM, NEURAL NETWORKS, AND MULTI-HYPOTHESIS TRACKING ALGORITHMS TO PROVIDE ON-SCENE ASW COMMANDERS WITH A RELIABLE MEANS FOR CORRELATING, TRACKING, AND CLASSIFYING INTERMITTENT DETECTIONS OF SUBSURFACE CONTACTS.

ORINCON CORP
9363 TOWNE CENTRE DR
SAN DIEGO, CA 92121
CONTRACT NUMBER:
KENNETH KAISER
TITLE:
INFORMATION PROCESSING AND DISTRIBUTION FOR THE INTEGRATED UNDERS SURVEILLANCE SYSTEM
TOPIC# 59 OFFICE: SPAWAR IDENT#: 37084

SUBMITTED BY

THE OBJECTIVE OF THIS TASK IS TO DEVELOP A COMMUNICATIONS NETWORKING CONCEPT TO SUPPORT THE CURRENT AND FUTURE COMMUNICATIONS NEEDS OF THE INTEGRATED UNDERSEA SURVEILLANCE SYSTEM (IUSS). THE NETWORK MUST BE CAPABLE OF SUPPORTING IUSS COMMUNICATIONS NEEDS DURING ANY PHASE OF HOSTILITY, FROM PEACE TO GLOBAL WAR. THERE HAS BEEN MUCH CONCERN WITHIN THE NAVY OF LATE THAT SYSTEMS ARE BEING DEVELOPED WHICH ARE TOO NARROW IN THEIR FOCUS, THAT ARE NOT INTEROPERABLE, AND THAT BECAUSE OF SHORTFALLS IN THE SYSTEMS ENGINEERING AREA, ARE SUBJECT TO DELAYS OR CANCELLATION. THESE ISSUES NOT ONLY IMPACT THE SYSTEM UNDER DEVELOPMENT BUT OTHERS AS WELL. SYSTEMS WHICH WERE RELYING ON INFORMATION FROM THESE DEVELOPMENTAL SYSTEMS, FIND THAT THAT INFORMATION IS NO LONGER THERE BECAUSE THE SYSTEM HAS BEEN CANCELED. ORINCON HAS PROPOSED AN APPROACH UTILIZING SOUND SYSTEMS ENGINEERING PRINCIPLES THAT WILL RESULT IN A NETWORK THAT WILL RESPOND TO THE NEEDS OF THE END USERS, OPTIMIZE THE CAPABILITIES OF THE IUSS COMMUNITY, AND RESPOND TO THE CHANGING INFORMATION NEEDS RESULTING FROM INTRODUCTION OF NEW SUBSYSTEMS AND CHANGING THREAT CONDITIONS.

ORINCON CORP
9363 TOWNE CENTRE DR
SAN DIEGO, CA 92121
CONTRACT NUMBER:
JAMES J SIDLETSKY
TITLE:
ANTI-SURFACE WARFARE SYSTEMS ARCHITECTURE TOP-LEVEL WARFARE REQUIREMENTS COMPLIANCE
TOPIC# 17 OFFICE: SPAWAR IDENT#: 37283

MILITARY LEADERS MUST FORMULATE OPTIMAL ACQUISITION STRATEGIES THAT BEST USE THE AVAILABLE RESOURCES TO COMPLY WITH THE WARFARE STRATEGIES DEVELOPED BY PLANNERS AND PRACTIONERS. THE NAVY APPROACHES THIS IN A LOGICAL TOP-DOWN MANNER, DEVELOPING TOP LEVEL WARFARE REQUIREMENTS (TLWRs), AND REQUIRED OPERATIONAL FUNCTIONS (ROFs), AND ASSESSING CURRENT FORCE CAPABILITIES AND SHORTFALLS. THE COMBINATION OF CHANGES IN THE STRATEGIC ENVIRONMENT, THE EVOLUTION OF POLITICALLY AND MILITARILY SERIOUS THIRD WORLD THREATS, RAPID ADVANCEMENT OF TECHNOLOGY, AND SHRINKING AND VACILLATING DEFENSE BUDGETS HAS CREATED A VERY COMPLEX PROBLEM FOR THE WARFARE SYSTEMS

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ARCHITECTS AND ENGINEERS CHARGED WITH MAKING DECISIONS THAT RESULT IN APPROPRIATE ACQUISITIONS. THE PRIMARY OBJECTIVE OF PHASE I IS TO DEVISE AND DEMONSTRATE A METHOD SUITABLE FOR SIGNIFICANTLY IMPROVING THE EFFECTIVENESS OF THE ANTI-SURFACE WARFARE (ASUW) SYSTEMS ARCHITECTURE PROCESS IN THE FACE OF LIMITED ACQUISITION FUNDING. THIS PROCEDURE STATES THE PURPOSES TO BE ACHIEVED IN CONCISE QUANTITATIVE FORMAT AT EACH LEVEL OF CONCERN, SO THAT ALTERNATIVE MEANS TO ACHIEVE THESE ENDS CAN BE PROPERLY EVALUATED. PHASE II WOULD EXTEND THIS DEMONSTRATION TO COMPLETE AN EVALUATION OF BASELINE AND ALTERNATIVE ASUW ARCHITECTURES.

ORTEL CORP
2015 W CHESTNUT ST
ALHAMBRA, CA 91803
CONTRACT NUMBER:
DAVID B HUFF
TITLE:
MILLIMETER WAVE PACKAGING OF OPTOELECTRONIC COMPONENTS
TOPIC# 208 OFFICE: NOSC IDENT#: 37930

CURRENT DEVICE TECHNOLOGY IS PROGRESSING TO THE POINT THAT NEW PACKAGING TECHNIQUES ARE REQUIRED TO ALLOW THE FULL HIGH SPEED CAPABILITIES OF THESE DEVICES TO BE USED. CURRENT FIBER OPTIC PACKAGING IS LIMITED BY MECHANICAL CONSIDERATIONS TO BELOW 20 GHz. NEW PACKAGE DESIGNS ARE NEEDED TO PUSH THE FREQUENCY CAPABILITY OF THESE DEVICES INTO MILLIMETER WAVE USES. WE PROPOSE TO BEGIN THIS RESEARCH WITH A FIBER-COUPLED PACKAGED PHOTODIODE DESIGNED TO WORK AT 30 GHz.

OSBORNE A ASSOCS INC
756 LAKEFIELD RD - BLDG J
WESTLAKE VILLAGE, CA 91361
CONTRACT NUMBER:
H W VOLBERG
TITLE:
DETECTION OF BOTTOM DEPLOYED MINES
TOPIC# 106 OFFICE: NAVSEA IDENT#: 36756

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THE PRIMARY OBJECTIVE OF THIS RESEARCH PROJECT IS TO ACCURATELY DEFINE THE EXPERIMENTAL PROCEDURES NECESSARY TO DETERMINE THE OPTIMUM FREQUENCIES AND BANDWIDTHS FOR USE IN A BOTTOM MINE DETECTION AND CLASSIFICATION SONAR SYSTEM. IN ORDER TO ACCOMPLISH THIS TASK, FOUR AREAS OF STUDY HAVE BEEN IDENTIFIED. FIRST, SUITABLE TEST SITES MUST BE LOCATED AND QUALIFIED. SECOND, APPROPRIATE BOTTOM CONDITIONS FOR THE TEST MUST BE DETERMINED AND THESE MUST BE CORRELATED TO THE EXISTING TEST SITES. THIRD, APPROPRIATE MINE-LIKE TARGETS MUST BE DESIGNED AND ANALYSED. AND, FOURTH, A SUITABLE BREADBOARD SONAR SYSTEM, INCLUDING TRANSPONDERS, MUST BE SPECIFIED. IN ORDER TO ARRIVE AT A REALISTIC AND ACHIEVABLE SPECIFICATION, A VARIETY OF FACTORS WILL BE INVESTIGATED, INCLUDING NEAR-FIELD AND FREE-FIELD MINE TARGET STRENGTH RESPONSE PATTERNS, MINE BURIAL, MINE CASE DESIGN, ACOUSTIC BANDWIDTH, TARGET ASPECT ANGLE BOTTOM REVERBERATION, GRAZING ANGLES, BOTTOM TYPES AND OTHER FACTORS RELATING TO THE PRACTICAL IMPLEMENTATION OF ACOUSTIC SYSTEMS.

OSBORNE A ASSOCS INC
756 LAKEFIELD RD - BLDG J
WESTLAKE VILLAGE, CA 91361
CONTRACT NUMBER:
ANDREW R BAZELEY
TITLE:
MINE AVOIDANCE SUBMARINE-TETHERED REMOTE OPERATING VEHICLE
TOPIC# 107 OFFICE: NAVSEA IDENT#: 36767

THE PHASE I PROJECT WILL DEVELOP THE TECHNICAL SPECIFICATION FOR A MINE AVOIDANCE SUBMARINE TETHERED REMOTE OPERATING VEHICLE (MASTR) SYSTEM CAPABLE OF DETECTING MOORED AND BOTTOM MINES AND OTHER ORDNANCE TO ASSURE SAFE PASSAGE FOR THE SUBMARINE. THE PREEMINANT DESIGN CRITERIA FOR THE MASTR SYSTEM WILL BE THAT IT PROVIDE SUFFICINET REAL-TIME DATA THAT THE OPERATOR CAN DETECT, CLASSIFY AND ACCURATELY DETERMINE THE POSITION OF ALL MINE LIKE OBJECTS IN THE IMMEDIATE PATH OF THE SUBMARINE. THE SYSTEM SPECIFIED MUST BE CAPABLE OF QUIET OPERATIONS AT CONSIDERABLE STANDOFF RANGE FROM THE SUBMARINE; IT MUST ACHIEVE HIGH THROUGH-THE-WATER SPEED; IT MUST CARRY ACOUSTIC SENSORS CAPABLE OF DETECTING AND CLASSIFYING MINES AND TRANSMITTING REAL-TIME DATA TO THE OPERATOR ABOARD THE SUBMARINE;

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IT MUST BE ABLE TO ACCURATELY RESOLVE ITS OWN POSITION RELATIVE TO THE SUBMARINE; AND IT MUST BE CAPABLE OF BEING LAUNCHED, RECOVERED, RECHARGED AND MAINTAINED FROM THE SUBMARINE. THE SPECIFICATION DEVELOPED WILL ADDRESS THE PROPOSED MASTR VEHICLE DESIGN, THE ACOUSTIC SENSOR SYSTEMS AND NAVIGATION EQUIPMENT REQUIRED FOR THE MISSION, THE LAUNCH AND RECOVERY SYSTEM AND THE OPERATORS CONTROL STATION.

OVONIC IMAGING SYSTEMS INC
1896 BARRETT
TROY, MI 48084
CONTRACT NUMBER:
ADI ABILEAH
TITLE:
GRID FREE MODULAR LARGE SCREEN LIQUID CRYSTAL (LC) DISPLAYS WITH COLORS
TOPIC# 201 OFFICE: NOSC IDENT#: 37864

OVER THE PAST FEW YEARS OIS HAS DEVELOPED ACTIVE MATRIX LIQUID CRYSTAL DISPLAYS USING A BROAD RANGE OF AMORPHOUS SILICON ALLOY ADDRESSING DEVICES INCLUDING TFT'S, NIN DIODES, AND IN PARTICULARLY PIN DIODES. MOST OF OUR RECENT WORK IS CONCENTRATED ON DISPLAYS DRIVEN BY PIN DIODE SWITCHES. THESE DISPLAYS SHOW FULL COLOR VIDEO PERFORMANCE OVER A WIDE TEMPERATURE RANGE (-54 C TO 85 C), AND HAVE BEEN TESTED FOR MILITARY, AVIONIC AND AUTOMOTIVE APPLICATIONS. IN THIS PROJECT WE WILL EXPLORE THE FEASIBILITY OF PRODUCING LARGE GRID FREE MODULAR LCD BY MATCHING SMALLER DISPLAY COMPONENTS TO A DIVERGING FACE PLATE (FIBER OPTIC MICROCHANNEL PLATE WITH TILT TO 15 DEGREES AT THE EDGE FIBERS). IN PHASE I (THE CURRENT PROPOSAL) THE MAIN OBJECTIVES ARE TO ACHIEVE ACCEPTABLE RESOLUTION FOR A DISPLAY PLUS FACE PLATE COMBINATION, AND TO OPTIMIZE THE BACKLIGHT IN ORDER TO HAVE SUNLIGHT READABILITY (HIGH AMBIENT LIGHT LEVELS). THE DISPLAYS FOR THIS STUDY WILL BE OUR HIGH RESOLUTION (164 DOTS PER INCH) COLOR, ACTIVE MATRIX LCDS. THIS MAIN OBJECTIVE WILL INCLUDE THE OPTICAL MATCHING OF THE DISPLAY AND FACEPLATE, AND IMPROVING PHOTOMETRIC PERFORMANCE. A NEW TECHNIQUE USING THE FACEPLATE TO GET HIGHER CONTRAST RATIOS (CR), AND VISIBILITY NEARLY INDEPENDENT OF VIEWING ANGLE, WILL BE TESTED. PROTOTYPES USING THESE CONCEPTS WILL BE BUILT IN PHASE I ON A SMALL SCALE BUT WITH FULL PERFORMANCE. THIS

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WILL LEAD US TO SUCCESSFUL FULL SCALE INTERFACING BETWEEN ADJACENT DISPLAY UNITS IN PHASE II.

PAGE AUTOMATED TELECOMMUNICATIONS SYS
PO BOX 188 - RTE 2
LA HONDA, CA 94020
CONTRACT NUMBER:
PATRICIA WIENER
TITLE:
NEW PACKAGING TECHNOLOGIES FOR SENSOR BASED (FIBER OPTIC) COMPUTE SYSTEMS
TOPIC# 82 OFFICE: NAVAIR IDENT#: 36466

A NEW SENSOR CONFIGURATION HOLDS PROMISE FOR SIGNIFICANTLY IMPACTING THE INTERCONNECTIVITY CRISES AS IT RELATES TO PARALLEL SYSTEMS. THE NEED FOR AN ADEQUATE SENSING AND TRANSLATION (CAPABILITY) PATTERN RECOGNITION, ANY AUTOMATED DETECTION TECHNIQUE WHICH COULD ENABLE RESPONSES IN REAL TIME IS APPARENT. IT IS ANTICIPATED THAT INCREASED NUMBERS OF SENSORY ELEMENTS ABLE TO INTERACT WITH PROCESSING ELEMENTS WOULD ENABLE A SOLUTION TO ENHANCING PATTERN RECOGNITION AND REAL TIME SYSTEM OPERATION. THE ABILITY TO FABRICATE "SMART SKINS" PROVIDES THE POSSIBILITY OF RESOLVING SOME KEY TECHNOLOGICAL ISSUES IN AUTOMATION, ROBOTICS, ROBOTICS SYSTEMS, SENSING ARRAYS, IN ANY SYSTEM WHICH OPERATES PRIMARILY IN THE PERCEPTUAL, ACTION AND DECISION-MAKING DOMAINS. THE FABRICATION OF FIBER OPTIC MULTIPLE SENSORS IN A DENSE STRUCTURE CAPABLE OF SENSING DIFFERENT MODALITIES APPEARS FEASIBLE. IN THE PHASE I PORTION OF THIS PROJECT A FABRICATING METHODOLOGY FOR DEVELOPING A MULTISENSOR SYSTEM WILL BE TESTED. THIS "SMART SKIN" CONCEPT IS AN INNOVATION FOR THE PHYSICAL REALIZATION OF COMPLEX SENSOR BASED, REAL TIME SYSTEMS. THIS PROPOSAL ADDRESSES THIS QUESTION.

PASK RESEARCH & ENGINEERING INC
1022 FRANCISCA CT
PINOLE, CA 94564
CONTRACT NUMBER:
DR JOSEPH A PASK
TITLE:
JOINING ALUMINA TO SAPPHIRE FOR COPPER VAPOR LASER TUBES
TOPIC# 16 OFFICE: MCRDAC IDENT#: 37312

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THE PROPOSED PHASE I RESEARCH HAS SEVERAL ELEMENTS. THREE APPROACHES TO JOINING SAPPHIRE TO ALUMINA WILL BE EXPLORED: 1) SOLID-STATE OR DIRECT JOINING, 2) USE OF A METALLIC (Nb OR Pt OR THEIR ALLOYS) INTERLAYER, AND 3) JOINING WITH A DEVITRIFIABLE GLASS. BOND STRENGTH, VACUUM TIGHTNESS, THERMOCHEMICAL COMPATIBILITY (OF THE BOND) WITH COPPER, AND RESISTANCE TO FAILURE DURING THERMAL CYCLING UP TO 1500 DEG C WILL BE EVALUATED AND WILL INDICATE THE RELATIVE STRENGTHS AND WEAKNESSES OF THE THREE APPROACHES. THIS INFORMATION, IN CONJUNCTION WITH AN ASSESSMENT OF THE RELATIVE EASE OF APPLYING THESE TECHNIQUES TO (LARGER-SCALE) COPPER VAPOR LASER SYSTEMS, WILL BE USED TO DETERMINE AND PRIORITIZE THE RESEARCH APPROACHES TO BE USED DURING PHASE II. PHASE II WORK WOULD FOCUS ON FABRICATION AND EVALUATION OF SEALED TUBES. SINCE LONG-TERM CONTAINMENT OF COPPER VAPOR AND SUSTAINED LASER OPERATION ARE THE GOALS OF SEALED-TUBE TECHNOLOGY, PHASE II RESEARCH WOULD ALSO ADDRESS THE CRITICAL ISSUES OF LONG-TERM MICROSTRUCTURAL, THERMOMECHANICAL AND THERMOCHEMICAL STABILITY.

PDA ENGINEERING
2975 REDHILL AVE
COSTA MESA, CA 92626
CONTRACT NUMBER:
DOUGLAS A MARX
TITLE:
SILICON-CARBIDE REINFORCED ALUMINUM FOR LIGHTWEIGHT TORPEDO HULL APPLICATIONS
TOPIC# 110 OFFICE: NAVSEA IDENT#: 36818

TORPEDO HULL SECTIONS ARE CURRENTLY EITHER CAST OR FORGED FROM ALUMINUM. DUE TO THE INHERENTLY MODERATE STRENGTH AND STIFFNESS TO WEIGHT RATIOS AFFORDED BY ALUMINUM, RELATIVELY THICK TORPEDO HULL SECTIONS ARE REQUIRED TO WITHSTAND THE HYDRODYNAMIC LOADS ENCOUNTERED DURING DEEP DEPTH OPERATIONS AS WELL AS THE DYNAMIC LOADS ENCOUNTERED DURING SURFACE TESTING. CONSEQUENTLY, THE MAJORITY OF THE TORPEDO WEIGHT IS ATTRIBUTABLE TO THE HULL, THEREBY SEVERELY LIMITING THE INTERNAL PAYLOAD, INCLUDING BATTERIES, MOTOR, AND ORDNANCE THAT CAN BE PACKAGED ONBOARD. IN AN EFFORT TO IMPROVE OVERALL TORPEDO CAPABILITY, IT IS DESIRABLE TO REDUCE THE HULL SECTION WEIGHT. TO

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ACCOMPLISH THIS, REQUIRES FABRICATING TORPEDO HULLS FROM ALTERNATE MATERIALS EXHIBITING MUCH GREATER STRENGTH AND STIFFNESS TO WEIGHT RATIOS. HOWEVER, THESE ALTERNATE MATERIALS MUST ALSO BE CAPABLE OF ACCOMMODATING A SEGEMENTED HULL CONSTRUCTION WITH PENETRATORS AND BE COST COMPETITIVE WITH EXISTING ALUMINUM ALLOYS PRESENTLY IN USE. SILICO-CARBIDE PARTICULATE REINFORCED ALUMINUM METAL MATRIX COMPOSITES AFFORD EXCEPTIONALLY HIGH STRENGTH AND STIFFNESS TO WEIGHT RATIOS AT A VERY AFFORDABLE PRICE WHILE STILL MAINTAINING MANY OF THE DESIRABLE MANUFACTURING CHARACTERISTICS OF ALUMINUM. FOR THIS REASON, SILICON-CARBIDE REINFORCED ALUMINUM APPEARS TO BE AN EXCELLENT MATERIAL FOR FABRICATING HIGH STRENGTH, LIGHT WEIGHT TORPEDO HULL SECTIONS. THE PROPOSED EFFORT PRESENTED HERE WILL ATTEMPT TO MAKE A PRELIMINARY ASSESSMENT OF THE FEASIBILITY OF USING SILICON-CARBIDE REINFORCED ALUMINUM IN TORPEDO HULL SECTIONS. THIS EFFORT WILL ENTAIL BOTH A PRELIMINARY CHARACTERIZATION OF MATERIAL PROPERTIES AS WELL AS AN ESTIMATE OF THE POTENTIAL WEIGHT SAVINGS ACHIEVABLE WITH A SILICON-CARBIDE ALUMINUM METAL MATRIX COMPOSITE.

PDI CORP
2200 SOMERVILLE RD
ANNAPOLIS, MD 21401
CONTRACT NUMBER:
E J LECOURT JR
TITLE:
CONTINUOUSLY ADJUSTABLE ELECTRICALLY OPERATED CONTROL VALVE
TOPIC# 179 OFFICE: NAVAIR IDENT#: 37660

CURRENT STEAM CATAPULT TECHNOLOGY USES AN OPEN-LOOP CONTROL SYSTEM TO LAUNCH AIRCRAFT FROM CARRIER DECKS. THIS SYSTEM DOES NOT MINIMIZE THE QUANTITY OF STEAM REQUIRED AND REQUIRES HIGH SHIP SPEED TO ACHIEVE THE REQUIRED AIR SPEED FOR SAFE LAUNCHES. IT IS PROPOSED TO DESIGN AND ANALYZE A CLOSED-LOOP CONTROL SYSTEM WHICH MEASURES STEAM PRESSURE, AIRCRAFT ACCELERATION, VELOCITY, AND POSITION AND USES THESE VARIABLES AS FEEDBACK TO PROVIDE CONSTANT ACCELERATION DURING THE LAUNCH. THE TECHNICAL OBJECTIVE FOR PHASE I IS TO DETERMINE THE FEASIBILITY OF THE PROPOSED CLOSED-LOOP SYSTEM. TASK 1 OF THE PROJECT WILL ESTABLISH THE REQUIREMENTS FOR THE SYSTEM IN TERMS OF LAUNCH PERFORMANCE. A PRELIMINARY DESIGN OF THE CONTROL SYSTEM WILL BE PREPARED IN TASK 2 INCLUDING AN INVESTIGATION OF THE REQUIRED

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SENSORS. IN TASK 3 MATHEMATICAL MODELS WILL BE DEVELOPED FOR ALL OF THE CATAPULT SYSTEM COMPONENTS INCLUDING THE STEAM SYSTEM, ROTARY STEAM VALVE, CATAPULT CYLINDERS, AND CONTROL SYSTEM. THE DYNAMIC PERFORMANCE OF THE SYSTEM WILL BE PREDICTED USING A COMPUTER SIMULATION IN TASK 4. DOCUMENTATION PREPARED IN TASK 5 WILL CONSIST OF A DESCRIPTION OF THE SYSTEM, SCHEMATIC DRAWINGS, BLOCK DIAGRAMS OF THE CONTROL SYSTEM, AND THE RESULTS OF THE DYNAMIC ANALYSIS.

PERRY TECHNOLOGIES
275 W 10TH ST
RIVIERA BEACH, FL 33404
CONTRACT NUMBER:
PAUL D RUSHFELDT
TITLE:
TECHNOLOGY FOR DEVELOPMENT OF A MINE AVOIDANCE SUBMARINE-TETHERED REMOTE OPERATING VEHICLE
TOPIC# 107 OFFICE: NAVSEA IDENT#: 36775

UNITED STATES SUBMARINES WILL BE FACED WITH SITUATIONS WHERE THEY WILL ENCOUNTER MINEFIELDS IN THEIR OPERATIONS AND AT THE PRESENT TIME THEY MUST AVOID THOSE AREAS. CURRENT MINE LOCATION SONAR SYSTEMS ARE ONLY FOR THE PURPOSE OF MINE AVOIDANCE, FINDING THE MINE FIELD SO THAT THE SHIP CAN AVOID THE AREA. IN ADDITION, THE CURRENT SYSTEMS CANNOT DETECT MINES THAT ARE CLOSELY TETHERED TO THE BOTTOM OR VERY CLOSE TO THE TOP AT SUFFICIENT DISTANCES TO BE OPERATIONALLY USEFUL. IN FACT, IT CAN BE SHOWN THAT IT IS NOT POSSIBLE TO DETECT THESE MINES FROM THE PLATFORM AT OPERATIONAL RANGES. THIS PROJECT PROVIDES A SUBMARINE-TETHERED REMOTE OPERATED VEHICLE (ROV) THAT WILL OPERATE FORWARD OF A TRANSITING SUBMARINE AND PROVIDE MINE DETECTION AND CLASSIFICATION INFORMATION TO THE SUBMARINE SO THAT IT CAN BE MANEUVERED SAFELY THROUGH A MINEFIELD. THIS IS POSSIBLE BECAUSE THE MINE DETECTION SENSORS ARE DEPLOYED SUFFICIENTLY IN FRONT OF THE SUBMARINE THAT THE REQUIRED OPERATIONAL RANGE CAN BE MET. PHASE I OF THIS PROJECT PROVIDES A CONCEPT DESIGN FOR A SUBMARINE-TETHERED ROV SYSTEM THAT IS OPERATED FROM AND RETURNS TO THE HOST SUBMARINE. THE SYSTEM DESIGN ADDRESSES THE THREAT ENVELOPE OF MODERN MINES, THE HIGH-RESOLUTION SONAR CAPABILITIES FOR MINE DETECTION.CLAS-SIFICATION, THE REMOTE OPERATING VEHICLE (ROV) THAT CARRIES THE SEARCH SENSORS FORWARD OF THE SUBMARINE, AND THE LAUNCH AND RECOVERY

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SYSTEM FOR THE ROV.

PHLOGISTRONICS
96 WASHINGTON AVE
WALTHAM, MA 02154
CONTRACT NUMBER:
SCOTT HYNEK
TITLE:
DEVELOPMENT OF UNDERWATER CRYOCUTTER
TOPIC# 188 OFFICE: NCSC IDENT#: 37749

A JET OF LIQUID NITROGEN SHOULD BE ABLE TO CUT UNDERWATER STRUCTURAL MATERIALS, BY INTRODUCING THERMAL STRESSES AND BY RENDERING THE MATERIAL BRITTLE AND THUS VULNERABLE TO THERMAL ATTACK. TO SUCCESSFULLY MAINTAIN A JET OF LIQUID NITROGEN IN WATER, HOWEVER, ONE MUST AVOID CERTAIN ADVERSE PHENOMENA: UNCONTROLLED BOILING OF LIQUID NITROGEN WITHIN A CLOSED VOLUME, PREMATURE BOILING OF THE LIQUID JET WITHIN THE NOZZLE, HEAR OR MOMENTUM TRANSFER BETWEEN THE JET AND THE WATER, FREEZING OF WATER ABOUT THE NOZZLE WHEN THE JET IS INACTIVE, AND FREEZING OF ANY MOVING PARTS WITHIN THE DEVICE. WE PROPOSE TO DESIGN TWO DEVICES, A PORTABLE SYSTEM AND A LONG-DURATION SYSTEM, THAT AVOID THESE PHENOMENA; AND TO BUILD AND TEST A LABORATORY PROTOTYPE.

PHOENIX DIGITAL CORP
2315 N 35TH AVE
PHOENIX, AZ 85009
CONTRACT NUMBER:
RONALD A BROWN
TITLE:
BASEBAND/BROADBAND FAULT TOLERANT FIBER OPTIC LOCAL AREA NETWORK FOR SAFENET SHIPBOARD COMMUNICATION SYSTEMS
TOPIC# 99 OFFICE: NAVSEA IDENT#: 36670

A FIBER OPTIC LOCAL AREA NETWORK (LAN) DEVELOPMENT PROJECT IS PROPOSED TO PROVIDE FAULT TOLERANT, SECURE SHIPBOARD COMMUNICATIONS. THE LAN WILL UTILIZE PHOENIX DIGITAL'S FAULT TOLERANT, "SELF-HEALING"

SUBMITTED BY

FIBER OPTIC COMMUNICATIONS TECHNOLOGY, IN CONJUNCTION WITH GTE'S BIREFRINGENT WAVELENGTH DIVISION MULTIPLEXER (BWDM) TECHNOLOGY. THE BWDM ALLOWS MULTIPLE OPTICAL COMMUNICATION CHANNELS IN A SPECIFIC FIBER TRANSMISSION WINDOW TO BE SENT OVER A SINGLE FIBER, THUS ENABLIG DIFFERENT COMMUNICATION PROTOCOLS TO BE ENCODED BY WAVELENGTH AND TRANSMITTED OVER THE SAME PHYSICAL NETWORK CARRIER. SUBCARRIER MULTIPLEXING WILL BE USED TO PROVIDE A METHOD FOR ALLOCATING VOICE CHANNELS TO THE NETWORK. WHILE THIS TECHNOLOGY HAS BEEN DEVELOPED FOR TELECOMMUNICATION APPLICATIONS BY GTE CORPORATION, PHOENIX DIGITAL HAS RECEIVED A LICENSE TO APPLY THIS ADVANCED TECHNOLOGY TO MILITARY LAN COMMUNICATIONS. THE PROJECT OBJECTIVES WILL BE TO SPECIFY, DESIGN AND BUILD A WORKING PROTOTYPE MODEL OF AN OPTICAL LAN TO DEMONSTRATE HOW ADMINISTRATIVE VOICE, TACTICAL VOICE, AND CONTROL/DATA CAN BE ENCODED AND COMMUNICATED OVER MULTIPLE OPTICAL WAVELENGTHS IN A SINGLE OPTICAL CONDUCTOR. NEW, HEURISTIC TECHNIQUES FOR PROVIDING HIGH SPEED COMMUNICAITON WRAPBACK FAULT TOLERANCE WILL ALSO BE INCLUDED IN THE DEMONSTRATION. THE PHASE I DEMONSTRATION WILL PROVIDE THE PROOF OF CONCEPT NECESSARY TO PROCEED WITH A PHASE II IMPLEMENTATION OF A FAULT TOLERANT, BROADBAND OPTICAL COMMUNICATION TECHNOLOGY, COMPATIBLE WITH NAVY COMMUNICATION STANDARDS SAFENET I AND II.

PHOTO-METRICS INC
4 ARROW DR
WOBURN, MA 01801
CONTRACT NUMBER:
DR PATRICK J McNICHOLL
TITLE:
REMOTE WIND SENSING
TOPIC# 180 OFFICE: NAVAIR IDENT#: 37672

WE PROPOSE A PROCEDURE FOR MAPPING THE THREE DIMENSIONAL WIND FIELD ABOUT THE SUPERSTRUCTURE OF SHIPS USING AN EYESAFE, COHERENT, PULSED, BACKSCATTER LIDAR. PRESENT OPTICAL HETERODYNE DETECTION TECHNIQUES TOGETHER WITH RECENT LASER ADVANCES ALLOW FOR ATTAINMENT OF THE SPATIAL AND VELOCITY RESOLUTION NECESSARY FOR THE EVALUATION OF WIND EFFECTS ON ARRIVING/DEPARTING AIRCRAFT. THE DATA PROCESSING PROPOSED WILL PROVIDE FOR BOTH REALTIME RANGE VS RADIAL VELOCITY DISPALY AND DATA STORAGE FOR LATER ANALYSIS. THE REAL TIME DISPLAY

SUBMITTED BY

WILL ENABLE REMOTE SAMPLING OF WIND ALONG THE FLIGHT PATH UNDER OPERATIONAL CONDITIONS.

PHOTONIC SYSTEMS INC
1900 S HARBOR CITY BLVD
MELBOURNE, FL 32901
CONTRACT NUMBER:
DENNIS R PAPE
TITLE:
HIGH-SPEED OPTICAL RANGE/DOPPLER SIGNAL PROCESSOR
TOPIC# 163 OFFICE: NSWC IDENT#: 36172

HIGH PERFORMANCE AIR TARGETS ARE BECOMING INCREASINGLY DIFFICULT TO DETECT, TRACK, AND IDENTIFY WITH CURRENT RADAR SIGNAL PROCESSING TECHNOLOGY. IMPROVED RADAR RANGE AND DOPPLER PERFORMANCE CAN BE OBTAINED BY UTILIZING LARGE TIME-BANDWIDTH PRODUCT SIGNALS. THESE SIGNALS, HOWEVER, ARE PARTICULARLY DIFFICULT TO PROCESS WITH CURRENT DIGITAL SIGNAL PROCESSING TECHNOLOGY. OPTICAL SYSTEMS, ON THE OTHER HAND, HAVE THE CAPABILITY OF PERFORMING LARGE NUMBERS OF COMPLEX MULTIPLICATIONS AND ADDITIONS IN REAL-TIME. USING ACOUSTO-OPTIC TECHNOLOGY, WE PROPOSE TO DEVELOP A COMPACT OPTICAL SIGNAL PROCESSOR CAPABLE OF PERFORMING WIDEBAND PULSE COMPRESSION, RANGE GATING, AND DOPPLER FILTERING. THIS PROCESSOR, WITH AN ORDER-OF-MAGNITUDE HIGHER PROCESSING SPEED THAN THAT POSSIBLE WITH DIGITAL SIGNAL PROCESSING TECHNOLOGY, CAN COMPRESS 200 MHz BANDWIDTH SIGNALS AND RESOLE 1000 RANGE BINS AND 1000 FREQUENCIES IN REAL-TIME. BECAUSE OF ITS SMALL SIZE AND WEIGHT, LOW POWER CONSUMPTION, AND POTENTIALLY LOW PRO-DUCTION COST, THE OPTICAL PROCESSOR CAN BE INSERTED INTO A NUMBER OF RADAR APPLICATIONS. THE HIGH-SPEED PARALLEL SPECTRAL PROCESSING FEATURE OF THE PROCESSOR MAKES IT ATTRACTIVE FOR COMMERCIAL SIGNAL PROCESSING APPLICATIONS AS WELL, INCLUDING SEISMIC PROCESSING.

PHYSICAL DYNAMICS
7855 FAY AVE - STE 200
LA JOLLA, CA 92037
CONTRACT NUMBER:
BRUCE J WEST
TITLE:
PROCESSING TECHNIQUES FOR CHAOTIC TIME SERIES
TOPIC# 77 OFFICE: NAVAIR IDENT#: 36400

SUBMITTED BY

RECENTLY A NEW PARADIGM FOR THE INTERPRETATION OF IRREGULAR APERIODIC TIMES SERIES HAS EMERGED, BASED ON THE DYNAMICS OF THE LOW-DIMENSIONAL NONLINEAR SYSTEMS AND DISTINGUISHES BETWEEN "NOISE" AS TRADITIONALLY USED IN STATISTICS AND THE NOTION OF "CHAOS," WHICH IS RANDOMNESS GENERATED BY DETERMINISTIC EQUATIONS OF MOTION. WE PROPOSE TO INVESTIGATE THE FEASIBILITY OF METHODS TO DISTINGUISH BETWEEN THESE TWO SOURCES OF IRREGULARITY IN TIME SERIES DATA IN ORDER TO TEST NEW NONLINEAR FORECASTING TECHNIQUES. IN PARTICULAR, WE PROPOSE TO SURVEY THE FIELD OF CHAOS TECHNOLOGY WITH A VIEW TO APPLYING THESE TECHNIQUES TO THE ANALYSIS AND DISPLAY OF BROADBAND ACOUSTIC SIGNALS.

PHYSICAL OPTICS CORP
2545 W 237TH ST - STE B
TORRANCE, CA 90505
CONTRACT NUMBER:
DR FREDDIE LIN
TITLE:
REAL-TIME OPTICAL HOLOGRAPHIC POLYNOMIAL PROCESSOR FOR GENERAL NONLINEAR TRANSFORMS
TOPIC# 162 OFFICE: NSWC IDENT#: 36161

THE GOAL OF THIS PROGRAM IS TO FILL THE NEED FOR A REAL-TIME OPTICAL NONLINEAR SIGNAL PROCESSOR FOR RADAR AND SONAR APPLICATIONS. THE MOTIVATION FOR THIS PROPOSED WORK IS TO OPTICALLY IMPLEMENT A GENERAL CLASS OF NONLINEAR TRANSFORMS, INCLUDING THE LOG FUNCTION, VIA A POLYNOMINAL APPROXIMATION, SINCE MOST NONLINEAR FUNCTIONS CAN BE ACCURATELY APPROXIMATED BY A POLYNOMIAL TERM. THE PROPOSED POLY-NOMIAL PROCESSORS ARE BASED ON A STACKED HOLOGRAPHIC ELEMENT ARRAY WHICH IS RECONSTRUCTED BY AN OFF-BRAGG LASER BEAM. BY MEANS OF A CASCADED OFF-BRAGG RECONSTRUCTIONS, A SERIES OF POLYNOMINAL TERMS IS GENERATED AT LIGHT-TRANSMIT SPEEDS. THE PROPOSED PROCESSORS PROVIDE VERY HIGH PARALLELISM, HIGH SPEED (us"ns) AND LARGE DYNAMIC RANGE (>2000:1). THE PROCESSING CAN BE DONE EITHER IN 3D FREE SPACE OR IN 2D PLANAR WAVEGUIDE CONFIGURATION. IN PARTICULAR, 3D POLYNOMIAL PROCESSORS CAN ALSO EVALUATE BIVARIATE POLYNOMIALS AND BIPOLAR POLYNOMIAL PROCESSING CAN BE REALIZED USING POLARIZATION HOLOGRAPHIC MATERIALS.

SUBMITTED BY

PHYSICAL OPTICS CORP
2545 W 237TH ST - STE B
TORRANCE, CA 90505
CONTRACT NUMBER:
DR TOMASZ JANNSON
TITLE:
DEVELOPMENT OF FUTURE HIGHLY PARALLEL WAVELENGTH DIVISION MULTIPLEXING SHIPBOARD VOICE COMMUNICATION NETWORKS
TOPIC# 99 OFFICE: NAVSEA IDENT#: 36671

PHYSICAL OPTICS CORPORATION (POC) PROPOSES THE NEAR-TERM DEVELOPMENT OF NOVEL FIBER-OPTIC WDM NETWORKS TO INCREASE THE NETWORK PERFORMANCE (USER POPULATION, NETWORK CAPACITY, NETWORK ACCESS TIME, ETC.) OF FUTURE NAVY SHIPBOARD VOICE COMMUNICATION NETWORKS. FIBER OPTIC WDM NETWORKS CAN NOT ONLY ACHIEVE HIGHER NETWORK AGGREGATE BANDWIDTHS BUT ALSO WILL RESULT IN HIGHLY PARALLEL (> 100 CHANNELS) SIMULTANEOUS COMMUNICATION. CONVENTIONAL FIBER OPTIC TDM (OR OTHER MULTIPLE ACCESS) NETWORKS CAN ACHIEVE RELATIVELY HIGH BANDWIDTHS (10 Mb/s - 10 Gb/s) BUT RESULT IN EITHER INEFFICIENT UTILIZATION OF THE COMMUNICATION MEDIA OR LONG NETWORK ACCESS TIMES (DUE TO MANY COLLISIONS). WDM CAN ALLOW HIGH CIRCUIT AVAILABILITY (UP TO 100%) FOR CRITICAL CHANNELS, POINT-TO-POINT COMMUNICATION FOR TACTICAL CHANNELS, AND BROADCAST-TYPE COMMUNICATIONS FOR ADMINISTRATIVE CHANNELS. WHILE ALSO INTEGRATING MIXED-MEDIA DATA (VOICE, VIDEO, COMPUTER, RADAR, ETC.) TYPES IN A SINGLE NETWORK. FURTHER, WDM NETWORKS CAN ALSO BE ENTIRELY PASSIVE (NO EMI EFFECTS, COST REDUCTION, NO POWER CONSUMPTION, NUCLEAR/SPACE HARDENED). POC'S MOLECULAR WDM NETWORK DESIGN ALLOWS THE ADDITION OF USERS (OR GROUPS OF USERS) INTO THE SYSTEM WITH NO IMPACT ON SYSTEM PERFORMANCE. THIS MODULAR APPROACH ENHANCES THE NETWORK'S GROWTH AND ROBUTNESS POTENTIAL.

PHYSICAL RESEARCH INC
2769 - 152ND AVE NE
REDMOND, WA 98052
CONTRACT NUMBER:
GERLAD L FITZPATRICK
TITLE:
VIBRATION DETECTORS USING MAGNETIC SUSPENSION VIA HIGH TEMPERATUR SUPERCONDUCTORS
TOPIC# 127 OFFICE: NAVSEA IDENT#: 35827

SUBMITTED BY

THERE EXISTS A NEED FOR INEXPENSIVE, LOW FREQUENCY (0.001 Hz TO 50 Hz) ULTRASENSITIVE VIBRATION DETECTORS. RUGGEDNESS, STABILITY, DYNAMIC RANGE, SENSITIVITY AND COST ALL COMBINE TO LIMIT IN ONE WAY OR ANOTHER THE USE OF CONVENTIONAL DEVICES. RECENT RESEARCH WITH THE NEW CLASS OF HIGH TEMPERATURE CERAMIC SUPERCONDUCTORS AND WITH EDDY CURRENT DISPLACEMENT GAUGES HAS PROVIDED A NEW APPROACH TO THESE VIBRATION DETECTORS. THE MEISSNER EFFECT CAN BE USED TO LEVITATE SMALL MAGNETS ABOVE A SPECIALLY SHAPED SUPERCONDUCTOR (SUCH AS YBa(2)Cu(2)O(6.5) AT 77 DEG K) AND AN EDDY CURRENT DEVICE CAN BE USED TO DETECT THE MOTION OF THIS MAGNET IN RESPONSE TO DISTURBANCES. BECAUSE THE LEVITATION IS ESSENTIALLY "FRICTIONLESS", AND BECAUSE EQUILIBRATION SHOULD BE VERY RAPID, DRIFT MIGHT BE ALMOST NONEXISTENT IN SUCH INSTRUMENTS. PRELIMINARY INVESTIGATIONS INDICATE THAT SUCH SYSTEMS SHOULD BE LOW COST, VERY RUGGED DURING TRANSPORT AND SETUP, AND HAVE SUFFICIENT BANDWIDTH, DYNAMIC RANGE AND SENSITIVITY TO COMPETE FAVORABLY WITH CONVENTIONAL DETECTORS. THE ADVENT OF SUCH ULTRASENSITIVE DEVICES COULD GREATLY FACILITATE MONITORING OF LOW FREQUENCY VIBRATION, PERHAPS FORMING THE NUCLEUS OF A VERY SENSITIVE DRY SIDE SONAR DETECTION SYSTEM.

PHYSICAL SCIENCES INC
PO BOX 3100 - RESEARCH PK
ANDOVER, MA 01810
CONTRACT NUMBER:
LAWRENCE G PIPER
TITLE:
OIL CONTAMINANT MONITOR
TOPIC# 123 OFFICE: NAVSEA IDENT#: 35779

IN THIS PHASE I PROPOSAL WE PROPOSE TO TEST THE FEASIBILITY OF DEVELOPING A MONITOR FOR CONTAMINATION LEVELS IN ENGINE OIL USING A SIMPLE SENSITIVE FLUORESCENCE TECHNIQUE BASED UPON ACTIVE-NITROGEN EXCITATION OF NINE METAL CONTAMINANTS THAT HAVE BEEN PREVIOUSLY DEMONSTRATED TO MONITOR ENGINE WEAR. WE WILL EXCITE THESE METAL EMISSIONS IN A NITROGEN AFTERGLOW. THIS FORM OF EXCITATION GIVES SELECTIVE EXCITATION OF ONLY A FEW STRONG LINES OF EACH OF THE METALS. THE PHASE I PROPOSAL HAS TWO PURPOSES. THE FIRST IS TO DETERMINE WHICH OF TWO NITROGEN AFTERGLOW ALTERNATIVES IS SIMPLEST TO IMPLEMENT

SUBMITTED BY

AND MOST SENSITIVE, AND TO IDENTIFY THE PRINCIPAL DIAGNOSTIC LINES OF EACH ELEMENT. THE SECOND IS TO TEST THE POSSIBILITY THAT THE ENERGY IN THE ACTIVE NITROGEN ITSELF WILL ATOMIZE METAL PARTICLES SUFFICIENTLY TO PERMIT SENSITIVE SPECTRAL IDENTIFICATION. INFORMATION GATHERED IN THIS PROGRAM WILL ALLOW THE DESIGN OF A PROTOTYPE SYSTEM DURING THE PHASE II PROGRAM WHICH WILL ALLOW SIMULTANEOUS DETERMINATION OF ALL CONTAMINANT METALS.

PHYSICS MATHEMATICS & COMPUTERS INC
PO BOX 787
SOCORRO, NM 87801
CONTRACT NUMBER:
PATRICK BUCKLEY
TITLE:
RADIATION TRANSPORT MODELING ON A PARALLEL COMPUTER
TOPIC# 135 OFFICE: NSWC IDENT#: 35869

A LAMBERTIAN ATTENUATION MODEL WILL BE COMBINED WITH A VERY FAST RAY TRACING ALGORITHM ON A NETWORK OF TRANSPUTER ELEMENTS TO DETERMINE THE APPLICABILITY OF PARALLEL COMPUTING TO EXAMPLE RADIATION TRANSPORT MODELING.

PLANNING SYSTEMS INC
7925 WESTPARK DR
McLEAN, VA 22102
CONTRACT NUMBER:
DAVID S WOOLLEN
TITLE:
CHAOTIC/FRACTAL PROCESSING AND DISPLAY METHODS
TOPIC# 77 OFFICE: NAVAIR IDENT#: 36399

IN THIS EFFORT WE PROPOSE TO APPLY CERTAIN RECENTLY DEVELOPED ALGORITHMS TO THE PROBLEM OF CHARACTERIZING STRANGE ATTRACTORS RECONSTRUCTED FROM ACOUSTIC TIME SERIES DATA. THESE ALGORITHMS ARE NOW IN RELATIVELY COMMON USE IN EXPERIMENTAL DATA ANALYSIS OF CHAOTIC SYSTEMS AND HAVE ENJOYED REASONABLE SUCCESS AGAINST REAL WORLD DATA. IN PARTICULAR, WE PROPOSE TO USE GENERALIZED CORRELATION INTEGRALS

SUBMITTED BY

TO MEASURE THE HAUSDORFF (FRACTAL) DIMENSION OF THE ATTRACTOR, TO DISTINGUISH BETWEEN DETERMINISTIC CHAOS AND WHITE NOISE, AND TO DISPLAY A SPECTRUM OF DIMENSIONS OF ATTRACTORS IN THE DATA SETS.

PLANNING SYSTEMS INC
7925 WESTPARK DR
McLEAN, VA 22102
CONTRACT NUMBER:
ALLEN BARNES
TITLE:
NEURAL NET SOFTWARE APPLICATIONS
TOPIC# 98 OFFICE: NAVSEA IDENT#: 36661

THE INTEREST IN BUILDING INTELLIGENT MACHINES IS A CENTURIES OLD GOAL OF MANKIND. SERIOUS RESEARCH INTO BUILDING INTELLIGENT MACHINES BEGAN IN THE EARLY PART OF THIS CENTURY. WHILE NEURAL NETWORKS HAVE BEEN AROUND FOR SEVERAL DECADES, IT HAS ONLY BEEN IN THIS DECADE, IN PARTICULAR, THE LAST 2 YEARS, THAT SIGNIFICANT RESEARCH AND APPLICATIONS HAVE BEEN PRODUCED. THIS RESEARCH HAS SPAWNED THE CREATION OF MANY NEW SOFTWARE TOOLS TO MODEL NEURAL NETWORK ARCHITECTURES AND CAPABILITIES. THE AVAILABILITY OF THESE COMMERCIALLY AVAILABLE PACKAGES WILL ALLOW NEURAL NETWORK RESEARCH AND PROTOTYPING TO BE DONE MORE RAPIDLY AND ALLOW RESEARCHERS TO CONCENTRATE ON HOW TO USE NEURAL NETWORKS RATHER THAN HOW TO CODE A SIMULATION. THE MAIN OBJECTIVE OF THE PHASE I EFFORT IS THE DETERMINATION OF THE MATURITY OF CURRENTLY AVAILABLE COMMERCIAL NEURAL NETWORK SOFTWARE TOOLS AND THE DEVELOPMENT OF A PLAN FOR USING THESE TOOLS IN CONJUNCTION WITH AVAILABLE EXPERT SYSTEM SOFTWARE. SPECIFICALLY, WE WILL SURVEY AND EVALUATE CURRENTLY AVAILABLE COMMERCIAL NEURAL NETWORK SOFTWARE SIMULATION PACKAGES, SELECT NEURAL NETWORK PACKAGES FOR EVALUATION, CHOOSE THREE NAVAL APPLICATIONS FOR SOLUTION BY A NEURAL NETWORK/EXPERT SYSTEM ENVIRONMENT, AND, FINALLY, SPECIFY THE STEPS NECESSARY TO IMPLEMENT EACH APPLICATION USING NEURAL NETWORK AND EXPERT SYSTEM SOFTWARE.

PLANNING SYSTEMS INC
7925 WESTPARK DR
McLEAN, VA 22102
CONTRACT NUMBER:
STEPHEN C SCHIFF
TITLE:
TACTICS DEVELOPMENT FOR COORDINATED USAGE OF ONBOARD/OFFBOARD ELECTRONIC WARFARE (EW) SYSTEMS
TOPIC# 120 OFFICE: NAVSEA IDENT#: 36894

SUBMITTED BY

THREAT ANALYSIS AND OWN FORCE CAPABILITIES ANALYSIS TASKS WILL BE PERFORMED TO MEET TWO MAJOR OBJECTIVES AND ONE SUBSIDIARY OBJECTIVE. THE MAJOR OBJECTIVES ARE TO IDENTIFY DEFICIENCIES IN CURRENT CAPABILITIES FOR COUNTERING THE ANTISHIP MISSILE THREAT, AND TO PROVIDE PRELIMINARY RECOMMENDATIONS OF PROPOSED COOPERATIVE TACTICS. THE SECONDARY OBJECTIVE IS TO PRODUCE A CONCRETE TACTICS PRODUCT THAT EXTENDS FLEET CAPABILITIES FOR COORDINATED MULTISHIP ANTISHIP MISSILE DEFENSE. THE THREAT ANALYSIS TASK WILL INCLUDE SOVIET, SOVIET-DERIVATIVE, AND WESTERN WEAPONS TOGETHER WITH THE SURVEILLANCE AND TARGETING SYSTEMS THAT SUPPORT THEM. EMPLOYMENT TACTICS WILL BE FULL TAKEN INTO ACCOUNT BY EMBEDDING THE WEAPONS CONSIDERATIONS WITH THE CONTEXT OF REALISTIC ACCEPTED SCENARIOS. VULNERABILITIES WILL BE ASSESSED FOR EACH MISSILE TYPE AS A FUNCTION OF THE ENGAGEMENT PHASE (E.G., MIDCOURSE GUIDANCE) AND SCENARIO AS A WHOLE. THE OWN FORCE CAPABILITIES ANALYSIS WILL EXAMINE CURRENT, DEVELOPMENTAL AND CONCEPTUAL SYSTEMS AND TACTICS THAT MIGHT BE APPLIED TO THE PROBLEM OF COORDINATED ONBOARD/OFFBOARD AND MULTISHIP COOPERATIVE COUNTERMEASURES. CAPABILITIES WILL BE MAPPED AGAINST VULNERABILITIES TO DETERMINE WHERE DEFICIENCIES OR OPPORTUNITIES EXIST. RESULTS OF THE ANALYSES WILL BE DOCUMENTED IN A MANNER SUITABLE FOR SUPPORTING THE NAVY PROGRAMMING AND DECISION PROCESSES AS WELL AS THE TECHNICAL AND TAC D&E COMMUNITIES.

PRB ASSOCS INC
47 AIRPORT VIEW DR
HOLLYWOOD, MD 20636
CONTRACT NUMBER:
JEFFREY CALLAHAN
TITLE:
BUSS - AN ADVANCED CONCEPT FOR ASW SEARCH AND SURVEILLANCE
TOPIC# 18 OFFICE: SPAWAR IDENT#: 37236

OVER THE PAST FIVE YEARS, THE SOVIET SUBMARINE FORCE HAS GROWN SIGNIFICANTLY QUIETER, MAKING DETECTION AND TRACKING BY CONVENTIONAL METHODS MUCH MORE DIFFICULT. THIS TREND IS EXPECTED TO CONTINUE IN THE FUTURE. GREATLY IMPROVED TECHNOLOGY AND INNOVATIVE CONCEPTS ARE REQUIRED TO COMPENSATE FOR LOSS OF ASW SEARCH CAPABILITY. BUSS (BUOYANT UNDERSEA SEARCH SYSTEM) IS A NOVEL APPROACH TO ADDRESSING

SUBMITTED BY

THE ASW SEARCH AND SURVEILLANCE PROBLEM IN BOTH THE OPEN OCEAN AND UNDER ICE. IT APPEARS TO OFFER POTENTIALLY SIGNIFICANT OPERATIONAL AND COST ADVANTAGES OVER OTHER PROPOSED SOLUTIONS TO THIS PROBLEM. PRB ASSOCIATES, INC. PROPOSES TO CONDUCT A FEASIBILITY STUDY OF THE BUSS CONCEPT, ADDRESSING OPERATIONAL, TECHNICAL AND COST ISSUES.

PRESEARCH INC
8500 EXECUTIVE PARK AVE
FAIRFAX, VA 22031
CONTRACT NUMBER:
MICHAEL LOMAN
TITLE:
ANTI-SUBMARINE WARFARE (ASW) COMMAND CONTROL COMMUNICATIONS AND INTELLIGENCE MODEL DEVELOPMENT
TOPIC# 23 OFFICE: SPAWAR IDENT#: 37418

NAVY DECISION MAKERS NEED AN ACCURATE AND RELIABLE ASW/C3I MODEL TO EVALUTE THE WARFIGHTING SUPPORT PROVIDED BY PRESENT AND FUTURE ASW COMMAND, CONTROL, COMMUNICATIONS AND INTELLIGENCE SYSTEMS. THE PRIORITY OF THIS REQUIREMENT IS INCREASING AS THE NAVY CONSIDERED ALTERNATIVE ARCHITECTURES FOR COUNTERING SOVIET ADVANCED SUBMARINES. THE ASW/C3I MODEL WILL PROVIDE VALUABLE INSIGHTS INTO THE INPACTS OF ORGANIZATIONAL RELATIONSHIPS, NEW SYSTEM CONCEPTS AND DESIGNS, AND ALTERNATIVE TECHNOLOGY INVESTMENTS. TO PROVIDE THESE INSIGHTS, THE MODEL MUST COMPREHENSIVELY ADDRESS SENSORS, SENSOR DATA COMMUNICATIONS, FUSION AND DATA ANALYSIS TO INCLUDE TRACK CORRELATION AND TARGET CLASSIFICATION AND DATA BASE MANAGEMENT, MAN-MACHINE INTERFACES, THE HUMAN DECISION PROCESS INVOLVING TACTICS AND ASW RESOURCE ALLOCATIONS, COMMAND COMMUNICATIONS AND ASW ENGAGEMENT RESULTS. THIS PROPOSAL DESCRIBES PRESEARCH'S APPROACH FOR DEVELOPING AN ASW/C3I MODEL USING AN OBJECT-ORIENTED PROGRAMMING LANGUAGE (SMALLTALK). THE PROPOSAL FIRST OUTLINES THE ELEMENTS AND FUNCTIONAL RELATIONSHIPS ATTENDANT WITH PROVIDING C3I SUPPORT OF THE ASW MISSION. IT NEXT DESCRIBES A PROGRAM FOR CONDUCTING A LITERATURE SEARCH OF PREVIOUS EFFORTS IN EACH AREA, ANALYZING FUNCTIONAL REQUIREMENTS, ASSESSING RISKS INHERENT IN DEVELOPMENT OF THE MODEL AND INITIATING THE TOP LEVEL DESIGN OF THE MODEL.

PROCESSING RESEARCH INC
8027 LEESBURG PIKE - STE 201
VIENNA, VA 22182
CONTRACT NUMBER:
DR CLARENCE H STEWART
TITLE:
WAVEFORM DESIGN TO DEFEAT INTERCEPT/IDENTIFICATION
TOPIC# 205 OFFICE: NOSC IDENT#: 37899

SUBMITTED BY

CURRENT, UBIQUITOUS TIME-OF-ARRIVAL (TOA) BASED INTERCEPT RECEIVER PROCESSING CAN BE EASILY DEFEATED BY RANDOMIZING THE RADAR PRI. CURRENTLY DEPLOYED SYSTEMS ALL EMPLOY SOME FORM OF (RELATIVELY) NARROW BANDWIDTH SUPERHETERODYNE-BASED INTERFEROMETER AS THE BASIC INTERCEPT RECEIVER ARCHIETECTURE; ADDITION OF PULSE-TO-PULSE RANDOM FREQUENCY AGILITY WILL FURTHER DEGRADE THE INTERCEPT CAPABILITY. USE OF A RADAR WAVEFORM WITH PSEUDORANDOM TIME AND (PULSE-TO-PULSE) FREQUENCY AGILITIES WILL EFFECTIVELY DENSY INTERCEPT TO THE NARROW BANDWIDTH SUPERHETERODYNE CLASS OF RECEIVER; THERE WOULD BE A LARGE SCAN-ON-SCAN REDUCTION IN PROBABILITY OF INTERCEPT (POI) IN BOTH THE FREQUENCY AND TEMPORAL DIMENSIONS. NEW INITIATIVES IN INTERCEPT RECEIVER DEVELOPMENT INCLUDE WIDE BANDWIDTH (2,000 MHz) PARALLEL PROCESSING CHANNELIZERS WITH OPTIONAL COLLECTION MODES WHICH CAN PRODUCE UP TO 50 dB OF PROCESSING GAIN. THE DESIGN OF A RADAR WAVEFORM (MODEL) WHICH CAN DEFEAT A TRULY MODERN INTERCEPT RECEIVER WHILE MAINTAINING TARGET ACQUISITION/TRACKING PERFORMANCE REQUIRES INDEPTH UNDERSTANDIG OF RADAR SYSTEMS AND CURRENT INTERCEPT SYSTEMS; PRI HAS THIS EXPERIENCE AND CAPABILITY.

PROCESSING RESEARCH INC (PRI)
8027 LEESBURG PIKE - STE 201
VIENNA, VA 22182
CONTRACT NUMBER:
DR VERNE NOMADY
TITLE:
FUNCTIONAL RECOGNITION OF RADAR SIGNALS
TOPIC# 121 OFFICE: NAVSEA IDENT#: 35746

ALGORITHMS WILL BE DEVELOPED THAT PERMIT AUTOMATIC IDENTIFICATION OF NAVY ESM CONTACTS BY FUNCTION. THE ALGORITHMS WILL PROVIDE A COMPUTER-BASED IMPLEMENTATION AND IMPROVEMENT IN TERMS OF RELIABLE IDENTIFICATION AND TIMELINESS, ANALOGOUS TO "THUMB RULES" USED BY OPERATORS TO REPORT EMITTER FUNCTIONS. THE APPROACH WILL IDENTIFY FUNCTIONAL RECOGNITION CATEGORIES IN THE CURRENT AND PROJECTED THREAT SIGNAL ENVIRONMENT AND DETERMINE THE PARAMETER RANGES IN EACH CATEGORY. THE THREAT WILL BE DEFINED IN TERMS OF RADAR FUNCTION AND DECISION ALGORITHMS DEVELOPED FOR USE IN IDENTIFYING THE RADAR FUNCTION FOR CONTACT REPORTING. THE IMPACTS OF PARAMETERS NOT

SUBMITTED BY

MEASURED BY THE ESM SYSTEM ON FUNCTIONAL RECOGNITION ARE ASSESSED AND POSSIBLE SOLUTIONS IDENTIFIED.

PRODUCT PLANNING INC
2125 OXFORD RD
DES PLAINES, IL 60018
CONTRACT NUMBER:
BERNARD BISHOP
TITLE:
AUTONOMOUS UNDERWATER VEHICLE ARRAY DEPLOYMENT SYSTEM
TOPIC# 2 OFFICE: ONR IDENT#: 37508

THE AUTONOMOUS UNDERWATER VEHICLE (AUV) HAS BECOME A REALITY OVER THE LAST TEN YEARS. THEY HAVE BEEN DESIGNED TO FUNCTION WELL IN HOSTILE ENVIRONMENTS BY THE OIL INDUSTRY FOR SUCH TASKS AS OIL RIG INSPECTION. WITH THE INEVITABILITY OF THE QUIET RUSSIAN SUBMARINE, THE NAVY WILL SOON HAVE TO APPLY NEW LEARNED AUV TECHNIQUES FOR SURVEILLANCE. IT SEEMS INEVITABLE THAT THE NAVY WILL WANT TO USE TETHERED TORPEDO VEHICLES TO IMPROVE SURVEILLANCE AND TRIANGULATION TECHNIQUES. WHEN THIS HAPPENS, THEY WILL HAVE TO FIND A WAY TO DEPLOY AND RETRIEVE A TOWED ARRAY FROM A TORPEDO. WE HAVE RECENTLY CONCEIVED NEW CAPSTAN TECHNIQUES WHICH COULD SOLVE THE UNIQUE PROBLEMS OF TORPEDO ARRAY DEPLOYMENT. OUR MECHANISM COULD BE DESIGNED VERY SMALL IN DIAMETER, LIGHT IN WEIGHT, QUIET RUNNING AND HAS LOW INERTIAL WITH HIGH EFFICIENCY. THE LONG TERM BENEFITS OF SUCH A SYSTEM ARE MANY, BUT THE LONG TERM PLANNING MUST BEGIN TODAY TO FULFILL THE NEEDS OF THE YEAR 2000. IT IS OUR INTENT TO VERIFY THE FEASIBILITY OF A LINEAR CAPSTAN DEVICE WITH AN INTERNAL DRUM STOWAGE. THE MAJOR DESIGN CRITERIA FOR PHASE I WILL BE UNDERSTANDING THE LIMITATIONS OF INTERNALLY WRAPPING AN ARRAY IN A DRUM. THE MEASURE OF THIS SUCCESS WILL BE RELIABILITY.

PSI TECHNOLOGY CO
PO BOX 3100 - RESEARCH PK
ANDOVER, MA 01810
CONTRACT NUMBER:
CONSTANCE L SENIOR
TITLE:
PRODUCTION OF COATED BORON POWDERS BY CHEMICAL VAPOR DEPOSITION
TOPIC# 7 OFFICE: ONR IDENT#: 37565

SUBMITTED BY

BORON POWDER IS DESIRED FOR USE IN PROPELLANT AND EXPLOSIVE APPLICATIONS BECAUSE OF ITS HIGH ENERGY DENSITY, BUT COMMERCIALLY AVAILABLE BORON HAS SEVERE DRAWBACKS. WE PROPOSE TO DEVELOP A PROCESS TO MANUFACTURE HIGH PURITY, OXYGEN-FREE BORON POWDER WITH PARTICLE SIZES IN THE RANGE 1-5 um. IN PHASE I, WE WILL DEMONSTRATE THE FEASIBILITY OF PRODUCING BORON POWDER BY A TWO-STEP PROCESS. IN THE FIRST STEP, SMALL SEED PARTICLES ARE FORMED BY DECOMPOSITION OF BCl(3) WITH A CO(2) LASER. IN THE SECOND STEP, SEED PARTICLES ENTER A FURNACE WHERE THERMAL PYROLYSIS OF B(2)H(6) PROVIDES A SOURCE OF CONDENSABLE VAPOR. SEED PARTICLES GROWN BY CONDENSATION, WHILE HOMOGENEOUS NUCLEATION IS SUPPRESSED BY THE PRESENCE OF SEED PARTICLES. WE WILL WORK IN PARTNERSHIP WITH CVD, INC., A COMPANY WITH EXPERIENCE IN THE APPLICATION OF COATINGS BY CHEMICAL VAPOR DEPOSITION AND IN SCALING UP CVD PROCESSES, TO IDENTIFY A COATING MATERIAL AND A PROCESS FOR COATING BORON POWDER WITH A THIN, PROTECTIVE LAYER TO INHIBIT SURFACE OXIDE FORMATION. IN PHASE II, WE PLAN TO INCREASE THE SCALE OF THE PROCESS TO GROW PARTICLES IN THE RANGE OF 1-5 um ON A CONTINUOUS BASIS AND TO INTEGRATE THE COATING STEP INTO THE OVERALL PROCESS.

Q-DOT INC
1069 ELKTON DR
COLORADO SPRINGS, CO 80907
CONTRACT NUMBER:
DAVID W GARDNER
TITLE:
IMAGING DETECTOR/PROCESSOR FOR OPTICAL SIGNAL PROCESSING
TOPIC# 161 OFFICE: NSWC IDENT#: 36152

THE REASTER-SCAN OUTPUT OF IMAGE DATA FROM PRESENT CCD IMAGERS REDUCES THE EFFICIENCY OF OPTICAL SIGNAL PROCESSING SYSTEMS. HERE DETECTOR/PROCESSOR ARCHITECTURES ARE STUDIED TO REDUCE THE EFFECT OF THE BOTTLENECK AT THE DETECTOR OUTPUT. INNOVATIVE TECHNIQUES ARE PROPOSED TO GENERATE AREA ARRAY PROCESSORS WHICH PERFORM IMAGE-PROCESSING FUNCTIONS ON THE SENSOR CHIP.

QUALCOMM INC
10555 SORRENTO VALLEY RD
SAN DIEGO, CA 92121
CONTRACT NUMBER:
EDWARD G TIEDEMANN JR
TITLE:
NETWORK PROTOCOLS FOR UHF MULTIUSER TRAFFIC
TOPIC# 47 OFFICE: SPAWAR IDENT#: 36993

SUBMITTED BY

QUALCOMM, INC. PROPOSES TO DEVELOP A NETWORK PROTOCOL FOR THE NAVY UHF SATELLITE COMMUNICATIONS SYSTEM WHICH WILL SUPPORT THE WIDE VARIETY OF CURRENT AND ANTICIPATED NAVAL UHF SATELLITE COMMUNICATIONS NEEDS AND WILL BE DESIGNED SO THAT FUTURE, CURRENTLY UNANTICIPATED, NEEDS CAN BE MET. THE TRAFFIC ROUTING WILL BE ABLE TO BE EITHER POINT-TO-POINT, MULTICASE, OR BROADCAST; THE TRAFFIC FORMAT CAN BE IN EITHER A STREAM OR A BLOCK FORMAT. THE PROTOCOL WILL SUPPORT ACKNOWLEDGEMENTS AND FLOW CONTROL. THE NETWORK RESOURCES WILL BE POOLED AND CONTROLLED BY VARIOUS LEADER TERMINALS WHICH FORM THE NODES OF A HIERARCHICAL TREE. EACH LEADER TERMINAL WILL HAVE SOME RESOURCES THAT IT CAN DIRECTLY ALLOCATE AND, THROUGH COOPERATION WITH OTHER LEADERS, ADJUST RESOURCE ALLOCATION THROUGHOUT THE NETWORK. THE RESOURCE ALLOCATION PROCESS WILL BE DESIGNED TO BE DYNAMIC AND WILL ALLOCATE RESOURCES ON A MESSAGE BY MESSAGE BASIS. SINCE LEADERS PARTIALLY CENTRALIZE THE DATABASE AND SINCE MANY TERMINALS IN THE NETWORK CAN BECOME LEADERS, THIS PROTOCOL WILL NOT HAVE THE DATABASE CONSISTENCY PROBLEMS OF A DISTRIBUTED PROTOCOL, NOR WILL IT HAVE THE SINGLE POINT VUNERABILITY OF A CENTRALIZED PROTOCOL.

QUALCOMM INC
10555 SORRENTO VALLEY RD
SAN DIEGO, CA 92191
CONTRACT NUMBER:
ANDREW J VITERBI
TITLE:
HIGH DATA RATE SATELLITE COMMUNICATIONS
TOPIC# 57 OFFICE: SPAWAR IDENT#: 37076

QUALCOMM, INC. PROPOSES TO STUDY THE DEVELOPMENT OF A DIGITAL UHF SATCOM MODEM CAPABLE OF TRANSMITTING THREE TIMES THE INFORMATION RATE IN A GIVEN CHANNEL BANDWIDTH CURRENTLY TRANSMITTED BY CONVENTIONAL MEANS. OVER FLTSAR 25 KHz CHANNELS TYPICAL CURRENT INFORMATION RATES ARE NOT GREATER THAN 16 Kb/s, WHILE THE PROPOSED SYSTEM WOULD TRANSMIT OVER THE SAME BANDWIDTH AT UP TO 48 Kb/s, WITH NO GREATER INCREASE IN TRANSMITTED POWER (OR LINK BUDGET) THAN THAT REQUIRED FOR THE THREE-FOLD INCREASE IN DATA RATE. THE TECHNIQUE TO BE USED IS TRELLIS CODING WITH 8PSK AND 16PSK MODULATION. A UNIQUE CODING TECHNIQUE WHICH REQUIRES ONLY MODIFICATION OF EXISTING

SUBMITTED BY

CONVOLUTIONAL CODERS-VITERBI DECODERS ACHIEVES THIS INCREASED EFFICIENCY.

QUALCOMM INC
10555 SORRENTO VALLEY RD
SAN DIEGO, CA 92121
CONTRACT NUMBER:
EDWARD G TIEDEMANN JR
TITLE:
NETWORK PROTOCOLS SUPPORTING ANTI-AIR WARFARE
TOPIC# 17 OFFICE: SPAWAR IDENT#: 37287

THE BASIS FOR A STRONG SYSTEMS ENGINEERING EFFORT MUST LIE IN A THROUGH UNDERSTANDING OF THE TECHNICAL ALTERNATIVES AVAILABLE. IN THE ANTI-AIR WARFARE COMMUNICATIONS NETWORK AREA THESE ALTERNATIVES MUST BE DEVELOPED FROM A COMPREHENSIVE THEORETICAL BASE AND TAILORED TO THE SPECIFIC NEEDS OF THE ENVIRONMENT. THE PHASE I ACTIVITY WILL ESTABLISH A SET OF ARCHITECTURAL CANDIDATES FOR COMMUNICATION NETWORKS TO SUPPORT ANTI-AIR WARFARE SYSTEMS AS THEY EVOLVE IN REACTION TO NEW SYSTEMS, THREATS, AND TACTICAL SITUATIONS. THE CANDIDATES WILL REPRESENT THE APPLICATION OF CURRENT NETWORKING TECHNOLOGIES TO THE BATTLE GROUP WIDE COMMUNICATION PROBLEM AND WILL EMPHASIZE THE INTEGRATION PROBLEMS OF MULTIPLE PLATFORMS AND AN EVOLVING ASSET BASE.

R-CUBED COMPOSITES INC
3392 W 8600 S
WEST JORDAN, UT 84088
CONTRACT NUMBER:
ROBERT V MICHEL
TITLE:
HIGH-STRENGTH LIGHTWEIGHT TORPEDO HULLS
TOPIC# 110 OFFICE: NAVSEA IDENT#: 36821

SUBMARINE LAUNCHED TORPEDOES CURRENTLY USE CAST OR FORGED ALUMINUM HULL SECTIONS. THIS PROPOSAL OUTLINES THE PROCEDURES THAT SHALL BE USED BY R-CUBED COMPOSITES TO EVALUATE TORPEDO HULL SECTIONS THAT ARE

SUBMITTED BY

MADE UTILIZING MATERIALS THAT OFFER A GREATER STRENGTH/WEIGHT AND/OR STIFFNESS/WEIGHT RATIOS THAN DO THE PRESENT ALUMINUM HULL SECTIONS. THESE HIGHER RATIO MATERIALS ARE OF COMPOSITE CONSTRUCTION MADE WITH MATRIX RESINS OF TOUGHENED EPOXIES AND THERMOPLASTICS WITH GRAPHITE FIBER. R-CUBED COMPOSITES HAS BEEN SUCCESSFUL IN FABRICATION OF THICK WALLED FILAMENT WOUND CYLINDERS USED FOR HIGH PRESSURE HYDRAULIC ACTUATORS UTILIZING BOTH THE TOUGHENED EPOXY AND THERMOPLASTIC RESINS. OF THE TWO MATERIALS THE THERMOPLASTIC MATERIAL WAS THE MOST EFFECTIVE. THIS PROPOSAL IS IN RESPONSE TO THE SBIR PROGRAM ENTITLED "HIGH-STRENGTH, LIGHTWEIGHT TORPEDO HULLS NO. N89-110" FOR THE UNITED STATES NAVY. PHASE I OF THIS PROGRAM IS THE MATERIAL AND PROCESSING EVALUATION. R-CUBED HAS SELECTED TWO THERMOPLASTIC RESINS AND TWO THERMOSET RESINS TO BE USED IN THE PHASE I STAGE. AFTER FABRICATION HAS BEEN ACCOMPLISHED, THE CYLINDERS WILL BE TESTED IN EXTERNAL COMPRESSION BY THE UNIVERSITY OF UTAH. UPON COMPLETION OF THE TESTING, THE RESULTS SHALL BE EVALUATED TO DETERMINE THE BEST PLAN FOR FOLLOW-ON WORK AND DEVELOPMENT.

RADIATION SCIENCE INC
PO BOX 293
BELMONT, MA 02178
CONTRACT NUMBER:
DR DANIEL R PARSIGNAULT
TITLE:
A PORTABLE X-RAY FLUORESCENCE LUBRICATING OIL DEBRIS ANALYSER
TOPIC# 123 OFFICE: NAVSEA IDENT#: 35781

THE MOTION OF CONTACTS BETWEEN OIL-LUBRICATED COMPONENTS INSIDE AN ENGINE IS ACCOMPANIED BY FRICTION WHICH IN TURN PRODUCES WEAR PARTICLES. THESE OIL SYSTEM DEBRIS ARE DEPOSITED IN THE OIL, AND AN INCREASE IN THEIR PRODUCTION RATE IS AN IMPORTANT INDICATOR OF THE INTERNAL CONDITION OF THE ENGINE. THE MONITORING OF WEAR METALS IN LUBRICATING OILS HAS BECOME STANDARD PRACTICE IN THE AIRCRAFT INDUSTRY TO ANTICIPATE INCIPIENT FAILURES OF COMPONENTS INSIDE GAS TURBINE ENGINES. THIS PRACTICE IS ALSO FOLLOWED BY THE UNITED STATES ARMED FORCES, IN THE TRI-SERVICE JOINT OIL ANALYSIS PROGRAM (JOAL) LABORATORIES. ONE OF THE TECHNIQUES USED TO MONITOR AND ANALYSE OIL DEBRIS IS THE X-RAY FLUORESCENCE SPECTROSCOPY (XRFS) TECHNIQUE. IN

SUBMITTED BY

THIS PROJECT, WE PROPOSE TO DEMONSTRATE THE FEASIBILITY OF IMPLEMENTING A PORTABLE XRFS SYSTEM DEDICATED TO OIL SYSTEM DEBRIS ANALYSIS WHICH CAN BE CONVENIENTLY LOCATED AND OPERATED IN A SHIP ENVIRONMENT, AND EASILY TRANSPORTED FROM SHIP TO SHIP, AS REQUIRED.

RADIX SYSTEMS INC
2 TAFT CT
ROCKVILLE, MD 20850
CONTRACT NUMBER:
DR RONALD G HUGHES
TITLE:
ANALYSIS OF BROADBAND SUBMARINE SIGNATURES BY CHAOTIC PROCESSING METHODS
TOPIC# 77 OFFICE: NAVAIR IDENT#: 36402

THE PROPOSED RESEARCH WILL DEVELOP AND IMPLEMENT SEVERAL METHODS OF ANALYSIS OF CHAOTIC PROCESSES AND APPLY THEM TO BROADBAND SUBMARINE SIGNATURES. SPECIFIC MEASURES INCLUDE PHASE TRAJECTORIES, POINCARE' SECTIONS, RETURN MAPS, LYAPUNOV EXPONENTS, CHAOTIC DIMENSION, AND ENTROPY. THESE MEASURES WILL BE TESTED FOR ROBUSTNESS UNDER VARYING CONDITIONS OF SIGNAL-TO-NOISE RATIO, LENGTH OF DATA SAMPLE, SAMPLING RATE, FILTERING, AND INTERNAL TECHNICAL PARAMETERS. THE TECHNIQUES WILL THEN BE TESTED ON BOTH CONTRIVED CHAOTIC TIME SERIES AND REAL SUBMARINE SIGNATURES. A SURVEY OF CURRENT CHAOS TECHNOLOGY WILL ALSO BE PROVIDED.

RADIX SYSTEMS INC
2 TAFT CIR - STE 203
ROCKVILLE, MD 20850
CONTRACT NUMBER:
RICHARD H KIRKLIN
TITLE:
COLOR DISPLAY OF ACOUSTIC DATA
TOPIC# 54 OFFICE: SPAWAR IDENT#: 37055

THIS PROPOSAL DESCRIBES AN APPROACH TO DEVELOPMENT OF A DISPLAY THAT PRESENTS SIGNAL INTENSITY AND TARGET BEARING AS FUNCTIONS OF BOTH

SUBMITTED BY

TIME AND FREQUENCY. WITH RESPECT TO SIGNAL INTENSITY, TIME, AND FREQUENCY, THE DISPLAY IS TOTALLY ANALOGOUS TO A LOFAR DISPLAY. IN ADDITION, THE DISPLAY IMPARTS TARGET BEARING THROUGH THE USE OF COLOR. ASSOCIATION OF TONALS, HARMONICS, AND BROADBAND SIGNALS WITH TARGETS, AND, THEREFORE, TARGET CLASSIFICATION IS ENHANCED BECAUSE ALL FEATURES FROM A GIVEN TARGET APPEAR ON THE DISPLAY WITH THE SAME COLOR, I.E., FROM THE SAME BEARING. THUS, TRANSIENTS FROM A TARGET APPEAR AS A SEQUENCE OF BROADBAND BURSTS, EACH WITH THE SAME COLOR. THE OBJECTIVE OF THE PROPOSED EFFORT IS TO DEMONSTRATE THE FEASIBILITY AND EFFICACY OF THE DISPLAY WHEN APPLIED TO REAL DATA SUCH AS FROM A TOWED ARRAY. AFTER THIS CAPABILITY HAS BEEN DEMONSTRATED, THE APPLICATION OF THE DISPLAY TO OTHER SITUATIONS THAT MIGHT BENEFIT FROM A "FOUR-DIMENSIONAL" PRESENTATION BECOMES STRAIGHT-FORWARD. THE PROPOSED EFFORT INCLUDES ACQUISITION OF MEASUREMENTS SUITABLE FOR DEMONSTRATION, DEVELOPMENT, AND IMPLEMENTATION OF SIGNAL PROCESSING AND COLOR CODING ALGORITHMS, AND DEMONSTRATION OF THE FEASIBILITY AND UTILITY OF THE DISPLAY.

REKENTHALER TECHNOLOGY ASSOCS CORP/RTA
3400 JENNINGS CHAPEL RD
WOODBINE, MD 21797
CONTRACT NUMBER:
DOUGLAS A REKENTHALER
TITLE:
NON-ACOUSTIC SENSOR AND GUIDANCE FOR UNDERWATER VEHICLE
TOPIC# 100 OFFICE: NAVSEA IDENT#: 36680

IN THIS PHASE I, SBIR PROGRAM, THE RTA CORPORATION WILL ADAPT A PROPRIETARY, EXISTING "ACTIVE MAGNETIC FIELD SENSOR (AMFS)" TECHNOLOGY TO THE PROBLEM OF SENSING, GUIDANCE AND CONTROL OF SMALL, HIGH-SPEED, UNDERWATER VEHICLES. RTA WILL MODIFY OUR PRESENT AMFS DESIGN, TO INCORPORATE AN ADDITIONAL SENSOR HEAD, APPLY SIGNAL PROCESSING TECHNIQUES TO PERFORM BACKGROUND NOISE CANCELLATION, AND ADDRESS THE POTENTIAL PERFORMANCE SPECIFICATIONS OF AN OPERATIONAL PROTOTYPE AMFS. DURING PHASE I, A SINGLE AMFS SENSOR WILL BE FIELD TESTED, AND THE TANDEM (TWO SENSOR) CONFIGURATION WILL BE FABRICATED FOR EXPLOITATION DURING PHASE II. THE AMFS TECHNOLOGY WILL BE TAILORED FOR ONE OR MORE NAVSEA PLATFORMS.

REMSA INC
47 E QUEENSWAY - STE 205
HAMPTON, VA 23669
CONTRACT NUMBER:
ROSETTA C BILLUPS
TITLE:
DEVELOP DATA BASE OF POTENTIAL ELECTRONIC WARFARE (EW)
NON-DEVELOPMENTAL ITEMS
TOPIC# 122 OFFICE: NAVSEA IDENT#: 35764

SUBMITTED BY

A MODIFIED SYSTEMS ENGINEERING PROCESS TO BE APPLIED TO NDI DECISIONS, AVAILABLE AND USEABLE VALIDATED DATA ON IN-USE EW NDI. DATA ON POTENTIAL EW NDI TECHNOLOGY TO FACILITATE DECISION-MAKING FOR: - STANDARDIZATION (FORM, FIT, FUNCTION) GUIDANCE - COMPETITION. ASSISTENCE IN TAILORING SYSTEM REQUIREMENTS TO MEET MISSION NEEDS.

RESEARCH APPLICATIONS INC
400 W 15TH ST - STE 1003
AUSTIN, TX 78701
CONTRACT NUMBER:
DR BRUCE BUCKMAN
TITLE:
LOW-FREQUENCY VIBRATION AND ACOUSTIC MEASUREMENTS
TOPIC# 127 OFFICE: NAVSEA IDENT#: 35828

CURRENT LOW FREQUENCY VIBRATION AND ACOUSTIC MEASUREMENTS ARE NOT ADEQUATE TO MEET THE NEEDS OF THE NAVY. ONE OF THE TECHNIQUES THAT HAS HAD MUCH EXPERIMENTATION FOR THESE AND OTHER HIGH PRECISION MEASUREMENTS INCORPORATES AN INTERFEROMETRIC APPROACH. DR BRUCE BUCKMAN HAS DEVELOPED A FUNDAMENTAL CIRCUIT MODIFICATION THAT ALLOWS THE TYPICAL FIBER OPTIC SENSOR TO HAVE A DRAMATIC INCREASE IN SENSITIVITY AND SIGNAL TO NOISE RATIO. UNDER THE SBIR PROGRAM, THIS DEMONSTRATED IMPROVEMENT WILL BE APPLIED TO BUILDING FIBER OPTIC INTERFEROMETRIC SENSORS PROTOTYPES, WHICH WILL PROVIDE OPTIMIZED MEASUREMENT OF LOW FREQUENCY VIBRATION AND ACOUSTICS. FURTHERMORE, THESE BASIC PRINCIPLES WILL BE APPLICABLE TO ANY OTHER FIBER OPTIC SENSOR, SUCH AS MAGNETOMETERS AND GYROSCOPES. THE PHASE I OBJECTIVES ARE: EXPERIMENTALLY TEST AN EXISTING MACH-ZEHNDER HYDROPHONE, NAVY DESIGN WITH AND WITHOUT THIS IMPROVEMENT. ESTABLISH LIMITS ON SENSITIVITY AND UNCERTAINTY FOR THE UNDERWATER OPERATING ENVIRONMENT FOR BOTH MEASUREMENTS. DESIGN A CUSTOM ACOUSTIC MEASUREMENT SUB-SYSTEM OPTIMIZED TO TAKE ADVANTAGE OF THE CIRCUIT OF IMPROVEMENTS TO DEMONSTRATE THE OPERATIONAL CALIBRATION APPROACH. BUILD AND LAB TEST ONE ACOUSTIC MEASUREMENT PROTOTYPE.

RESEARCH OPPORTUNITIES INC
2200 AMAPOLA CT - STE 101
TORRANCE, CA 90405
CONTRACT NUMBER:
WILLIAM C RILEY
TITLE:
COMPOSITES FOR INTEGRAL DIELECTRIC/HEAT SINK FOR ELECTRONIC DEVIC
TOPIC# 95 OFFICE: NAVSEA IDENT#: 36611

SUBMITTED BY

THE OBJECTIVE OF THIS PROGRAM IS TO SHOW THE FEASIBILITY OF FABRICATING AN INTEGRAL DIELECTRIC/HEAT SINK USING ORGANIC MATRIX COMPOSITES. SEM E PROPERTY REQUIREMENTS WILL BE GOALS. HIGH THERMAL CONDUCTIVITY GRAPHIT FIBERS (1100 W/m DEG K) WILL BE USED TO ACHIEVE THE SEM E HEAT SINK THERMAL CONDUCTIVITY REQUIREMENT. THE USE OF THESE FIBERS WILL LEAD TO A NEGATIVE EXPANSION IN THE HEAT SINK. THEREFORE, METAL ADDITONS TO THE HEAT SINK WILL BE MADE TO INCREASE THE THERMAL EXPANSION TO MATCH THE GLASS-EPOXY SEM E DIELECTRIC. IT IS PLANNED TO USE BOTH A COPPER-COATED GRAPHITE FIBER TOW AND GRAPHITE-ALUMINUM WIRE FOR THIS PURPOSE. THIS TECHNOLOGY WILL BE DEMONSTRATED IN BOTH EPOXY AND THERMOPLASTIC COMPOSITES. HEAT SINK JOINING TO THE DIELECTRIC WILL BE ACCOMPLISHED BY CO-CURING OR COMPRESSION MOLDING. EVALUATION WILL BE BASED ON THERMAL AND MECHANICAL PROPERTIES MEASURED BEFORE AND AFTER THERMAL CYCLING, USING SEM E SPECIFICATIONS. OF PARTICULAR IMPORTANCE IS A COMPARISON OF PROPERTIES OF THE INTEGRAL DIELECTRIC/HEAT SINK WITH ADHESIVELY BONDED COMPONENTS. SYSTEM IMPACT ASSESSMENT WILL INCLUDE A COMPARISON OF THE POTENTIAL OF ORGANIC MATRIX COMPOSITES WITH CERAMIC MATERIALS SUCH AS BeO.

RO-SEARCH INC
PO BOX 188
WAYNESVILLE, NC 28786
CONTRACT NUMBER:
SVEN OBERG
TITLE:
LIGHTWEIGHT COLD WEATHER SAFETY BOOT
TOPIC# 66 OFFICE: NSSC IDENT#: 36235

A LIGHTWEIGHT COLD WEATHER WATERPROOF SAFETY BOOT WITH A WATER RESISTANT LEATHER UPPER EXTERIOR, DMS, POLYURETHANE MID-SOLE/VULCANIZED RUBBER TREAD SOLE CONSTRUCTION, INTERIOR LINED WITH A LAMINATE OF A WATER IMPERMEABLE/VAPOR PERMEABLE BARRIER MICROFIBER THERMAL INSULATION AND NON-WOVEN PERMEABLE SYNTHETIC SHOE LINING AND A FIBERGLASS SAFETY TOE.

ROBOT VISION CORP
5105 SWISS AVE
DALLAS, TX 75214
CONTRACT NUMBER:
JAMES E GREEN
TITLE:
A NEW MOTION DETECTOR AS A NON-SCANNING OPTICAL TRACKING SYSTEM
TOPIC# 203 OFFICE: NOSC IDENT#: 37878

SUBMITTED BY

RECENT RESEARCH ON MOTION DETECTION IN IMAGES HAS PRODUCED A SIMPLE AND EFFECTIVE METHOD FOR FINDING OBJECT MOTION IN CLUTTERED NATURAL OUTDOOR SCENES. THE METHOD WORKS WELL EVEN ON IMAGES SEQUENCES FROM MOVING PLATFORMS. IN THIS PHASE I PROGRAM WE PROPOSE TO TEST ITS APPLICABILITY TO TARGET RECOGNITION AND TRACKING SCENARIOS IN FLIR IMAGES. IF APPLICABLE TO THESE SCENARIOS, THE METHOD CAN PROVIDE THE SEEKER FOR A NON-SCANNING, CHEAP, RELIABLE, MULTI-TARGET TRACKER, OR FOR A WEAPON LAUNCHED TOWARD SUSPECTED ENEMY TARGETS WHICH FINDS AND KILLS ANYTHING THAT IS MOVING. AS AN ADDITION TO CURRENT TARGET ACQUISITION AND TRACKING TECHNOLOGY, RELIABLE MOTION DETECTION CAN IMPROVE ITS PERFORMANCE DRAMATICALLY. FURTHER, THE METHOD WORKS WELL ON COMPLEX, CLUTTERED VISIBLE-LIGHT TV IMAGES, RAISING THE POSSIBILITY OF DRAMATIC COST REDUCTIONS BY SUBSTITUTING CHEAP TVs IN SOME SYSTEMS WHICH CURRENTLY USE FLIRs. THE METHOD HAS BEEN IMPLEMENTED ON A SIMPLE PIPELINED IMAGE COMPUTER WHICH OPERATES AT VIDEO FRAME RATES. IT PROBABLY CAN BE IMPLEMENTED AS AN INTEGRATED CIRCUIT, ALLOWING IT AND A TV CMERA TO FIT INTO VERY SMALL WARHEADS. RELIABLE MOTION DETECTION IS A KEY ELEMENT PREVIOUSLY MISSING FROM AUTONOMOUS TARGET ACQUISITION AND TRACKING SYSTEMS.

ROSS-McNATT INC
339 REVELL HWY - STE 206
ANNAPOLIS, MD 21401
CONTRACT NUMBER:
TOBIN R McNATT
TITLE:
MK-6 LIFE RAFT IMPROVEMENTS
TOPIC# 124 OFFICE: NAVSEA IDENT#: 35787

THE PHASE I MK 6 LIFE RAFT IMPROVEMENTS PROGRAM WILL ASSESS AND IDENTIFY SPECIFIC NEEDS FOR IMPROVEMENTS IN THE MK 6 LIFE RAFT AND WILL SYSTEMATICALLY DEVELOP FEASIBILITY STUDIES OF ALTERNATIVE IMPROVEMENTS WHICH WILL BE INTEGRATED INTO AN IMPROVED TOTAL LIFE RAFT. IMPROVEMENTS WILL BE EVALUATED AT THE COMPONENT AND SUBSYSTEM LEVEL FOR VITAL RELIABILITY-RELATED EQUIPMENTS SUCH AS THE INFLATION SYSTEM AND ENCAPSULATION METHOD. IN-WATER PERFORMANCE RELATED FEATURES SUCH AS THE RAFT SHAPE AND BALLAST SYSTEMS WILL ALSO BE EVALUATED FOR IMPROVEMENT. PHASE I WILL INCLUDE A PROTOTYPE

SUBMITTED BY

DEVELOPMENT AND TESTING PLAN FOR THE PHASE II PROGRAM.

ROSS-McNATT INC
339 REVELL HWY - STE 206
ANNAPOLIS, MD 21401
CONTRACT NUMBER:
JONATHAN M ROSS
TITLE:
DOCKING BLOCKS TECHNOLOGY
TOPIC# 126 OFFICE: NAVSEA IDENT#: 35822

THE PHASE I EFFORT WILL ADDRESS THE TECHNICAL OBJECTIVE OF DEVELOPING ONE OR MORE DEPENDABLE, COST EFFECTIVE ALTERNATIVES TO PRESENT DOCKING BLOCK SYSTEMS AND DEVELOP APPROACHES FOR DESIGNING AND TESTING THOSE ALTERNATIVES. IMPROVEMENTS WILL BE SOUGHT IN THE AREAS OF DOCKING BLOCK CONFIGURATION/GEOMETRY, MATERIALS, OPERATIONS AND MAINTENANCE. *THE EFFORT WILL CONSIST OF FIVE TASKS: IDENTIFY* DOCKING BLOCK REQUIREMENTS; IDENTIFY EXISTING DOCKING BLOCK METHODOLOGY; IDENTIFY ALTERNATIVE APPROACHES; DEVELOP APPROACHES FOR DESIGNING AND TESTING THE PROMISING ALTERNATIVES; AND DOCUMENT THE RESULTS IN A FORMAL REPORT.

SAFETY CONSULTING ENGINEERS INC
5240 PEARL ST
ROSEMONT, IL 60018
CONTRACT NUMBER:
C JAMES DAHN
TITLE:
REACTION EFFICIENCY OF ALUMINUM IN EXPLOSIVES
TOPIC# 148 OFFICE: NSWC IDENT#: 36009

OXIDANTS CONTAINING OXYGEN OR FLOURINE ARE TESTED FOR THEIR EFFICIENCY IN OXIDIZING ALUMINUM IN EXPLOSIVES. DETONATION CALORIMETRY AND/OR CYLINDER TESTS WILL BE CONDUCTED ON EXPERIMENTAL OR AUGMENTED FORMULATIONS OF EXPLOSIVES AND ALUMINUM WITH CONTROLLED OXIDANT SPECIES. DIFFERENT SIZES AND SHAPES OF ALUMINUM WILL ALSO BE TESTED.

SUBMITTED BY

SANDIA RESEARCH ASSOCS INC
PO BOX 2545
CORRALES, NM 87048
CONTRACT NUMBER:
DR STEVEN M SHOPE
TITLE:
PRELAUNCH TORPEDO COMMUNICATIONS USING ELECTROMAGNETIC INDUCTION
TOPIC# 112 OFFICE: NAVSEA IDENT#: 36853

THIS PROPOSAL DESCRIBES A PHASE I RESEARCH PROJECT TO EVALUATE ELECTROMAGNETIC INDUCTION AS A TECHNIQUE FOR PRELAUNCH TORPEDO COMMUNICATIONS. IN THIS CONCEPT, A MAGNETIC FLUX IS GENERATED IN A TOROIDAL-LIKE CORE. THE CORE WOULD BE MOUNTED ON A TORPEDO TUBE. A SMALL BLADE ANTENNA IS MOUNTED ON THE TORPEDO AND CAN DETECT OR EXCITE THE MAGNETIC FIELD IN THE CORE. TWO-WAY COMMUNICATION IS THEN POSSIBLE. IN THIS PROJECT, WE WILL DEVELOP A COMMUNICATIONS PROTOCOL ALONG WITH INTERFACE ELECTRONICS FOR THE WIRELESS LINK. THE POSSIBLE TORPEDOS AND TORPEDO TUBE MOUNTING CONFIGURATIONS WILL BE INVESTIGATED. CORE MATERIALS WILL ALSO BE STUDIED AND DESIGN CRITERIA FORMULATED. A PROTOTYPE DEVICE WILL BE BUILT TO DEMONSTRATE AND EVALUATE THE CONCEPT.

SAVI TECHNOLOGY INC
167 RINCONADA AVE
PALO ALTO, CA 94301
CONTRACT NUMBER:
ROBERT S REIS
TITLE:
THE DFTAG (TM) - AN RF TAG LOCATION SYSTEM
TOPIC# 64 OFFICE: NSSC IDENT#: 36229

A RADIO FREQUENCY IDENTIFICATION TAG SYSTEM IS PROPOSED WHICH HAS THE UNIQUE CAPABILITY TO PROVIDE LOCATION INFORMATION AS WELL AS TAG ID. THIS SYSTEM USES RADAR AND INTERFEROMETRIC TECHNIQUES TO PROVIDE RANGE AND DIRECTION WITH RESOLUTIONS LESS THAN 1 METER AND LESS THAN 1 DEGREE, RESPECTIVELY. THE SYSTEM IS REAL-TIME AND HAS

SUBMITTED BY

THE UNIQUE CAPABILITY TO WORK WITH GROUPS OF CO-LOCATED TAGS WITH ZERO PROBABILITY OF TAG INTERFERENCE. THE SYSTEM IS RELATIVELY INEXPENSIVE AND CAN BE USED TO TRACK EQUIPMENT AS WELL AS PEOPLE, ANIMALS AND MATERIALS.

SCIENCE RESEARCH LAB INC
15 WARD ST
SOMERVILLE, MA 02143
CONTRACT NUMBER:
BANIEL BIRX
TITLE:
SEALED TUBE METAL VAPOR LASER TECHNOLOGY
TOPIC# 16 OFFICE: MCRDAC IDENT#: 37313

THE OBJECTIVE OF THIS EFFORT IS TO DEVELOP SEALED TUBE METAL VAPOR LASER TECHNOLOGY FOR MARINE CORP APPLICATIONS. NEW ALL NIOBIUM-SAPPHIRE-ALUMINA SEALED TUBES ARE PROPOSED WHICH WILL BE COMPATIBLE WITH OPERATING TEMPERATURES OF 1500 DEG C WITH TEMPERATURE RECYCLING AND WITH A >3000 HOUR LIFE. SEALED TUBE DESIGNS WILL BE DEVELOPED WHICH ARE COMPATIBLE WITH BOTH LONGITUDINAL AND TRANSVERSE PUMPING OF THE COPPER VAPOR LASER. ALL SOLID STATE, SCR-COMMUTATED, NON-LINEAR MAGNETICALLY-SWITCHED DRIVERS WILL ALSO BE DEVELOPED TO DRIVE THESE LASERS AS PART OF THIS EFFORT. THESE DRIVERS HAVE BEEN ESPECIALLY-DESIGNED BY SRL TO COUPLE EFFICIENTLY (>60%) TO THE RAPIDLY-VARYING ELECTRICAL LOAD ENCOUNTERED IN COPPER VAPOR LASER DISCHARGE. BY EMPLOYING SCRs RATHER THEN THYRATRONS AS COMMUTATORS, THIS PULSER WILL HAVE A SIGNIFICANTLY EXTENDED LIFE (UP TO 10(11) SHOTS) AND WILL BE SIGNIFICIANTLY MORE COMPACT AND LIGHT WEIGHT THAN THYRATRON-BASED DESIGNS. PULSERS OF THIS DESIGN HAVE ALREADY BEEN USED BY SRL FOR DRIVING HIGH AVERAGE POWER COPPER VAPOR LASERS AT LLNL. IN PHASE I OF THE PROPOSED EFFORT, THE NIOBIUM-SAPPHIRE-ALUMINA TUBES AND ASSOCIATED PULSED POWER DRIVERS WILL BE DESIGNED IN DETAIL. IN ADDITION EXPERIMENTS WILL BE CONDUCTED TO DEMONSTRATE BONDING OF SAPPHIRE TO SAPPHIRE, SAPPHIRE TO ALUMINA, AND TO TEST SEAL DESIGNS WHICH PROVIDE A HIGH VACUUM SEAL BETWEEN ALUMINA AND NIOBIUM. IN PHASE II, A COMPLETE 1-10 WATT COPPER VAPOR LASER DEVICE WILL BE CONSTRUCTED AND TESTED.

SCIENTIFIC RESEARCH ASSOC INC
PO BOX 1058 - 50 NYE RD
GLASTONBURY, CT 06033
CONTRACT NUMBER:
DR STEPHEN J SHAMROTH
TITLE:
MIXED FLOW COMPRESSION SYSTEM
TOPIC# 192 OFFICE: NAPC IDENT#: 37780

SUBMITTED BY

AN INNOVATIVE APPROACH IS PROPOSED TO INTEGRATING SOPHISTICATED COMPUTATIONAL FLUID DYNAMICS (CFD) PROCEDURES INTO THE MIXED FLOW COMPRESSOR DESIGN SYSTEM. UNDER THE PHASE I/PHASE II EFFORT SCIENTIFIC RESEARCH ASSOCIATES IN CONJUNCTION WITH TELEDYNE CAE WOULD DEMONSTRATE THE CAPABILITY OF THE SRA NAVIER-STOKES PROCEDURE TO IMPACT UPON THE MIXED FLOW COMPRESSOR, CREATE A USER-FRIENDLY VERSION OF THE CODE WITH ALL I/O PERFORMED IN AN INTERACTIVE WORKSTATION ENVIRONMENT AND DEMONSTRATE IMPACT ON THE DESIGN PROCEDURE BY USING THE CODE IN THE DESIGN MODIFICATION PROCESS AND TESTING THE NEWLY DESIGNED BLADING CONFIGURATION. DEVELOPMENT OF INTERACTIVE I/O WORKSTATION PROTOCOLS WOULD OVERCOME THE CHIEF PROBLEM OF APPLYING SOPHISTICATED CODES TO THE DESIGN PROCESS; THAT BEING EASE OF PROBLEM "SET-UP" AND RESULTS INTERROGRATION. UNDER PHASE I THE EXISTING SRA CODE WOULD BE APPLIED TO AN EXISTING DESIGN TO ASSESS THE CODE'S CAPABILITY. UNDER PHASE II THE WORKSTATION I/O PROTOCOLS WOULD BE CREATED, THE CODE WOULD BE USED IN THE DESIGN MODIFICATION PROCESS AND THE MODIFIED DESIGN TESTED.

SCIENTIFIC RESEARCH ASSOCS INC
PO BOX 1058 - 50 NYE RD
GLASTONBURY, CT 06033
CONTRACT NUMBER:
DR DAVID V ROSCOE
TITLE:
A MARINE GAS TURBINE PROPULSION SYSTEMS DESIGN METHOD
TOPIC# 93 OFFICE: NAVSEA IDENT#: 36588

AN INNOVATIVE APPROACH IS PROPOSED FOR DEVELOPING A SOPHISTICATED COMPUTATIONAL FLUID DYNAMICS (CFD) PROCEDURE FOR MARINE GAS TURBINE EXHAUST DIFFUSERS AND INTEGRATING THIS PROCEDURE INTO THE GAS TURBINE DESIGN PROCESS. UNDER THE COMBINED PHASE I/PHASE II EFFORT, SCIENTIFIC RESEARCH ASSOCAITES WOULD DEMONSTRATE THE ABILITY OF ITS NAVIER-STOKES CODES TO SIMULATE EXHAUST DIFFUSER FLOW FIELD, ASSESS THE LEVEL OF ACCURACY OF THE PROCEDURE VIA COMPARISON WITH DATA AND DEVELOP A USER-FRIENDLY VERSION OF THE CODE, WHEREBY INPUT AND OUTPUT WOULD BE PERFORMED VIA INTERACTIVE PROTOCOLS IN A WORKSTATION ENVIRONMENT. DEVELOPMENT OF AN INTERACTIVE WORKSTATION I/O PROTOCOL WOULD OVERCOME A MAJOR PROBLEM ENCOUNTERED IN APPLYING SOPHISTICATED

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CFD CODES TO DESIGNS; THAT BEING EASE OF PROBLEM "SET-UP" AND RESULTS INTERROGATION. UNDER PHASE I, THE CODE WOULD BE APPLIED TO AN EXHAUST DIFFUSER CONFIGURATION TO DEMONSTRATE THE CAPABILITY OF THE COMPUTER CODE. UNDER PHASE II THE WORKSTATION I/O PROTOCOLS WOULD BE DEVELOPED AND THE PROCEDURE ASSESSED.

SEAKAY MANAGEMENT CORP
8 PLANT DR
WATERFORD, CT 06385
CONTRACT NUMBER:
CLAYTON K MORSE
TITLE:
C.O.'S COGNITIVE EXPERT SYSTEM
TOPIC# 103 OFFICE: NAVSEA IDENT#: 36725

A MODEL OF THE C.O.'S COGNITIVE PROCESS IS PROVIDED AND A SYSTEM DESIGNED TO SUPPORT THAT PROCESS. MODEL RECOGNIZES THAT THE MACHINE, ITSELF, IN MOST CIRCUMSTANCES CANNOT RECOGNIZE A TACTICAL SITUATION. ONCE THE C.O. IDENTIFIES A TACTICAL SITUATION, MACHINE AIDS THE C.O. TO GENERATE PLANS, USING SCENARIO GENERATOR AND EVALUATE THEM USING A SIMULATOR. OBJECT-ORIENTED DATA BASE AND KNOWLEDGE BASE AID THE C.O. IN EVALUATING TRAIL PLANS AND ASSESSMENT OF THE FINAL PLAN WHILE BEING CONDUCTED BY TRIGGERING PRIMARY AND SECONDARY MISSION OBJECTIVES (RULE SETS) THAT ARE A FUNCTION OF THE MISSION PHASE/TACTICAL SITUATION THAT THE C.O. HAD IDENTIFIED. DURING CONDUCT OF PLAN, MACHINE AIDS THE C.O. IN MONITORING THE PLAN BY PROVIDING RULE-BASED PLAN MONITORING TOOLS, AND BY ENABLING IMPOSITION, BY C.O., OF OPERATIONAL CONSTRAINTS, ALERTS AND OTHER RULES TO BE FOLLOWED.

SEAY T S INC
982 SANTA FLORENCIA
SOLANA BEACH, CA 92075
CONTRACT NUMBER:
THOMAS S SEAY
TITLE:
HIGH RESOLUTION ACTIVE SONAR WAVEFORMS AND PROCESSING
TOPIC# 58 OFFICE: SPAWAR IDENT#: 37083

SUBMITTED BY

THIS PROJECT WILL DEVELOP AND TEST HIGH RESOLUTION ACTIVE SONAR WAVEFORMS. THE HIGH RESOLUTION IS ACHIEVED BY COHERENTLY FREQUENCY HOPPING ELEMENTAL PULSES. THE HOPPING PATTERNS, WHICH ARE FROM THE SET OF BEST POSSIBLE PATTERNS, ARE EASILY GENERATED. A PRACTICAL RECEIVER PROCESSOR IS PROPOSED WHICH ACCOMODATS DIFFERENTIAL DOPPLER WITH LITTLE DEGRADATION. IT ALSO PROVIDES VERY HIGH RESISTANCE TO CW AND PULSED INTERFERENCE, AND PERMITS COHERENT INTEGRATION OVER THE AVAILABLE COHERENCE TIME OF THE CHANNEL. THE PROPOSED WAVEFORMS ARE BELIEVED TO BE CONSIDERABLY MORE EFFECTIVE IN EXTRACTING TARGET INFORMATION THAN LOW TIMEBANDWIDTH WAVEFORMS. A COMPUTER SIMULATION OR THE WAVEFORMS, THE CHANNEL INCLUDING TARGET, AND THE RECEIVER PROCESSING WILL BE WRITTEN AND USED TO VERIFY THE PREDICTED PERFORMANCE.

SECA INC
2211 BOB WALLACE AVE - STE 203
HUNTSVILLE, AL 35805
CONTRACT NUMBER:
RICHARD C FARMER
TITLE:
CFD ANALYSIS OF GAS TURBINE AGUMENTER IGNITION/BLOWOUT
TOPIC# 193 OFFICE: NAPC IDENT#: 37784

A COMPUTATIONAL FLUID DYNAMICS (CFD) ANALYSIS OF IGNITION AND BLOWOUT IN GAS TURBINE AUGMENERS IS PROPOSED IN ORDER TO IMPROVE OUR UNDERSTANDING OF IGNITION AND OF METHODS OF MAINTAINING STABLE COMBUSION. THE INTERACTION OF AERODYNAMICS AND COMBUSTION CHEMISTRY IS SO COMPLEX THAT GAS TURBINE AFTERBURNER DESIGN HAS BEEN ACCOMPLISHED BY USING EMPIRICAL CORRELATIONS AND EXPERIENCE. COMPUTATIONALLY EFFICIENT ALGORITHMS TO SOLVE THE NAVIER-STOKES EQUATIONS ON SUPER COMPUTERS WILL BE USED TO PROVIDE NEW DESIGN TOOLS FOR ANALYZING IGNITION AND BLOWOUT PHENOMENA. AN UNDERSTANDING BASED ON THIS MORE RIGOROUS ANALYSIS WILL RESULT IN BETTER, MORE RELIABLE DESIGNS FOR STABILIZING LOW PRESSURE, LOW SPEED FLAMES.

SHENANDOAH SYSTEMS CO
83 WASHINGTON ST - STE 405
DOVER, NH 03820
CONTRACT NUMBER:
JAMES GLYNN
TITLE:
FAULT TOLERANT INTEGRATED NAVIGATION SYSTEM DEVELOPMENT PROGRAM
TOPIC# 159 OFFICE: NSWC IDENT#: 36112

SUBMITTED BY

THE TOP LEVEL DESIGN AND SIMULATION OF A FAULT TOLERANCE, FAIL-SOFT INTEGRATED NAVIGATION SYSTEM IS PROPOSED. THE PROPOSED ARCHITECTURE CONSISTS OF A RING LASER GYRO, CORRELATION VELOCITY SPEED LOG, HEADING AND ATTITUDE SENSORS, KEEL DEPTH AND ALTITUDE SENSORS, AND A SHAFT TURNS-RATE SENSOR. AN EXTREMELY HIGH MEAN TIME BETWEEN FAILURE FIGURE IS EXPECTED TO RESULT FROM THE APPLICATION OF BOTH HARDWARE AND SOFTWARE FAULT TOLERANCE TECHNIQUES. THE SOFTWARE FAULT TOLERANCE TECHNIQUES INCLUDE THE DEVELOPMENT OF ROBUST DATA TRANSMISSION SOFTWARE, SOFTWARE VALIDITY ALGORITHMS, AND REDUNDANT POSITION COMPUTATION ALGORITHMS. REVERSIONARY MODES OF OPERATION ARE PLANNED TO ACCOMMODATE CONTINUED OPERATION IN THE FACE OF SENSOR FAILURES. THE PERFORMANCE OF THE SOFTWARE FAULT TOLERANCE SHALL BE VERIFIED THROUGH SIMULATION. CRITICAL NAVIGATION SENSORS SHALL BE REPLICATED AS REQUIRED.

SIERRA MONOLITHICS INC
107 W TORRANCE BLVD - STE 204
REDONDO BEACH, CA 90277
CONTRACT NUMBER:
DR BINNEG Y LAO
TITLE:
OCTAVE BANDWIDTH 8-BIT DIGITAL PHASE SHIFTER
TOPIC# 183 OFFICE: PMTC IDENT#: 37699

A SINGLE 8-BIT PHASE SHIFTER WITH AN OCTAVE BANDWIDTH TO COVER THE 5.3 TO 10.6 GHz BAND IS PROPOSED USING DIGITAL LINEARIZATION TECHNIQUES FOR PHASE SHIFT RESOLUTION AND SIGNAL AMPLITUDE LEVELING. IT HAS THE CAPABILITY OF BEING MODULATED AT 20 MHz RATE WITH 40 dB CARRIER SUPPRESSION AND LOW RESIDUAL OUTPUT NOISE. FOR 5-BIT APPLICATIONS ONLY THE TOP 5 MOST SIGNIFICANT BITS NEED TO BE DRIVEN. THE USE OF THE DIGITAL LINEARIZATION TECHNIQUES ALLOWS FOR A SINGLE DEVICE TO SIMULTANEOUSLY SATISFY THE LARGE BANDWIDTH, HIGH-BIT PHASE RESOLUTION, AND HIGH CARRIER SUPPRESSION REQUIREMENTS. THE PHASE I EFFORT WILL BE ON ESTABLISHING ITS FEASIBILITY THROUGH THE ANALYSIS AND DESIGN OF THE ENTIRE PHASE SHIFTER, HARDWARE COMPONENTS DEFINITION, AND A BREADBOARD DEMONSTRATION.

SIG-PRO SYSTEMS INC
1121 BALDWIN ST
SALINAS, CA 93906
CONTRACT NUMBER:
LONNIE A WILSON
TITLE:
WARFARE SYSTEMS ARCHITECTURES
TOPIC# 17 OFFICE: SPAWAR IDENT#: 37289

SUBMITTED BY

EW ARCHITECTURES ARE ESTABLISHED IN THE ARCHITECTURE GENERATOR WITH EW NAVAL WARFARE STRATEGIES, EW - TLWRs, MISSION DECOMPOSITION INFORMATION, BATTLE FORCE STRUCTURES AND ASSOCIATED INFORMATION AS KEY INPUTS. THIS NEW ARCHITECTURE GENERATOR IS BASED ON FUNDAMENTAL PROBABILITY THEOREMS, TIME AND EVENT SEQUENCING ALGORITHMS, PARALLEL PROCESSING ALGORITHMS, AND NAVAL WARFARE STRATEGY RULES. THE GENERATOR HANDLES THE DECOMPOSED MISSION TIERS, BATTLE FORCE STRUCTURES, AND PLATFORMS, SENSORS AND ASSOCIATED INFORMATION ON A FUNCTIONAL PROBABILITY BASIS. THE ARCHITECTURE EFFECTIVENESS EVALUATOR IS EMPLOYED TO QUALITATIVELY AND QUANTITATIVELY EVALUATE EW ARCHITECTURE FUNCTIONAL PERFORMANCE FUNCTIONS. THE TLWR COMPILANCE EVALUATOR COMPARES EW ARCHITECTURE FUNCTIONAL CAPABILITIES WITH ESTABLISHED TLWRs AND DETERMINES SHORTFALLS. ARCHITECTURE FUNCTIONAL PERFORMANCE SHORTFALLS ARE APPLIED AS FEEDBACK TO THE ARCHITECTURE GENERATOR FOR IMPROVEMENTS OR MODIFICATIONS AND PERFORMANCE ANALYSIS IS REPEATED.

SIGCOM INC
1776 E WASHINGTON ST
URBANA, IL 61801
CONTRACT NUMBER:
H VINCENT POOR
TITLE:
DETECTION TECHNIQUES FOR ACOUSTIC NON-GAUSSIAN SIGNALS
TOPIC# 14 OFFICE: ONT IDENT#: 37334

THE OBJECTIVE OF THIS PHASE I STUDY IS TO DEVELOP AND EVALUATE EFFECTIVE DETECTION ALGORITHMS FOR NON-GAUSSIAN ACOUSTIC SIGNALS OF INTEREST IN UNDERWATER SENSING SYSTEMS. THIS GENERAL OBJECTIVE CAN BE DIVIDED INTO SEVERAL INTERMEDIATE OBJECTIVES, INCLUDING: THE DEVELOPMENT OF SUITABLE NON-GAUSSIAN MODELS FOR SIGNALS OF INTEREST; THE DERIVATION OF CANONICAL OPTIMUM ALGORITHMS FOR SIGNAL DETECTION BASED ON THESE MODELS; THE ANALYSIS OF THE PERFORMANCE OF THESE OPTIMUM ALGORITHM AND THEIR SUBOPTIMUM APPROXIMANTS; AND THE COMPARISON OF THIS PERFORMANCE AND THE ALGORITHMIC COMPLEXITY OF THE NEW DETECTION ALGORITHMS TO THOSE OF CONVENTIONAL DETECTION TECHNIQUES. THE ACHIEVEMENT OF THESE OBJECTIVES WILL ANSWER TWO BASIC QUESTIONS REGARDING THE FEASIBILITY OF THE PROPOSED APPROACH: WHAT

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PRACTICAL STRUCTURES CAN BE BEST USED TO DETECT NON-GAUSSIAN ACOUSTIC SIGNALS? AND, WHAT PERFORMANCE GAINS CAN BE EXPECTED THROUGH THE USE OF THESE STRUCTURES? THE ANSWERS TO THESE QUESTIONS WILL PROVIDE THE BASIS FOR EXTENSIVE PHASE II EXPERIMENTATION WITH THE MOST PROMISING ALGORITHMS FOR DETECTING ACOUSTIC NON-GAUSSIAN SIGNALS. IN VIEW OF THE SUBSTANTIAL SUCCESS RESULTING FROM ANALOGOUS NON-GAUSSIAN NOISE STUDIED, IT IS ANTICIPATED THAT THIS WORK ON THE NON-GAUSSIAN SIGNAL PROBLEM COULD LEAD TO SIGNIFICANT ADVANCES IN THE CAPABILITY OF UNDERWATER ACOUSTIC SENSORS TO DETECT AND EXPLOIT SIGNALS OF INTEREST.

SIGNAL PROCESSING TECHNOLOGY LTD
703 COASTLAND DR
PALO ALTO, CA 94303
CONTRACT NUMBER:
BENJAMIN FRIEDLANDER
TITLE:
TRANSIENT PROCESSING USING THE GABOR REPRESENTATION
TOPIC# 85 OFFICE: NAVSEA IDENT#: 36515

CONVENTIONAL SONAR PROCESSING IS BASED ON TECHNIQUES DEVELOPED FOR NARROWBAND STATIONARY (LONG DURATION) SIGNALS. THE INADEQUACIES OF THESE TECHNIQUES WHEN APPLIED TO THE DETECTION AND CLASSIFICATION OF TRANSIENTS MOTIVATES THE SEARCH FOR NOVEL APPROACHES TO THE PROBLEM. THE GABOR REPRESENTATION IS A PROMISING TECHNIQUE FOR DETECTION AND CLASSIFICATION OF UNDERWATER ACOUSTIC TRANSIENTS, WHICH PROVIDES AN ALTERNATIVE TO "TRADITIONAL" FFT BASED PROCESSING. BASED ON PRE-LIMINARY RESULTS OBTAINED ON SYNTHETIC DATA AND USING OUR EXTENSIVE EXPERIENCE IN TRANSIENT PROCESSING, WE BELIEVE THAT THE GABOR REPRESENTATION IS A NATURAL WAY OF CHARACTERISING UNDERWATER TRANSIENTS. IN PHASE I WE WILL PROCESS REAL ACOUSTIC TRANSIENTS USING BOTH CONVENTIONAL AND GABOR BASED TECHNIQUES, AND PERFORM A COMPARATIVE EVALUATION. WE WILL ALSO COMPLETE THE DEVELOPMENT OF TRANSIENT DETECTION AND CLASSIFICATION ALGORITHMS USING THE "GABORGRAM" AS A STARTING POINT. IN PHASE II WE WILL DESIGN AND BUILD A LOW-COST REAL-TIME TRANSIENT PROCESSING WORKSTATION TO BE USED FOR TEST AND EVALUATION OF GABOR PROCESSING ON LARGE VOLUMES OF DATA, FOR R&D, AND AS AN ADJUNCT TO OPERATIONAL PROCESSING SYSTEMS.

SILHOUETTE TECHNOLOGY INC
PO BOX 1479
MORRISTOWN, NJ 07962
CONTRACT NUMBER:
DR GENE DWYER
TITLE:
DESKTOP HIGH SPACE-BANDWIDTH PRODUCT HOLOGRAPHIC FILM PRINTER TO FABRICATE COMPUTER GENERATED HOLOGRAMS
TOPIC# 138 OFFICE: NSWC IDENT#: 35918

SUBMITTED BY

COMPUTER GENERATED HOLOGRAMS ARE FINDING APPLICATIONS IN AREAS OF ARTIFICIAL INTELLIGENCE RESEARCH, OPTICAL COMPUTING AND TEST LENS FABRICATION. HOWEVER, RESEARCH HAS BEEN HAMPERED BY THE LACK OF AN AFFORDABLE AND PRACTICAL DESK-TOP SYSTEM CAPABLE OF PRINTING COMPUTER GENERATED HOLOGRAMS OF THE PROPER SIZE AND RESOLUTION. SILHOUETTE TECHNOLOGY HAS DEVELOPED A NEW TECHNOLOGY TO MAKE AN AFFORDABLE, DESK-TOP HOLOGRAPHIC FILM PRINTER OFFERING A VERY HIGH SPACE-BANDWIDTH PRODUCT. THE DEVICE EXCEEDS THE CAPABILITY OF EXISTING SYSTEMS. IN ADDITION, THE MAINTENANCE REQUIREMENTS FOR THIS DEVICE WOULD BE SIGNIFICANTLY REDUCED OVER ELECTRON BEAM RECORDERS.

SILICON DESIGNS INC
1445 NW MALL ST
ISSAQUAH, WA 98027
CONTRACT NUMBER:
JOHN C COLE
TITLE:
A RELIABLE SOLID-STATE MAGNETIC SENSOR
TOPIC# 78 OFFICE: NAVAIR IDENT#: 36417

THE FLUXGATE MAGNETOMETER HAS EVOLVED OF THE LAST 50 YEARS INTO A SENSITIVE DEVICE USED IN STRAPDOWN MAGNETIC COMPASSES. HOWEVER, THE FLUXGATE MAGNETOMETER IS RELATIVELY COMPLEX, REQUIRING A LARGE NUMBER OF PARTS, INCLUDING FERROMAGNETICS. ITS RELIABILITY MAKES IT LESS DESIRABLE FOR USE IN FUTURE MAGNETIC COMPASSES. PROBLEMS WITH THE FERROMAGNETICS INCLUDE RELATIVELY LARGE SENSITIVITY TO TEMPERATURE, VIBRATION AND SHOCK AND A TENDENCY TO DEVELOP A SEMI-PERMANENT MAGNETIC FIELD THAT REQUIRES RECALIBRATION. SILICON DESIGNS HAS BEEN WORKING FOR SEVERAL YEARS ON INTEGRATED CIRCUIT SENSORS. THIS WORK INCLUDES THE DEVELOPMENT OF HIGHLY SENSITIVIE AND ACCURATE INTEGRATED SENSOR/AMPLIFIER CIRCUITS. WE PROPOSE TO DEVELOP A SOLID-STATE MAGNETIC SENSOR THAT DOES NOT INCLUDE FERROMAGNETIC MATERIALS AND THEIR ACCOMPANYING PROBLEMS. IN PHASE I WE PROPOSE TO DESIGN, FABRICATE AND TEST A PROTOTYPE SENSOR CONTAINING A SOLID-STATE SENSOR AND ITS ELECTRONICS.

SILICON TECHNOLOGY INC
3251 OLD FRANKSTOWN RD
PITTSBURGH, PA 15239
CONTRACT NUMBER:
JOSEPH M EVANS
TITLE:
ACOUSTICALLY DAMPED TORPEDO PROPELLERS
TOPIC# 101 OFFICE: NAVSEA IDENT#: 36698

SUBMITTED BY

ACHEMICALLY BONDED CERAMIC HAS BEEN IDENTIFIED THAT HAS A RELATIVELY HIGH ACOUSTIC DAMPING COEFFICIENT COMBINED WITH HIGH STRENGTH. THE PHASE I PROGRAM FOCUSES ON CONFIRMING THE MECHANICAL AND ACOUSTIC PROPERTIES OF THE MATERIAL PRELIMINARY TO INVESTIGATION ITS USE IN A SIMPLIFIED PROPELLER DESIGN.

SILTRONIX INC
9449 BALBOA AVE - STE 311
SAN DIEGO, CA 92123
CONTRACT NUMBER:
RICHARD GOOD
TITLE:
SPAWAR ARCHITECTURE DATA INTERCHANGE FORMAT
TOPIC# 17 OFFICE: SPAWAR IDENT#: 37290

THE VAST AMOUNT OF WARFARE SYSTEM ARCHITECTURE DATA TOGETHER WITH THE LARGE NUMBER OF DIFFERENT DATABASE MANAGEMENT SYSTEMS WITH NO STANDARDS BETWEEN THEM HAS CREATED A PROBLEM OF SIGNIFICANT MAGNITUDE FOR WARFARE SYSTEM ARCHITECTS. THE INABILITY TO EASILY SHARE INFORMATION WITH OTHER WARFARE SYSTEM ARCHITECTS FROM WITHIN AND ACROSS WARFARE AREAS HAS RESULTED IN THE POTENTIAL FOR INCORRECT CONFLICTING, AND INSUFFICIENT INFORMATION BEING MADE AVAILABLE TO THE ARCHITECTS. THIS PROGRAM WILL DEVELOP A STANDARD DATA INTER-CHANGE FORMAT FOR SPAWAR ARCHIETECTURAL DATA THAT WILL ENABLE ALL WARFARE AREAS TO EASILY INTERCHANGE DATA, VERIFY AND VALIDATE THEIR EXISTING DATA, AND PROVIDE A COMMON FRAME OF REFERENCE FOR ALL WARFARE SYSTEM ARCHITECTS. WARFARE ARCHITECTURAL DATA IS CURRENTLY PROVIDED IN MANY DIFFERENT FORMS; TEXTUAL DESCRIPTIONS, PICTORAL REPRESENTATIONS OF INTERLINKS BETWEEN SYSTEMS, TEXTUAL DESCRIPTIONS OF THESE LINKS, PLOTS OF WEAPON PERFORMANCE, TABLES OF DATA, PHOTOGRAPHIC IMAGES OF PLATFORMS, ETC.. THIS PROGRAM WILL DEVELOP A SPAWAR ARCHITECTURE DATA INTERCHANGE FORMAT (SADIF) THAT WILL RESOLVE THE MANY DIFFERENT DATA FORMS AS WELL AS THE DIFFERENCES IN NOMENCLATURE, DATA QUERY METHODS FILE EXCHANGE PROTOCOLS, AND STANDARDS FOR DATA ACCESS. PHASE I WILL PROVIDE A REPORT DETAILING THIS SADIF.

SIMULATION ENGINEERING TECHNOLOGY (SET)
7708 LEESBURG DR
BETHESDA, MD 20817
CONTRACT NUMBER:
DR GEUN J YOO
TITLE:
COMPUTATIONAL FLOW MODELING OF MARINE GAS TURBINE DIFFUSERS
TOPIC# 93 OFFICE: NAVSEA IDENT#: 36589

SUBMITTED BY

DURING PHASES I & II, USER-FRIENDLY COMPUTER SOFTWARE WILL BE DEVELOPED TO BE USED BY THE NAVY FOR COMPUTATIONAL MODELING OF THREE-DIMENSIONAL, UNSTEADY, SEPARATED, RECIRCULATED, TURBULENT FLOWS IN MARINE GAS TURBINE EXHAUST DIFFUSERS. THE COMPUTATIONAL FLUID DYNAMICS (CFD) APPROACH IS BASED ON A UNIQUE COMBINATION OF THE PRESSURE GRADIENT METHOD AND THE MASS-ACCELERATED CONVERGENCE SCHEME. THE SOFTWARE IS CAPABLE OF PREDICTING PRESSURE DROP, FLOW DISTRIBUTIONS, AND THERMODYNAMIC LOSSES, AND MAY BE APPLIED TO VARIOUS CONFIGURATIONS AND THE OPERATIONAL CONDITIONS OF DIFFERENT DESIGNS. THE FINAL PRODUCT WILL BE AN INTEGRATED PACKAGE OF NUMERICAL COMPUTATION, GEOMETRIC PLOTS, GRID GENERATION, AND GRAPHIC DISPLAY. THE PRIMARY OBJECTIVE OF PHASE I WILL BE TO BUILD THE TECHNICAL FOUNDATION OF THE FINAL PRODUCT, INCLUDING TURBULENCE MODELING, IMPLEMENTATION OF THE MASS-ACCELERATED CONVERGENCE SCHEME, MODELING OF STEADY AND UNSTEADY FLOWS IN COMPONENTS, AND DEVELOPMENT OF A GRID GENERATION SCHEME.

SOFTWARE PRODUCTIVITY SOLUTIONS INC
PO BOX 361697
MELBOURNE, FL 32936
CONTRACT NUMBER:
DR J KAYE GRAU
TITLE:
EXPERT SYSTEM FOR SOFTWARE RELIABILITY ENGINEERING
TOPIC# 141 OFFICE: NSWC IDENT#: 35952

THIS ADVANCED RESEARCH AND DEVELOPMENT EFFORT WILL PROVIDE AN INNOVATIVE TECHNOLOGY FOR THE MANAGEMENT, DEVELOPMENT, AND ASSURANCE OF RELIABLE SOFTWARE. THE TECHNOLOGY WILL FOCUS ON THE SUPPORT OF RELIABILITY ENGINEERING DURING THE REQUIREMENTS AND DESIGN PHASES. THE RELIABILITY ANALYSES SUPPORTED BY THIS TECHNOLOGY WILL PROVIDE VALUABLE FEEDBACK TO GOVERNMENT AND CONTRACTOR MANAGERS, DEVELOPERS, AND ASSURANCE ENGINEERS. THE EMPHASIS OF THE FEEDBACK WILL BE ON HELPING TO IMPROVE THE "AS-BUILT" QUALITY OF THE SOFTWARE. TO PROVIDE EARLY FEEDBACK, AN INNOVATIVE APPROACH IS PROPOSED THAT APPLIES PROCESS METRICS DURING THE SOFTWARE REQUIREMENTS PHASE, AND COMBINES THE USE OF BOTH PROCESS AND PRODUCT METRICS DURING THE DESIGN PHASE. THE EFFORT WILL GO BEYOND MERELY IDENTIFYING A SET OF

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RELIABILITY METRICS. A SUPPORTING METHOD WILL BE PROVIDED THAT INCLUDES: CONSIDERATION OF QUALITY GOALS/REQUIREMENTS; APPROACHES TO ACHIEVING THESE GOALS; AND FEEDBACK AND ADVICE. THE SUPPORTING METHOD ENSURES THAT THE RELIABILITY ENGINEERING EFFORT IS TARGETED TO THE NEEDS OF THE SPECIFIC APPLICATION. AN IMPORTANT ASPECT OF THE RESEARCH IS THE EMPHASIS ON PROVIDING AUTOMATED SUPPORT. THE RESEARCH EFFORT WILL PROTOTYPE A RELIABILITY ENGINEERING TOOL DEMONSTRATING THE AUTOMATION CONCEPT. THE PROTOTYPE TOOL WILL REUSE EXISTING QUALITY TOOLS, AND WILL INCORPORATE APPLICABLE EXPERT SYSTEMS TECHNOLOGY.

SOFTWARE PRODUCTIVITY SOLUTIONS INC
PO BOX 361697
MELBOURNE, FL 32936
CONTRACT NUMBER:
DR ANDRES RUDMIK
TITLE:
DEVELOP AND DEMONSTRATE A THIRD GENERATION CASE INFRASTRUCTURE
TOPIC# 142 OFFICE: NSWC IDENT#: 35973

AN INNOVATIVE THIRD GENERATION INFRASTRUCTURE IS PROPOSED FOR COMPUTER-AIDED SOFTWARE ENGINEERING (CASE) SYSTEMS. THE INFRA-STRUCTURE PROVIDES A COMPREHENSIVE SET OF OBJECT-ORIENTED DATABASE, OBJECT-ORIENTED USER INTERFACE AND PROCESS MODELING CAPABILITIES THAT ARE USED TO PROVIDE HIGHLY INTEGRATED CASE FUNCTIONALITY. THE APPROACH DRAMATICALLY REDUCES THE TYPICAL METHODOLOGY, USER INTER-FACE, DOCUMENTATION AND ADMINISTRATION PROBLEMS WITH CASE TOOLS USED FOR REAL-TIME EMBEDDED SYSTEMS SOFTWARE DEVELOPMENT. THE KEY TO THE APPROACH IS A ROBUST AND HIGHLY TAILORED OBJECT-ORIENTED INFRA-STRUCTURE THAT REDUCES THE CONCEPTUAL GAP BETWEEN THE USER'S MODEL OF THE SYSTEM AND THE REPRESENTATIONS, MODELS AND IMPLEMENTATIONS OF THE CASE TOOLS. BY DEALING WITH INTERNAL STRUCTURES AND MODELS THAT ARE CLOSER TO THE WAY HUMANS THINK ABOUT SYSTEMS AND SOFTWARE, MANY OF THE CALSSIC ADAPTION, EXTENSIBILITY AND INTEGRATION PROBLEMS WITH CASE SYSTEMS CAN BE REDUCED OR ELIMINATED. THE PROPOSED PHASE I EFFORT WILL CONCENTRATE ON THE FOLLOWING: DEVELOPMENT OF A REFERENCE MODEL AND EVALUATION CRITERIA FOR THIRD GENERATION INFRASTRUCTURES; BREADBOARD PROTOTYPING OF THE PROPOSED APPROACH; AND PLANNING DEVELOPMENT OF A THIRD GENERATION CASE INFRASTRUCTURE

SUBMITTED BY

PRODUCT.

SOLO-HILL ENGINEERING INC
1919 GREEN RD
ANN ARBOR, MI 48105
CONTRACT NUMBER:
DR WILLIAM J HILLEGAS
TITLE:
COATED REINFORCEMENT MATERIALS FOR IMPROVED STABILITY AND FABRICABILITY
TOPIC# 96 OFFICE: NAVSEA IDENT#: 36628

THE PERFORMANCE AND EFFECTIVENESS OF SUPERSONIC OR HYPERSONIC TACTICAL MISSILES ARE DEPENDENT ON THE RELIABILITY OF FINS AND OTHER EXTERNAL STRUCTURAL COMPONENTS. CURRENT TITANIUM-BASED ALLOYS AND SUPERALLOYS USED IN AEROSPACE APPLICATIONS EITHER DO NOT HAVE ADEQUATE STRENGTH UNDER OPERATING CONDITIONS OF TEMPERATURE AND STRESS OR THEY ARE TOO HEAVY TO PROVIDE THE THRUST-TO-WEIGHT RATIO FOR THE PERFORMANCE DESIRED. AT THE DESIRED OPERATING SPEEDS OF MISSILES, THE EXTERNAL COMPONENTS, ESPECIALLY LEADING EDGES OF FINS, ATTAIN TEMPERATURES OVER 2000 DEG F. SINCE THE FINS PROVIDE FLIGHT STABILITY, IT IS ESSENTIAL THAT THEY ARE ABLE TO SUSTAIN FLIGHT-INDUCED STRESSES AT THESE TEMPERATURES TO MAINTAIN THEIR STABILIZING FUNCTION. FURTHERMORE, SINCE THERE IS A CONTINUING DEMAND TO EXTEND RANGE AND MANEUVERABILITY, IT IS NECESSARY TO REDUCE MISSILE WEIGHT. SAMPLES OF BOTH La(2)O(3-) COATED AND UNCOATED ALUMINA PARTICULATES WILL BE BLENDED WITH NiAl POWDER AND CONSOLIDATED INTO DISCON-TINUOUSLY-REINFORCED COMPOSITES. THESE COMPOSITES WILL THEN BE THERMAL CYCLE TESTED. COMPOSITES WILL BE EVALUATED METALLOGRAPHICALLY TO ASSESS THE EXTENT OF MATRIX AND/OR INTERFACIAL CRACKING. IF AVAILABLE, WE WILL UTILIZE ATOMIZED NiAl POWDER (PRODUCED BY CRUCIBLE) AS THE MATRIX FOR THE INTERMETALLIC MATRIX COMPOSITES. SINGLE CRYSTAL ALUMINA WHISKERS ARE POTENTIALLY VERY ATTRACTIVE AS A REINFORCEMENT FOR MATRIX COMPOSITES, AND WE EXPECT TO COAT ALUMINA WHISKERS IN PHASE II.

SONETECH
70 CAMPBELL RD
BEDFORD, NH 03102
CONTRACT NUMBER:
DR HARVEY C WOODSUM
TITLE:
INVESTIGATION OF A NOVEL ACOUSTIC WARFARE CONCEPT
TOPIC# 18 OFFICE: SPAWAR IDENT#: 37243

SUBMITTED BY

THE PROPOSED INVESTIGATION IS IN THE GENERAL AREA OF ACOUSTIC WARFARE. THE SYSTEM CONCEPT TO BE INVESTIGATED IS AIMED AT ACHIEVING DECEPTION/DIVERSION OF OPPOSING ASW FORCES. THE CONCEPT IS BASED ON EXPLOITING WEAKNESSES IN THREAT ACOUSTIC SENSOR SYSTEMS IN ORDER TO CREATE FALSE TARGETS. OPERATIONAL APPLICATIONS MIGHT INCLUDE CREATION OF FALSE TARGETS TO DRAW AWAY ASW AIRCRAFT FROM FRIENDLY FORCES; USE OF FALSE TARGETS IN SETTING UP CHOKE POINT BARRIERS; AND USE OF FALSE TARGETS FOR DIVERSION IN ORDER TO ESCAPE SUPERIOR FORCES. IN EACH OF THESE INSTANCES, THREAT DECISION-MAKERS WOULD BE CAUSED TO MISCALCULATE BASED ON FALSE SENSOR INFORMATION.

SONEX ENTERPRISES INC
3998 FAIR RIDGE DR - STE 220
FAIRFAX, VA 22033
CONTRACT NUMBER:
DR DONALDINE E SAMSON
TITLE:
AUTOMATED SPECIFICATION OF TESTING FOR SOFTWARE SYSTEMS
TOPIC# 200 OFFICE: NOSC IDENT#: 37863

THE PRIMARY RESEARCH OBJECTIVE OF THIS PROPOSED WORK IS TO DEVELOP AUTOMATED TOOLS AND TECHNIQUES TO SUPPORT THE SOFTWARE TESTING PROCESS. THIS OBJECTIVE IS CONSISTENT WITH THE SONEX EFFORT TO PROVIDE KNOWLEDGE BASED ASSISTANCE FOR TESTING LARGE, COMPLEX SYSTEM. CENTRAL TO OUR DEVELOPMENT WORK IS THE LEVEL I MODULE OF EXTEND, A KNOWLEDGE-BASED SYSTEM WHICH GENERATES TEST PLANS THROUGHOUT THE SOFTWARE DEVELOPMENT LIFE CYCLE. EXTEND IS CURRENTLY BEING DEVELOPED UNDER PHASE II OF A SBIR CONTRACT AND PROVIDES A BASIC LEVEL OF SUPPORT. OUR PROPOSED PHASE I RESEARCH FOR NOSC WILL PROVIDE BROADER TEST COVERAGE INCLUDING DESIGN, SPECIFICATION, UNIT AND COMPONENT TESTING AND ANALYSIS TOOLS BUILT ON THE FOUNDATION OF LEVEL I EXTEND. THE LEVEL I MODULE OF EXTEND PROVIDES TEST PLAN GENERATION FROM REQUIREMENTS SPECIFICATIONS, DESIGN AND CODE. IT IS LIMITED IN THE SCOPE OF ITS AUTOMATED ASSISTANCE, AND FURTHER RESEARCH AND DEVELOPMENT ARE NEEDED TO PROVIDE MORE COMPLETE COVERAGE. THE FOUNDATION FOR THIS WORK IS IN PLACE WITH LEVEL I OF EXTEND. BUILDING ONTO THIS FOUNDATION WILL GIVE NOSC A ROBUST TEST CAPABILITY, ORIENTED TO THEIR PARTICULAR NEEDS, THROUGH THIS PROPOSED RESEARCH EFFORT.

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SPARTA INC
1104 CAMINO DEL MAR
DEL MAR, CA 92014
CONTRACT NUMBER:
KENNETH J CHEVERTON
TITLE:
FIBER REINFORCED CERAMIC COATINGS
TOPIC# 86 OFFICE: NAVSEA IDENT#: 36527

SPARTA, INC. PROPOSES TO ASSESS THE ADVANTAGES OF CERAMIC WHISKER REINFORCED THERMAL BARRIER COATINGS IN PROVIDING COATING INTEGRITY FOR GAS TURBINE AIRFOILS AND DIESEL ENGINE COMPONENTS. THE SPARTA PHASE I TECHNICAL PROGRAM HAS THREE TECHNICAL TASKS. IN TASK 1, SPARTA WILL SELECT THE COATING SYSTEM TO BE STUDIED, THE RANGE OF REINFORCEMENT VOLUME FRACTIONS TO BE INCLUDED AND THE PROCESSING PARAMETERS TO BE EMPLOYED. IN TASK 2, UNREINFORCED AND REINFORCED COATINGS WILL BE FABRICATED AND EXAMINED FOR UNIFORMITY AND POROSITY. IN TASK 3, THE FRACTURE TOUGHNESS OF THE UNREINFORCED AND REINFORCED COATINGS WILL BE EXPERIMENTALLY MEASURED. AN ASSESSMENT WILL BE MADE OF THE SENSITIVITY OF COATING FRACTURE TOUGHNESS TO REINFORCEMENT VOLUME FRACTION AND PROCESSING PARAMETERS. THE PROPOSED PROGRAM WILL IDENTIFY THAT COMBINATION OF REINFORCEMENT AND PROCESSING PARAMETERS WHICH PRODUCES THE MAXIMUM ENHANCEMENT IN THERMAL BARRIER COATING FRACTURE TOUGHNESS.

SPARTA INC
16516 BERNARDO CENTER DR - STE 200F
SAN DIEGO, CA 92128
CONTRACT NUMBER:
WILLIAM A GRENARD
TITLE:
ADVANCED SYSTEMS AND CONCEPTS FOR FUTURE NAVAL WARFARE
TOPIC# 18 OFFICE: SPAWAR IDENT#: 37244

THE GOAL OF THIS STUDY IS TO SHOW HOW THE NAVY CAN INCREASE ITS WARFARE CAPABILITY WHILE REDUCING COSTS. THE STUDY ADDRESSES

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INNOVATIVE RESTRUCTURING OF THE NAVY BATTLE FORCE TO ACCOMPLISH SIGNIFICANT FUTURE IMPROVEMENTS IN PERFORMANCE, SURVIVABILITY, AND AFFORDABILITY. ADVANCED CONCEPTS ARE INVESTIGATED THAT WILL PROVIDE DRAMATIC INCREASES IN NAVAL FIREPOWER, WHILE REDUCING ACQUISITION AND OPERATING COSTS. INNOVATIONS INCLUDE OFFENSIVE AND DEFENSIVE SYSTEMS NOT NOW IN USE, AND AUTOMATION OF SYSTEMS NOW USED, INCLUDING SHIPS AND AIRCRAFT. THE STUDY DEFINES PRELIMINARY CONCEPTS FOR AN INTEGRATED SET OF WEAPON SYSTEMS, AND ASSESSES THEIR VALUE IN TERMS OF COST MANPOWER REQUIREMENTS, AND SUSTAINABILITY OF BATTLE.

SPARTA INC
16516 BERNARDO CENTER DR - STE 200F
SAN DIEGO, CA 92128
CONTRACT NUMBER:
WILLIAM A GRENARD
TITLE:
INTEGRATION OF ASW SURVEILLANCE WITH ADI
TOPIC# 17 OFFICE: SPAWAR IDENT#: 37291

THE GOAL OF THIS STUDY IS TO INVESTIGATE METHODS FOR INTEGRATING CURRENT AND FUTURE ANTI-SUBMARINE WARFARE (ASW) SURVEILLANCE SYSTEMS INTO THE U.S. AIR DEFENSE NETWORK. THE PHASE I STUDY WILL CONCENTRATE ON DEFINITION OF ARCHITECTURAL CONNECTIONS BETWEEN CURRENT AIR FORCE SECTOR OPERATIONS COMMAND CENTERS (SOCCS) AND PLANNED UPGRADE TO MOBILE SURVIVABLE COMMAND CENTERS. THE STUDY WILL INCLUDE THE DEFINITION OF A COMBINED IUSS/ADI ARCHITECTURE AND DATA AND TIMELINE REQUIREMENTS, PLUS REQUIREMENTS FOR EVALUATION AND VALIDATION OF CONCEPTS.

SPECTRALYTIC
4750 WILEY POST WY - STE 110
SALT LAKE CITY, UT 84116
CONTRACT NUMBER:
ALAN SEELOS
TITLE:
QUANTITATIVE LUBRICATING OIL DEBRIS MONITORING AND ANALYSIS
TOPIC# 123 OFFICE: NAVSEA IDENT#: 35782

SUBMITTED BY

SPECTRALYTIC, INC. CONTROLS THE RIGHTS AND SUBSEQUENT PATENT TO A TECHNOLOGY DEVELOPED TO INCREASE THE ACCURACY AND EFFICIENCY OF DETECTION OF INCIPIENT FAILURE OF OIL-WETTED SYSTEMS, WHILE PROVIDING DATA COMPARABLE TO CURRENT MILITARY INSTRUMENTS IN A PORTABLE UNIT. THE TECHNOLOGY, VIA A FILTRATION PROCESS, TRAPS ALL THE PARTICULATE MATTER WITHIN A GIVEN OIL SAMPLE (ENGINE, HYDRAULIC, GEARBOX, TRANSMISSION, ETC.) ON A FILTER AND IRRADIATES THE FILTER WITH A MINIATURE X-RAY TUBE. UTILIZATION OF AN X-RAY SCAN ALLOWS PARTICULATE MATTER OF ANY SIZE (ABOVE .1ppm) TO BE DETECTED BY A SOLID STATE DETECTOR. A BRASSBOARD PROTOTYPE HAS BEEN TESTED TO SATISFACTION, HOWEVER PERIPHERAL TECHNOLOGIES HAVE ADVANCED TO THE POINT THAT A PRODUCT DEVELOPMENT PLAN MUST BE INVESTIGATED TO ENABLE INCORPORATION OF ALL FEASIBLE POTENTIAL ENHANCEMENTS, THUS MAXIMIZING THE FULL POTENTIAL OF THIS TECHNOLOGY.

SPECTRANETICS CORP
96 TALAMINE CT
COLORADO SPRINGS, CO 80907
CONTRACT NUMBER:
ROBERT A GOLOBIC
TITLE:
OPTIMIZATION OF A CLEAN XeCl LASER WITH A CRYOGENIC CLEAN-UP SYST
TOPIC# 33 OFFICE: SPAWAR IDENT#: 36917

AS A CONTRIBUTION TO THE NAVY'S SATELLITE LASER COMMUNICATIONS PROGRAM, WE PROPOSE TO OPTIMIZE LASER RELIABILITY BY IMPLEMENTING A CRYOGENIC GAS PROCESSING SYSTEM DURING A LASER LIFETEST. THE EXPECTED LIFETIME TO 10% ENERGY REDUCTION SHOULD BE GREATER THAN 100 MILLION SHOTS. WE WILL GATHER DATA ON GAS COMPOSITION AND GAS CONTAMINATION AS WELL AS ANALYZE OPTICAL CONTAMINATION. OUR CONCLUSION FROM THE RESULTS OF THE TEST SHOULD CONTRIBUTE TO IMPROVING THE NEXT GENERATION LASER.

SPECTRANETICS CORP
96 TALAMINE CT
COLORADO SPRINGS, CO 80907
CONTRACT NUMBER:
ROBERT A GOLOBIC
TITLE:
DETERMINATION OF CONTAMINATION SOURCES IN A HIGH CLEANLINESS XENON-CHLORIDE LASER
TOPIC# 29 OFFICE: SPAWAR IDENT#: 37496

SUBMITTED BY

AS A CRUCIAL STEP IN THE PROCESS OF DESIGNING A RELIABLE, LONG-LIFE XENON-CHLORIDE LASER FOR THE NAVY'S SATELLITE LASER COMMUNICATIONS PROGRAM, WE PROPOSE TO DETERMINE THE CAUSES OF LASER GAS AND WINDOW CONTAMINATION ON AN ALREADY "CLEAN" LASER. WE WILL GATHER QUANTITATIVE DATA ON GAS COMPOSITION THROUGHOUT A LIFETEST AS WELL AS ANALYZE OPTICAL CONTAMINATION. OUR CONCLUSIONS FROM THE PROJECT RESULTS SHOULD CONTRIBUTE TO OPTIMIZING LASER RELIABILITY.

SPECTRO INC
160 AYER RD
LITTLETON, MA 01460
CONTRACT NUMBER:
MALTE LUKAS
TITLE:
FEASIBILITY STUDY TO DEVELOP A JOAP COMPATIBLE PORTABLE OIL ANALYSIS SPECTROMETER
TOPIC# 123 OFFICE: NAVSEA IDENT#: 35783

SPECTROMETRIC OIL ANALYSIS HAS BECOME A PROVEN AND EFFECTIVE MAINTENANCE TECHNIQUE. HOWEVER THE SIZE, COST AND ENVIRONMENTAL STABILITY OF THESE INSTRUMENTS HAVE PRECLUDED THEM FOR USE IN REMOTE LOCATIONS OR ABOARD NAVAL VESSELS. AS A CONSEQUENCE, OIL SAMPLES ARE SENT TO CENTRAL LABORATORIES FOR ANALYSIS WHICH OFTEN LIMITS THE VALUE OF THE INFORMATION OBTAINED. DURING THE LAST TWO YEARS A PARTIAL SOLUTION TO THE PROBLEM OF ON-SITE OIL ANALYSIS HAS BEEN ACHIEVED WITH THE DEVELOPMENT AND FIELDING OF A NEW MOBILE OIL ANALYSIS SPECTROMETER. ALTHOUGH IT IS MOBILE, MEETS THE PREREQUISITES OF PRODUCING DATA WHICH CORRELATES TO EXISTING DATA BASES, AND OPERATES SUCCESSFULLY IN NONLABORATORY ENVIRONMENTS, IT EXCEEDS THE WEIGHT REQUIREMENTS TO BE CLASSIFIED AS "MANPORTABLE". THIS PROPOSAL WILL INVESTIGATE THE FEASIBILITY OF MAKING THIS MOBILE SPECTROMETER MANPORTABLE. WE PROPOSE TO USE EXISTING TECHNOLOGY TO SEPARATE THE SPECTROMETER INTO THREE INTERCONNECTED MANPORTABLE COMPONENTS TO INVESTIGATE WEIGHT AND COST REDUCTION POSSIBILITIES WITHIN EACH COMPONENT AND TO INVESTIGATE ANY POSSIBLE PERFORMANCE TRADE-OFFS WHICH MAY RESULT.

SPECTRUM ENGINEERING
938 CELIA WY
PALO ALTO, CA 94303
CONTRACT NUMBER:
DONALD CHIN
TITLE:
IMPROVED COMPUTER AIDED SOFTWARE ENGINEERING TECHNOLOGY FOR EMBED COMPUTER SYSTEMS
TOPIC# 142 OFFICE: NSWC IDENT#: 37996

SUBMITTED BY

THE PROPOSED PHASE I WORK WILL PROTOTYPE A NEW CASE TOOL THAT WILL ASSIST WITH THE DEVELOPMENT OF EMBEDDED COMPUTER SYSTEMS. THE MOST PROMINENT FEATURES OF THE TOOL ARE LIFE-CYCLE INTEGRATION AND FREEDOM FROM METHODOLOGY CONSTRAINTS. THE TOOL WILL PROVIDE MULTIPLE VIEWS INTO A DESIGN KNOWLEDGE BASE, ALLOWING THE USERS TO CHOOSE VIEWS THAT ARE MOST APPROPRIATE FOR THE ISSUES AT HAND. EACH VIEW SUPPORTS THE DISPLAY, EDITING, AND AUTOMATED ANALYSIS USING EITHER A GRAPHICAL, LIST-ORITNETED, OR TEXTUAL REPRESENTATION. THE KNOWLEDGE BASE SCHEMA AND VIEWS ARE USER CUSTOMIZABLE THROUGH EASY-TO-USE EDITORS, ALLOWING THE TOOL TO QUICKLY AND EASILY ADAPT TO NEW OR EVOLVING METHODOLOGIES. A SET OF CUSTOMIZED VIEWS THAT INTEGRATE BOTH A GRAPHICAL OBJECT-ORIENTED DESIGN NOTATION AND SOURCE CODE TEXT DEMONSTRATES THE TOOL'S ABILITY TO LINK SEPARATE STAGES OF THE DEVELOPMENT LIFE-CYCLE.

SPIRE CORP
PATRIOTS PK
BEDFORD, MA 01730
CONTRACT NUMBER:
DR PING-HUNG LU
TITLE:
NOVEL BIODEGRADABLE BLOCK COPOLYMER
TOPIC# 90 OFFICE: NAVSEA IDENT#: 36541

THE PROPER DISPOSAL OF PLASTIC SOLID WASTE IN THE PAST DECADE HAS BECOME A SERIOUS PROBLEM FOR SEVERAL NATIONS AND FOR SOME U.S. MUNICIPAL GOVERNMENTS. THIS PLASTIC SOLID WASTE HAS BEEN BLAMED FOR POLLUTING THE ENVIRONMENT AND POSING AN ECOLOGICAL THREAT TO MARINE LIFE. DEGRADABLE PLASTICS ARE CONSIDERED TO BE A VIABLE SOLUTION FOR PLASTIC SOLID WASTE DISPOSAL. SPIRE PROPOSES TO DEVELOP NOVEL BIODEGRADABLE PLASTICS BY BLOCK COPOLYMERIZATION. THESE HETEROCHAIN BLOCK COPOLYMERS WILL BE PREPARED UTILIZING DIODEGRADABLE POLY(B-HYDROXYALKANOATES), PHA, AS "HARD" SEGMENTS WITH COMMERCIALLY AVAILABLE BIOCOMPATIBLE POLYMERS SUCH AS POLY(OXYETHYLENE) AS "SOFT" SEGMENTS. IN THIS WAY, SPIRE ANTICIPATES DEVELOPING A WIDE RANGE OF DEGRADABLE PLASTIC MATERIALS WHICH ARE CURRENTLY UNAVAILABLE BY DIOSYNTHETIC METHODS. UPON SUCCESSFUL COMPLETION OF THIS PROGRAM, SPIRE WILL BE ABLE TO PROVIDE THE NAVY WITH AN ENTIRELY NEW FAMILY

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OF BIODEGRADABLE, ENVIRONMENTALLY SAFE PLASTICS WITH THE DESIRED PHYSICAL PROPERTIES OF CONVENTIONAL PLASTICS.

SPIRE CORP
PATRIOTS PK
BEDFORD, MA 01730
CONTRACT NUMBER:
DR JAMES K HIRYONEN
TITLE:
BEARING COATING DEVELOPMENT
TOPIC# 197 OFFICE: NAPC IDENT#: 37814

SPIRE HAS DEVELOPED EXTREMELY ADHERENT HARD COATINGS CAPABLE OF BEING DEPOSITED AT LOW SUBSTRATE TEMPERATURES (LESS THAN 100 DEG C). THEY INCLUDE DIAMOND-LIKE COATINGS (DLCs) AND ION BEAM ASSISTED COATINGS OF SILICON NITRIDE, BORON NITRIDE, AND TITANIUM NITRIDE USING SIMULTANEOUS NITROGEN ION BOMBARDMENT AND VACUUM DEPOSITION OF SILICON, BORON, OR TITANIUM. THIS PROCESS RETAINS MANY OF THE ADVANTAGES OF ION IMPLANTATION (SUPERIOR ADHESION) WHILE OVERCOMING IMPLANT THICKNESS LIMITATIONS AND ALLOWING LOWER PROCESSING COSTS. THESE COATINGS HAVE SHOWN DESIRABLE TRIBOLOGICAL AND CORROSION RESISTANCE PROPERTIES WHICH MAKE THEM IDEAL CANDIDATES FOR PROTECTING CRITICAL DOD BEARINGS. SPIRE'S EXPERIENCE WITH ION BEAM TREATING BEARINGS FOR A NAVY MANTECH PROGRAM UNIQUELY QUALIFIES IT TO APPLY THIS NEW COATING PROCESS TO BEARINGS.

SPIRE CORP
PATRIOTS PK
BEDFORD, MA 01730
CONTRACT NUMBER:
DR JAMES K HIRVONEN
TITLE:
BULK-DENSITY A1(2)O(3) THIN FILMS BY ION BEAM ENHANCED DEPOSITION
TOPIC# 136 OFFICE: NSWC IDENT#: 37994

ALUMINUM OXIDE IS A WIDELY USED CERAMIC EXHIBITING A NUMBER OF ATTRACTIVE BULK PROPERTIES INCLUDING CHEMICAL NERTNESS, HIGH-

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TEMPERATURE COMPATIBILITY, AND HIGH DIELECTRIC STRENGTH. UNFORTUNATELY, THESE PROPERTIES CANNOT ALWAYS BE ACHIEVED IN THIN FILMS WITH CONVENTIONAL DEPOSITION TECHNIQUES BECAUSE PINHOLES AND COLUMNAR MICROSTRUCTURE RESULT IN REDUCED DENSITY. THESE DEFECTS CAN LOWER THE BREAKDOWN VOLTAGE OF DIELECTRIC FILMS AND REDUCE THE ENVIONMENTAL STABILITY (WATER ABSORPTION) OF OPTICAL COATINGS. SPIRE CORPORATION HAS DEMONSTRATED THAT DEFECT-FREE THIN FILMS CAN BE PRODUCED ON A VARIETY OF SUBSTRATE MATERIALS BY A PROCESS KNOWN AS ION BEAM ENHANCED DEPOSITION (IBED), INVOLVING SIMULTANEOUS PHYSICAL VAPOR DEPOSITION AND CONCURRENT LOW ENERGY ION BOMBARDMENT. IBED FILMS EACH CAN BE GROWN AT RELATIVELY LOW TEMPERATURES COMPARED TO OTHER TECHNIQUES, ARE HIGHLY ADHERENT, FULL DENSE, PINHOLE-FREE, AND DO NOT SHOW THE COLUMNAR MICROSTRUCTURE COMMON TO OTHER LOW TEMPERATURE COATING PROCESSES. THE PROPOSED PHASE I RESEARCH WOULD INVESTIGATE IBED AS A MEANS OF DEPOSITING BULK-DENSITY Al(2)O(3) THIN FILMS ON SILICON (100) SUBSTRATES. THE PROCESS WILL INVOLVE ELECTRON BEAM EVAPORATION OF Al(2)O(3) OR Al UNDER CONCURRENT IRRADIATION WITH A LOW ENERGY (100-1000 eV) OXYGEN ION (O+/O(2+) BEAM FROM A KAUFMAN ION SOURCE. BY VARYING EVAPORATION RATE AND ION BEAM CURRENT DENSITY STOICHIOMETRIC, FULLY DENSE Al(2)O(3) FILMS OF ANY DESIRED THICKNESS CAN BE PRODUCED. THE OXYGEN ION WILL SERVE BOTH TO DENSITY THE COATING AND TO MAKE UP ANY LOSS OF OXYGEN DURING EVAPORATION.

SPRINGBORN LABS INC
10 SPRINGBORN CTR
ENFIELD, CT 06082
CONTRACT NUMBER:
ROY A WHITE
TITLE:
ELECTRICALLY CONDUCTIVE AND NON-TDI CONTAINING POLYURETHANE FOAM FOR ARMAMENT APPLICATION
TOPIC# 147 OFFICE: NSWC IDENT#: 36006

OVER THE PAST TWENTY YEARS, THE NAVY HAS BEEN USING A CASTOR OIL/TDI BASED URETHANE FOAM FOR ABLATIVE WEAR REDUCING JACKETS, TO PROVIDE ENDOTHERMIC PROTECTION TO GUN BARRELS AND REDUCE WEAR CAUSED BY EXCESSIVE HEATING. PRESENTLY THERE IS A NEED TO PROVIDE FORMULATIONS BASED ON LESS TOXIC AND MORE CHEMICALLY CONSISTENT RAW MATERIALS AND FOAMS WITH ANTISTATIC ADDITIVES TO PREVENT THE HAZARDS ASSOCIATED

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WITH ELECTROSTATIC ARCING. THE PURPOSE OF THIS PROPOSED PHASE I PROGRAM IS TO DEVELOP SUCH RIGID OR SEMIRIGID POLYURETHANE FOAMS BASED ON POLYESTER POLYOLS AND POLYMERIC MDI. ANTISTATIC CHARACTERISTICS WILL BE PROVIDED THROUGH THE USE OF HYDROPHILIC POLYOLS AND/OR CONDUCTIVE CARBON BLACK AS ADDITIVES TO THE FOAM OR THROUGH THE USE OF CONDUCTIVE COATINGS. CANDIDATE FOAMS WILL BE EVALUATED FOR KEY PROPERTIES SUCH AS DENSITY, MODULUS, GAS GENERATION, AND DECOMPOSITION ENDOTHERM. THE MORE PROMISING COMPOSITIONS WILL BE RECOMMENDED FOR MORE DETAILED FORMULATIONS, TESTING AND PROCESS DEVELOPMENT IN PHASE II.

SPRINGBORN LABS INC
10 SPRINGBORN CTR
ENFIELD, CT 06082
CONTRACT NUMBER:
ROY A WHITE
TITLE:
WATERBORNE RESIN DEVELOPMENT FOR FLEXIBLE ADHERENT PRIMER
TOPIC# 174 OFFICE: NAVAIR IDENT#: 37623

THE URETHANE, EPOXY, AND POLYSULFIDE PRIMERS PRESENTLY UTILIZED ON MILITARY AIRCRAFT ARE EFFICIENT FORMULATIONS BUT ARE SOLVENT-BORNE. IT IS INCREASINGLY IMPORTANT TO CONVERT TO WATERBORNE SYSTEMS TO MINIMIZE AIR POLLUTION IN THE VICINITY OF BASES APPLYING THESE COATINGS. THE PURPOSE OF THIS PROPOSAL IS TO DEVELOP A WATERBORNE URETHANE OR POLYSULFIDE THAT WILL MEET THE SPECIFICATIONS OF MIL-P-85853, I.E. METAL ADHESION, FLEXIBILITY AT LOW TEMPERATURE, SOLVENT RESISTANCE, WATER RESISTANCE, CHROMATE PIGMENT-COMPATIBILITY, AND FAST DRYING. WATERBORNE URETHANES ARE PRESENTLY DISPERSION STABILIZED BY A SMALL AMOUNT OF AMINE-NEUTRALIZED FREE CARBOXYL, USUALLY AT ABOUT 1 MOL CARBOXYL/2999 gms POLYMER. THIS CARBOXYL ALSO ENABLES ADHESION TO METAL. THERE ARE A NUMBER OF COMMERCIALLY AVAILABLE PROPRIETARY COMPOSITION URETHANE DISPERSIONS SUITABLE FOR THIS APPLICATION. WE ARE ALSO PROPOSING TO SYNTHESIZE A NUMBER OF WATERBORNE URETHANES WITH KNOWN COMPOSITION SO THAT ADHESION, SOLVENT RESISTANCE, BLISTERING RESISTANCE, ETC., CAN BE CORRELATED WITH COMPOSITION. SINCE POLYSULFIDES ENABLE BETTER METAL ADHESION AND LOW WATER PERMEABILITY, WE ARE ALSO PROPOSING TO EVALUATE POLYSULFIDE-URETHANE AND ACRYLATE-CURED POLYSULFIDE EMULSIONS.

SUBMITTED BY

MONSANTO HAS A NEW "URETHANE SUBSTITUTE" SYSTEM. WE ARE PROPOSING AN INITIAL EFFORT WITH THIS SYSTEM AS WELL.

SPRINGBORN LABS INC
10 SPRINGBORN CTR
ENFIELD, CT 06082
CONTRACT NUMBER:
ROY A WHITE
TITLE:
JOINT SEALANTS FOR CONCRETE AIRFIELD PAVEMENTS
TOPIC# 191 OFFICE: NCEL IDENT#: 37775

EFFECTIVE SEALING OR RESEALING OF JOINTS IN BITUMINOUS AND CAST CONCRETE RUNWAYS IS AN OLD AND ON-GOING PROBLEM. MANY OF THE PRESENTLY USED MATERIALS ARE DEFICIENT DUE TO POOR ADHESION TO THE PAVEMENT, HARDENING AND EXCESSIVE CONTRACTING DURING EXPOSURE TO COLD WEATHER RESULTING IN PAVEMENT CRACKING AND DELAMINATION, SHRINKAGE DUE TO CURE AND LOSS OF SOLVENTS ETC. AS PART OF A PHASE II SBIR PROGRAM WITH THE FAA OF DOT, SPRINGBORN DEVELOPED NOVEL EPOXY AND POLYSULFIDE SEALANTS FOR EMBEDDING LANDING LIGHTS AND CONDUCTORS IN AIRPORT PAVEMENTS, SEALANTS WHICH HAVE SUCCESSFULLY OVERCOME THOSE DEFICIENCIES DISCUSSED ABOVE. THE PURPOSE OF THE PROPOSED PHASE I EFFORT WILL BE TO DEVELOP IMPROVED SEALING COMPOUNDS WHICH WILL PROVIDE EASE OF PLACEMENT AND MUCH IMPROVED FIELD DURABILITY AND TO DEVELOP TEST SPECIFICATIONS TO QUALIFY NEW SEALANTS AS THEY ARE DEVELOPED OR APPEAR ON THE MARKET. SEALANTS DEVELOPED IN THE PHASE I PROGRAM WILL BE BASED ON THE EPOXY AND POLYSULIDE FORMATIONS DEVELOPED BY SLI FOR DOT AS WELL AS OTHER COMMERCIAL RESIN SYSTEMS.

SRS TECHNOLOGIES
990 EXPLORER BLVD NW
HUNTSVILLE, AL 35806
CONTRACT NUMBER:
MICHAEL A SCHROER
TITLE:
SOFTWARE DEVELOPMENT SYSTEM SAFETY ANALYSIS
TOPIC# 28 OFFICE: SPAWAR IDENT#: 37491

SUBMITTED BY

THE OBJECTIVE OF THIS RESEARCH IS TO DEVELOP SOFTWARE HAZARD ANALYSIS TECHNIQUES TO BE USED ON EXISTING AND DEVELOPING SYSTEMS. THE TECHNIQUES SHOULD WORK WITH PROGRAM DESIGN LANGUAGES FOR SYSTEMS UNDER DEVELOPMENT AND WITH WRITTEN CODE FOR SYSTEMS ALREADY DEVELOPED. IN BOTH NEW AND DEVELOPED SYSTEMS THE TECHNIQUES SHOULD ADDRESS THE INTERFACE BETWEEN HARDWARE AND SOFTWARE WHERE EXPERIENCE HAS SHOWN MANY PROBLEMS TO EXIST. THE PROPOSED PRODUCT IS A USER-FRIENDLY COMPUTER-AIDED TOOLSET THAT WILL ENABLE USER PERSONNEL TO PRODUCTIVELY PERFORM SYSTEM SAFETY AND SOFTWARE HAZARD ANALYSIS.

SRS TECHNOLOGIES INC
1500 WILSON BLVD - STE 800
ARLINGTON, VA 22209
CONTRACT NUMBER:
RICHARD C BALDWIN
TITLE:
WARFARE SYSTEMS ARCHITECTURE
TOPIC# 17 OFFICE: SPAWAR IDENT#: 37292

DEMONSTRATE AN EFFECTIVE METHOD FOR FORCE-LEVEL, TOP-DOWN SYSTEM ARCHITECTURE DEVELOPMENT, REPRESENTATION, ANALYSIS, AND INTEGRATION. THE SRS TECHNOLOGIES DEVELOPED INTEGRATED ARCHITECTURE ANALYSIS (IAA) METHOD WILL BE USED IN PHASE I TO SHOW HOW A FORCE-LEVEL SYSTEM ARCHITECTURE CAN BE DEVELOPED FROM EXISTING WARFARE MISSION AREA ARCHITECTURE WORK. ELEMENTS OF ANTI-SUBMARINE WARFARE (ASW) AND ANTI-SURFACE WARFARE (ASUW) WILL BE EXAMINED AS REPRESENTATIVE ELEMENTS OF THE CARRIER BATTLE FORCE (CVBF) ARCHITECTURE TO SHOW HOW THE INTEGRATION PROCESS WORKS. THE ARCHITECTURE WILL BE REPRESENTED IN A COMMON LEXICON USING MODERN STRUCTURED ANALYSIS LANGUAGE COMPONENTS. FORCE PERVASIVE ELEMENTS SUCH AS C2 WILL THEN BE PULLED OUT AND RELATED TO MISSION EFFECTIVENESS. SUFFICIENT PIECES OF ASW AND ASUW ARCHITECTURE WILL BE EXAMINED TO SHOW THAT THE METHOD CAN BE USED WITH ALL MISSION AREAS FOR FORCE-LEVEL, TOP-DOWN SYSTEM ARCHITECTURE DEVELOPMENT, REPRESENTATION, ANALYSIS, AND INTEGRATION. MORE DETAILED ARCHITECTURE DEVELOPMENT WILL BE LEFT FOR SUBSEQUENT PHASES.

STACKS INC
12280 SHALE RIDGE RD - UNIT #3
AUBURN, CA 95603
CONTRACT NUMBER:
WALTER SCHMIDT
TITLE:
DEVELOPMENT OF SEALED SAPPHIRE RAMAN CELLS
TOPIC# 31 OFFICE: SPAWAR IDENT#: 36907

SUBMITTED BY

RECENT DEVELOPMENTS IN HOT WINDOW RAMAN CELL TECHNOLOGY HAVE SHOWN THAT LONG LIVED DEVICES CAN BE MANUFACTURED. CELLS HAVE BEEN CONSTRUCTED UTILIZING ALUMINA TUBING AND SAPPHIRE WINDOW MATERIALS FUSED VIA CERAMIC BRAZING TECHNIQUES. SUCH DEVICES HAVE BEEN SHOWN TO HAVE LIFETIMES ON THE ORDER OF SEVERAL THOUSAND HOURS. CALCIUM ALUMINATE AND ALUMINA/YTTRIA EUTECTICS FORM USEABLE SEALS AT TEMPERATURES TO 1450 DEGREES C, BUT APPARENTLY ARE OF LIMITED LIFE-TIME AS THEY ARE CURRENTLY USED. LONG TERM CRYSTAL GROWTH AND POISONING VIA LEAD OXIDES FORMED OVER LONG PERIODS ALONG WITH THERMAL CYCLING TEND TO ACT AS MAJOR FAILURE MODES FOR THE LEAD VAPOR CELLS. WHAT WE PROPOSE IS TO DEVELOP THE SEAL TECHNOLOGY REQUIRED FOR THE MANUFACTURE OF AN ALL SAPPHIRE LEAD VAPOR RAMAN DEVICE. THE PROCESS TO TAKE PLACE VIA OPTICAL CONTACT BONDING AND SUBSEQUENT FIRING AT TEMPERATURES APPROACHING 1900 DEGREES C. THE RECRYSTALIZED JOINT TO HAVE NO BOUNDARY TO CHEMICALLY REACT WITH LEAD VAPOR NOR BUILT IN FAILURE MODE DUE TO DIFFERENCES IN CELL MATERIALS AND SEALANTS.

STAR MICROWAVE
540 DIVISION ST
CAMPBELL, CA 95008
CONTRACT NUMBER:
ROBERT M PHILLIPS
TITLE:
DEMONSTRATION OF BAKE-OUT ACTIVATED MICROPUMP FOR EXTENDED TWT SHELF LIFE
TOPIC# 118 OFFICE: NAVSEA IDENT#: 38870

THE OBJECTIVE OF THIS RESEARCH PROJECT IS TO DEMONSTRATE AND VALIDATE THE USE OF A BAKE-OUT ACTIVATED "MICROPUMP" AS A MEANS OF EXTENDING THE SHELF LIFE OF TWTs TO AT LEAST 5 YEARS. FEATURES OF THE "MICROPUMP" INCLUDE: 1) BAKE-OUT ACTIVATED - NO SPECIAL PROCESSING OR POWER SUPPLY REQUIRED. 2) ADAPTABLE AS A LOW COST ADDITION TO ANY EXISTING TWT DESIGN. 3) NOT ADVERSELY AFFECTED BY HIGH LEVEL OF GAS EVOLVED BY TWT DURING BAKE-OUT. EXPERIMENTAL VALIDATION OF THE "MICROPUMP" WILL BE CARRIED OUT USING ELEVATED TEMPERATURE ACCELERATED LIFE TESTING. INTERNAL PRESSURE OF THREE TEST VEHICLES CONTAINING "MICROPUMPS" AND THREE CONTROLS WILL BE COMPARED FOLLOWING THE ACCELERATED EQUIVALENT OF 7 YEARS SHELF LIFE.

SUBMITTED BY

STELLARTECH RESEARCH CORP
10418 PALO VISTA RD
CUPERTINO, CA 95014
CONTRACT NUMBER:
DR ROGER A STERN
TITLE:
DEVELOPMENT OF A PRESSURE AND TEMPERATURE TRANSDUCER FOR 100 KILO EXPLOSIVE ENVIRONMENTS
TOPIC# 102 OFFICE: NAVSEA IDENT#: 36704

THE OBJECTIVE OF THIS PROPOSAL IS TO DEVELOP A HIGH-ACCURACY, HIGH-RANGE PRESSURE AND TEMPERATURE TRANSDUCER FOR THE MEASURMENT OF RAPID TRANSIENTS TO 100 KILOBARS AND TEMPERATURES TO 2500 K IN UNDERWATER EXPLOSION BUBBLES. ALL MEASURING FUNCTIONS WILL BE PERFORMED BY ONE SMALL (ABOUT 20 MM IN DIAMETER) SENSOR UNIT. THE PRESSURE IS DETECTED BY CAPACITIVE METHODS USING A THICK, RUGGED METAL MEMBRANE. THE SENSOR CAN OPERATE AT TEMPERATURES OF 2500 K. THE EXPLOSION TEMPERATURE IS SIMULTANEOUSLY MEASURED BY A SMALL HIGH-ACCURACY, HIGH-SPEED RADIATION DETECTOR CAPABLE OF DETECTING TEMPERATURES TO 3000 K AND INTEGRATED IN THE PRESSURE SENSOR UNIT. A MICROCOMPUTER WITH A HIGH-SPEED REAL-TIME INTERFACE SAMPLES THE PRESSURE AND TEMPERATURE DATA. AS THE ONLY MOVING PART IS THE MEMBRANE, WITH A MAXIIMUM DISPLACEMENT OF 5 UM, IT IS EXPECTED THAT THE TRANSDUCER SYSTEM WILL BE QUITE RUGGED AND CAPABLE OF WITHSTANDING LARGE TEMPERATURE VARIATIONS AS WELL AS OVERLOADS UP TO TWICE ITS NOMINAL RANGE.

STEROIDS LTD - CHICAGO TECHNOLOGY PK
2201 W CAMPBELL PARK DR
CHICAGO, IL 60612
CONTRACT NUMBER:
ROBERT M MORIARTY
TITLE:
SYNTHESIS AND CHARACTERIZATION N-NITROSO NITRODIPHENYLAMINES AND NITROCENTRALITES
TOPIC# 132 OFFICE: NSWC IDENT#: 35860

SUBMITTED BY

BASED ON STEROIDS ITD.'S PRIOR EXPERIENCE IN THE SYNTHESIS OF NITRODIPHENYLAMINO-N-NITROSO COMPOUNDS AND NITROCENTRALITIES, AS WELL AS KNOWLEDGE OF THEIR BEHAVIOR, SPECTROSCOPIC CHARACTERIZATION, AND ISOLATION, WE NOW PROPOSE TO RESPOND TO THE CRITICAL NEED FOR A WIDE RANGE OF THESE COMPOUNDS WHICH ARE ESSENTIAL IN THE AREA OF EVALUATION OF POLYOLNITRATE EXPLOSIVE LIFETIMES. WE WILL SYNTHESIZE 18 KEY N-NITROSO-NITRODIPHENYLAMINES, 4 NITROCENTRALITES, AND 2(13) C-ENRICHED NITROCENTRALITIES. COMPLETE (1)H, (13)C, (15)N, FTIR, UV-VIS AND gc-MS DATA WILL BE OBTAINED. HPLC BEHAVIOR WILL BE ESTABLISHED FOR THE N-NITROSO-NITRODIPHENYLAMINES AND NITROCENTRALITES. THE IMPORTANCE OF THIS WORK IS THAT PURE SAMPLES OF ABSOLUTE STRUCTURAL HOMOGENEITY ARE INDISPENSABLE PREREQUISITES FOR ANALYSIS OF POLYOL NITRATE EXPLOSIVES, AND FOR THE DEVELOPMENT OF A DETAILED MECHANISM OF THEIR IN SITU FORMATION, AS WELL AS ESTABLISHMENT OF A TIME-COURSE ANALYSIS OF FORMATION TO BE USED AS AN INDEX OF EXPLOSIVE USEFUL LIFETIME. AN ULTIMATE LONG TERM GOAL IS ACQUISITION OF A CENTRAL LARGE SCALE REPOSITORY OF THE SAMPLES FOR DISTRIBUTION.

STRAINOPTIC TECHNOLOGIES INC
108 W MONTGOMERY AVE
NORTH WALES, PA 19454
CONTRACT NUMBER:
ALEX S REDNER
TITLE:
A NOVEL APPLICATION OF ULTRASONIC TOMOGRAPHY FOR POROSITY DISTRIBUTION MAPPING IN COMPOSITES
TOPIC# 76 OFFICE: NAVAIR IDENT#: 36385

CONVENTIONAL ULTRASONIC NONDESTRUCTIVE EVALUATION IS CAPABLE OF DETECTING POROSITY IN RESIN-MATRIX COMPOSITES, BUT CANNOT EVALUATE THE POROSITY DISTRIBUTION, NOR EVEN EVALUATE RELIABLY THE PROPER POROSITY PERCENTAGE. THIS STUDY IS PROPOSED TO DEVELOP AN ULTRASONIC TOMOGRAPHY TECHNIQUE FOR MAPPING THE POROSITY DISTRIBUTION IN RESIN-MATRIX COMPOSITES. THE BASIS OF THE PROPOSED APPROACH IS TO USE THE TOMOGRAPHICAL PRINCIPLE TO EXTRACT THE LOCAL PROROSITY LEVEL FROM THE AVERAGE VELOCITY OR ATTENUATION VALUES MEASURED ALONG MANY SETS OF PARALLEL PROPAGATION PATHS. RELIABLE EMPIRICAL RELATIONSHIPS

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BETWEEN VELOCITY OR ATTENUATION AND POROSITY WILL BE FIRST ESTABLISHED FOR SAMPLES OF UNIFORM POROSITY. THE INVESTIGATION WILL NOT BE RESTRICTED ONLY TO LONGITUDINAL-WAVE NORMAL INCIDENCE, BUT WILL ALSO INCLUDE SHEAR-WAVE AND WAVEGUIDE MODES TO BE EXCITED AT OBLIQUE INCIDENCE. THE DEVELOPED TECHNIQUE WILL THEN BE TESTED ON SAMPLES OF ARBITRARY POROSITY DISTRIBUTION TO DETERMINE ITS TECHNICAL FEASIBILITY. THE FINAL OUTPUT IS EXPECTED TO BE A SPATIAL MAPPING OF THE POROSITY DISTRIBUTION.

STRESS TECHNOLOGY INC
1800 BRIGHTON-HENRIETTA TOWN LINE RD
ROCHESTER, NY 14623
CONTRACT NUMBER:
DR NEVILLE F RIEGER
TITLE:
LIGHTWEIGHT TURBINE BLADE ATTACHMENT
TOPIC# 196 OFFICE: NAPC IDENT#: 37793

PROPOSED HEREIN IS A PROGRAM TO DEVELOP AN IMPROVED METHOD FOR TURBINE BLADE DISK ATTACHMENTS. A DESIGN CONCEPT IS PRESENTED TO ALLOW EASY REMOVAL AND REPLACMENT OF BLADES, REDUCE THE MASS OF THE ATTACHMENT REGION, AND MAINTAIN THE STRUCTURAL RELIABILITY OF STANDARD FIR-TREE AND DOVETAIL ENTRY ROOT DESIGN. THE "SPLIT ROOT" CONCEPT COMBINES THE INSTALLATION FEATURES OF AN AXIAL TYPE BLADE ROOT, WITH THE RIGIDITY AND STRENGTH OF A LESS MASSIVE STRADDLE MOUNT ROOT. THE SPLIT TOOT BLADE IS FASTENED AXIALLY ON THE DISK, WITH DIRECT CONTACT BETWEEN ADJOINING BLADE ROOT SURFACES FOR INCREASED MATERIAL DAMPING. PINS INSERTED AXIALLY BETWEEN ADJOINING ROOT FACES MAINTAIN BLADE RIGIDITY, AND PROVIDE ADDITIONAL DAMPING. ADVANTAGES OF THE SPLIT ROOT DESIGN ARE PRESERVATION OF THE AXIAL ENTRY INSTALLATION PROCEDURE, REDUCE BLADE TOOT MASS WITHOUT LOSS OF STRENGTH OR RIGIDITY, INCREASED BLADE DAMPING, LOWER DYNAMIC STRESS, AND EXTENDED BLADE LIFE. BY REDUCING MASS AND INCREASING DAMPING, THE SPLIT ROOT DESIGN MAY ALSO ALLOW SIMPLIFICATION OF THE ATTACHMENT GEOMETRY, WHICH WILL FURTHER EASE INSTALLATION AND REMOVAL OF THE BLADES, AS WELL AS REDUCE THEIR ASSOCIATED MANUFACTURING COSTS.

SWEET ASSOCS LTD
1300 CRYSTAL DR - STE 1704
ARLINGTON, VA 22202
CONTRACT NUMBER:
DR RICKI SWEET
TITLE:
ANTI-SUBMARINE WARFARE (ASW) C3I ARCHITECTURE EVALUATION
TOPIC# 17 OFFICE: SPAWAR IDENT#: 37294

SUBMITTED BY

THE PROPOSED PHASE I INNOVATIVE RESEARCH FOR SPAWAR WILL DEVELOP A PLAN FOR THE APPLICATION OF AN EVALUATION FRAMEWORK TO ARCHITECTURAL CONSIDERATIONS WITHIN ASW C3I. IT IS INTENDED THAT, IN PHASE II, A STANDARDIZED ANALYTIC METHODOLOGY, THE MCES, WILL BE APPLIED TO A SET OF EXEMPLAR ARCHITECTURAL PROBLEMS THAT SPAWAR IS MANDATED TO ADDRESS. DURING PHASE I, THESE PROBLEMS WILL BE IDENTIFIED TO BE ILLUSTRATIVE OF THE ENTIRE SPECTRUM OF ARCHITECTURAL PROBLEMS OF INTEREST. THE FRAMEWORK WILL DRAW UPON DATA AND TOOLS ALREADY ESTABLISHED FOR USE WITHIN SPAWAR AND ITS PREDECESSOR ORGANIZATION, THE NAVAL ELECTRONIC SYSTEMS COMMAND (NAVELEX). THE SYNTHESIS IS PARTICULARLY PRODUCTIVE IN A RESOURCE CONSTRAINED ENVIRONMENT, IN THAT THE MCES QUICKLY FOCUSES UPON THE CRITICAL ELEMENTS NEEDED TO ADDRESS THE PROBLEM AT HAND.

SWEETWOOD SPECIALTY CO
PO BOX 175 - R.D. #2
CLAYSVILLE, PA 15323
CONTRACT NUMBER:
THOMAS W PFLASTERER
TITLE:
AIR-INFLATED SPACE FRAME TRUSS FOR EXPENDABLE SHIP REPLICA
TOPIC# 182 OFFICE: PMTC IDENT#: 37689

THE PURPOSE OF THIS PROPOSAL IS TO EXPLORE EXPENDABLE SHIP REPLICAS. SPECIFICALLY, AIR-INFLATED SPACE FRAME TRUSSES COVERED WITH METALIZED FILM WILL BE DEVELOPED. IT WILL BE SHOWN THAT THIS TECHNOLOGY HAS SIGNIFICANT ADVANTAGES OVER CONVENTIONAL BALLOON TECHNOLOGY. POINTS TO BE EXAMINED ARE AS FOLLOWS: COATED MATERIALS, DESIGN, FABRICATION, STORAGE, INFLATION, DEPLOYMENT, REPAIR/REUSE, STATION KEEPING, STABILITY, ATTACHMENT/INCORPORATION OF SIMULATED EMITTERS AND PROPULSION POTENTIAL. METHODS OF VERY RAPID DEPLOYMENT AND IMPLICATIONS OF AN UNSOPHISTICATED ATTACK AS WELL AS WAR AT SEA SCENARIOS WILL ALSO BE ADDRESSED.

SYM-BIOTECH INC
PO BOX 3 - 8 FAIRFIELD BLVD
WALLINGFORD, CT 06412
CONTRACT NUMBER:
DR EDWARD M DAVIS
TITLE:
BIODEGRADATION OF HEAVY HYDROCARBONS
TOPIC# 129 OFFICE: NAVSEA IDENT#: 35840

SUBMITTED BY

SURFACTANTS AND ENZYMES WHICH PLAY KEY ROLES IN THE DEGRADATION OF HEAVY HYDROCARBONS BY MICROORGANISMS WILL BE PRODUCED, PURIFIED AND CHARACTERIZED. ANAEROBIC AND AEROBIC CULTURES OF A NUMBER OF MICROORGANISMS WILL BE INVESTIGATED AS PURE AND AS MIXED CULTURES. KEY VARIABLES AND PARAMETERS AFFECTING THE PRODUCTION OF ENYMES AND SURFACTANTS OF INTEREST WILL BE IDENTIFIED.

SYNERTECH ASSOCS INC
1600 WILSON BLVD - STE 900
ARLINGTON, VA 22209
CONTRACT NUMBER:
FRANK FARINELLA
TITLE:
PASSIVE RANGING ALGORITHM USING ELECTRO-OPTIC DATA
TOPIC# 116 OFFICE: NAVSEA IDENT#: 36876

SCANNING ELECTRO-OPTIC (E/O) SYSTEMS ARE CURRENTLY BEING DEVELOPED FOR INSTALLATION IN SURFACE SHIPS. THESE ELECTRO-OPTIC SYSTEMS CAN PROVIDE ACCURATE ANGULAR POSITION DATA ON OBJECTS THAT ARE BEING VIEWED BUT DO NOT PROVIDE RANGE TO THE OBJECTS. UNDER CONDITIONS OF TOTAL PASSIVE SURVEILLANCE (E.G. WHEN ACTIVE RADAR SENSORS ARE SHUT DOWN) SURFACE OPERATIONS MUST BE PERFORMED WITHOUT RANGE INFORMATION. THIS CAN BE EXTREMELY HAZARDOUS. THE ONLY ALTERNATIVE IS TO TURN ON ACTIVE SENSORS AND RISK DISCLOSURE OF OWN SHIPS PRESENCE AND POSITION TO HOSTILE UNITS, AND EXPOSURE TO ATTACK BY ANTI-RADIATION WEAPONS. SYNERTECH PROPOSES TO EXAMINE TECHNIQUES FOR PASSIVE RANGING AND TO DEVELOP AN ALGORITHM THAT WILL ALLOW SURFACE SHIP TO HAVE A TACTICAL OPTION TO EFFECTIVELY OPERATE DURING PERIODS WHEN RADIO FREQUENCY EMISSIONS ARE BEING CONTROLLED. THIS WILL BE DONE BY EXAMINING THE PERFORMANCE OF SEVERAL METHODS OF PASSIVE RANGING AND QUANTIFYING THEIR CAPABILITIES AND LIMITATIONS UNDER A VARIETY OF OPERATIONAL AND ENVIRONMENTAL CONDITIONS. AN OPTIMUM PASSIVE RANGING ALGORITHM WILL BE DEVELOPED, EVALUATED AND PREPARED FOR IMPLEMENTATION ON A GENERAL PURPOSE COMPUTER.

SYNETICS CORP
540 EDGEWATER DR
WAKEFIELD, MA 01880
CONTRACT NUMBER:
RICHARD A FASTRING
TITLE:
ANALYSIS OF THE RECONFIGURATION OF LOCAL AREA NETWORK (LAN)
TOPIC# 50 OFFICE: SPAWAR IDENT#: 37020

SUBMITTED BY

THIS PROPOSAL OFFERS AN INNOVATIVE SOLUTION TO THE PROBLEM OF DETERMINING HOW LONG A TOKEN RING LOCAL AREA NETWORK (LAN) WILL TAKE TO INITIALLY CONFIGURE, OR TO RECONFIGURE FOLLOWING STATION OR CABLE FAILURE/DAMAGE. THIS RECONFIGURATION TIME IS CRITICAL IN REAL-TIME MILITARY APPLICATIONS AND IN INDUSTRIAL CONTROL APPLICATIONS. THE PHASE I PROPOSAL INVOLVES THE DEVELOPMENT OF AN EVENT-STEPPED COMPUTER SIMULATION MODEL OF THE RECONFIGURATION ALGORITHMS FOR THE U.S. NAVY'S SAFENET-I LAN WHICH IS BASED ON THE IEEE 802.5 PROTOCOL. THE MODEL WILL YIELD RECONFIGURATION TIME AND RECONFIGURATION PATH FOR ARBITRARY LEVELS OF STATION/CABLE FAILURE. IT WILL INCLUDE STATION BYPASS, CABLE SWITCHING (HOPPING) AND LOOPBACK. THE MODEL WILL BE TABLE-DRIVEN SO AS TO PERMIT "WHAT-IF" ANALYSIS THAT CAN BE USED FOR OPTIMIZATION OF THE RECONFIGURATION ALGORITHM.

SYSTEM ENGINEERING & DEVELOPMENT CORP
9170 RUMSEY RD
COLUMBIA, MD 21045
CONTRACT NUMBER:
TERRY TURPIN
TITLE:
ELECTRONIC SUPPORT MEASURE RECEIVER STUDY
TOPIC# 117 OFFICE: NAVSEA IDENT#: 36887

ADVANCES IN RADAR TECHNOLOGY HAVE PRODUCED A NEW FAMILY OF THREATS. UNCONVENTIONAL WAVEFORMS SUCH AS SPREAD SPECTRUM AND VERY SHORT PULSES ARE COMBINED WITH STRATEGIES OF POWER MANAGEMENT. THESE NEW TYPES OF SIGNALS CALL FOR AN ADVANCE IN SHIPBOARD ELECTRONIC SUPPORT MEASURE (ESM) RECEIVERS. THIS STUDY WILL DEFINE THE PERFORMANCE VERSUS COST TRADEOFFS OF VARIOUS RECEIVER ARCHITECTURES. THE STUDY WILL INCLUDE ADVANCED COMPONENT AND SUBSYSTEM TECHNOLOGY SUCH AS MIMIC, GaAs, DRFM LSI, ACOUSTO-OPTICS, COMPRESSIVE TECHNIQUES, AND MULTIDIMENSIONAL TECHNIQUES SUCH AS AZIMUTH VS FREQUENCY. THIS STUDY IS COMPRISED OF FIVE TASKS WHICH ARE: 1) SELECT POSTULATED THREAT SIGNALS AND ENVIRONMENTS, 2) DEFINE RECEIVER FUNCTIONS AGAINST THESE SIGNALS, 3) SPECIFY RECEIVER ARCHITECTURES TO IMPLEMENT THESE FUNCTIONS, 4) ACCESS IMPLEMENTING TECHNOLOGIES, AND 5) PERFORM A COST, RISK, PERFORMANCE TRADEOFF. THIS PHASE I STUDY WOULD PROVIDE THE FOUNDATION FOR THE DEVELOPMENT OF AN ADVANCED SHIPBOARD ESM

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SYSTEM TO DETECT AND DETERMINE THE DIRECTION OF ARRIVAL OF UNCONVENTIONAL RADAR SIGNALS. THE RESULT OF THIS PROJECT WOULD BE IDENTIFICATION OF ESM RECEIVER ARCHITECTURES AND IMPLEMENTING TECHNOLOGIES, AND A TRADEOFF ANALYSIS THAT MAXIMIZES PERFORMANCE VERSUS DEVELOPMENT COST AND RISK.

SYSTEM ENGINEERING & DEVELOPMENT CORP
9170 RUMSEY RD
COLUMBIA, MD 21045
CONTRACT NUMBER:
DR LESLIE H GESELL
TITLE:
AN OPTICAL PROCESSOR FOR PASSIVE RF INTERFEROMETRY
TOPIC# 206 OFFICE: NOSC IDENT#: 37917

OPTICAL COMPUTING TECHNIQUES PROMISE DRAMATIC IMPROVEMENTS IN THE EFFICIENCY OF DIRECTION FINDING AND SIGNAL CHARACTERIZATION WITH PASSIVE RF PLANAR ARRAY INTERFEROMETRY. PLANAR ARRAY INTERFEROMETRY CAN PROVIDE FINE RESOLUTION DIRECTION OF ARRIVAL (DOA) MEASUREMENTS SIMULTANEOUSLY FOR SIGNALS WITHIN A WIDE FIELD OF VIEW. HOWEVER, THE PROCESSING BURDEN IS ENORMOUS USING STANDARD PROCESSING ARCHITECTURES. FURTHERMORE, CHARACTERIZING A PARTICULAR DETECTED SIGNAL, FOR EXAMPLE MEASURING THE POWER SPECTRAL DENSITY, WHEN OTHER SIGNALS ARE PRESENT WITHIN THE FIELD OF VIEW REQUIRES COMPLEX PROCESSING WHEN USING STANDARD METHODS. THIS PAPER PROPOSES AN OPTICAL FIBER PROCESSING ARCHITECTURE WHICH DRAMATICALLY INCREASES THE EASE WITH WHICH THE DOA OF THE SIGNALS CAN BE OBTAINED FROM PASSIVE RF PLANAR INTERFEROMETRIC ARRAYS AND TRIVIALIZES THE PROBLEM OF CHARACTERIZING THE RF ENERGY COMING FROM A PARTICULAR LOCATION. INCLUDED IN THE PROPOSED ARCHITECTURE IS A SUBSYSTEM USING OPTICAL PROCESSING TO ISOLATE RF ENERGY COMING FROM A PARTICULAR DIRECTION AND TO GENERATE THE POWER SPECTRAL DENSITY OF THE ISOLATED RF ENERGY. THE OBJECTIVE OF THIS EFFORT IS TO ESTABLISH THE SPECIFIC DESIGN REQUIREMENTS AND TO DEFINE A BASIS FOR ASSESSING THE FEASIBILITY OF THE OPTICAL PROCESSING; TO FURTHER DEVELOP AND REFINE THE ARCHITECTURE AND ESTABLISH SYSTEM CHARACTERISTICS AND PARAMETER VALUES TO SATISFY THE REQUIREMENTS; AND TO DETERMINE THE RISK AND EFFORT REQUIRED TO DEVELOP THE OPTICAL PROCESSOR.

SYSTEMS EXPLORATION INC
4241 JUTLAND DR
SAN DIEGO, CA 92117
CONTRACT NUMBER:
RICHARD W THOMAS
TITLE:
AIRBORNE COOPERATIVE ENGAGEMENT EFFECTIVENESS MODEL
TOPIC# 17 OFFICE: SPAWAR IDENT#: 37295

SUBMITTED BY

PROJECT OBJECTIVE: TO DEVELOP A COMPUTERIZED MODEL FOR TOP LEVEL, SYSTEMATIC EVALUATION OF ENGAGEMENT/MISSION EFFECTIVENESS PROVIDED BY COOPERATIVE ENGAGEMENT IN VARIOUS TACAIR MISSIONS, AND AS A FUNCTION OF THE ASSOCIATED ANTI-AIR-WARFARE (AAW) ARCHITECTURE. DESCRIPTION: COOPERATIVE ENGAGEMENT, AS ADDRESSED HEREIN, USES ONE AIRCRAFT TO PROVIDE TARGETING FOR, AND INFLIGHT CONTROL OF MISSILES LAUNCHED BY ANOTHER AIRCRAFT. IN EFFECT THIS CHANGES THE LAUNCH ACCEPTABILITY REGION (LAR) OF THE MISSILE. WHEN VIEWED FROM THE LAUNCH AIRCRAFT THE LAR THUS MAY BE EXPANDED BEYOND THAT WHICH MAY BE SUPPORTED BY THE LAUNCH AIRCRAFT'S OWN TARGETING. EXPANSION OF A MISSILE'S LAR THROUGH COOPERATIVE ENGAGEMENT IS THE BASIC CONCEPT UPON WHICH THIS MODELING RESEARCH PROJECT IS PROPOSED. THE SECOND CONCEPT IS THAT AN EXPANDED LAR WILL ENABLE INCREASED FIREPOWER TO BE BROUGHT TO BEAR IN A TIMELY MANNER AGAINST KEY TARGETS. THE INCREASE IN FIREPOWER IS, IN TURN, INDICATIVE OF A POTENTIAL INCREASE IN MISSION EFFECTIVENESS. ADDITIONALLY, THE RESEARCH WILL SPECIFICALLY EXPLORE THE FEASIBILITY AND PRACTICALITY OF DEVELOPING THE MODEL IN A FORMAT THAT MAXIMIZES ITS COMPATIBILITY AND EASE OF USE WITH THE APPLE MACINTOSH PERSONAL COMPUTER.

SYSTEMS EXPLORATION INT'L SERVICES CO
11010 ROSELLE ST
SAN DIEGO, CA 92121
CONTRACT NUMBER:
PAUL MAYNARD
TITLE:
SHIPBOARD ELECTROMAGNETIC EMISSIONS MANAGEMENT FOR ELECTRONIC WARFARE AND COMMUNICATIONS
TOPIC# 51 OFFICE: SPAWAR IDENT#: 37028

THE PROPOSED ELECTROMAGNETIC EMISSIONS MANAGEMENT SYSTEM PROTOTYPE WILL PROVIDE BATTLE FORCE/GROUP COMMANDERS WITH THE CAPABILITY TO PLAN, MONITOR AND OPERATIONALLY CONTROL BOTH FORCE AND PLATFORM ELECTROMAGNETIC (EM) EMISSIONS WITH A MINIMUM OF ELECTROMAGNETIC INTERFERENCE (EMI). THE PROPOSED SYSTEM WOULD SUPPORT FORCE/GROUP DYNAMIC EM SPECTRUM MANAGMENT AND PROVIDE GUIDANCE IN THE EMPLOYMENT OF EM EQUIPMENTS. IT WOULD ALSO PROVIDE THE MEANS TO RESOLVE OR MITIGATE IDENTIFIED EM CONFLICTS AND EMCON VIOLATIONS AND ALSO ENABLE

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FORCE/GROUP EM SIGNATURES TO BE ALTERED TO REDUCE THREAT VULNERABILITY IN SUPPORT OF THE ASSIGNED MISSION. ACCORDINGLY, THE SYSTEM WOULD BE AN INTEGRATED FORCE/GROUP EM SUPPORT SYSTEM CAPABLE OF PROVISING EM EMISSION MANAGEMENT FOR THE BATTLE FORCE/GROUP COMMANDER. THE PROPOSED SYSTEM WOULD UTILIZE EXPERT SYSTEM TECHNOLOGY WITH THE LATEST TECHNIQUES IN ARTIFICIAL INTELLIGENCE PROGRAMMING TO ACCOMPLISH PLANNING AND OPTIMUM MANAGMENT OF THE ELECTROMAGNETIC SPECTRUM. FUTURE PREPLANNED PRODUCT IMPROVEMENTS WOULD INVOLVE THE INTEGRATION OF THIS SYSTEM WITH THE NCCS AFLOAT, FDDS, AND EWCM SYSTEMS CURRENTLY IN DEVELOPMENT.

SYSTEMS MANAGEMENT TECHNOLOGY INC
1225 JEFFERSON-DAVIS HWY/GATEWAY 2/#1103
ARLINGTON, VA 22202
CONTRACT NUMBER:
TERRY S THAMES
TITLE:
HARPOON CAPTIVE CARRY SIMULATOR
TOPIC# 73 OFFICE: NAVAIR IDENT#: 36334

THE FACILITY TO RECORD AND RECONSTRUCT, ON A DESKTOP COMPUTER, IN-FLIGHT P-3C SIMULATED HARPOON LAUCH SCENARIOS WILL BE INVESTIGATED AS A FIRST STEP TOWARDS THE DESIGN OF A HARPOON CAPTIVE AIR TRAINING MISSILE (CATM) THAT WILL PROVIDE THE VP COMMUNITY WITH A COST-EFFECTIVE MEANS TO RECONSTRUCT SIMULATED HARPOON LAUNCH/ENGAGEMENT IMMEDIATELY UPON RETURN FROM FLIGHT. THE INVESTIGATION WILL INCLUDE: A HARPOON/P-3C INTERFACE ANALYSIS, HARPOON/DESKTOP COMPUTER SIMULATION ANALYSIS, SPECIFICATION FOR CAPABILITY TO RECORD AND RECONSTRUCT THE SIMULATION ON A DESKTOP COMPUTER, DEVELOPMENT OF A COMPUTER/SIMULATION CAPABILITIES STATEMENT REPORT, AND DEVELOPMENT OF A STRATEGY PLAN REPORT.

SYSTEMS TECHNOLOGY INC
13766 S HAWTHORNE BLVD
HAWTHORNE, CA 90250
CONTRACT NUMBER:
WAYNE F JEWELL
TITLE:
REMOTE WIND VELOCITY SENSING
TOPIC# 180 OFFICE: NAVAIR IDENT#: 37674

SUBMITTED BY

THE AIRWAKE VELOCITY FIELD IN THE RECOVERY ENVELOPE FOR AVIATION-CAPABLE SHIPS IS EXTREMELY COMPLEX. TURBULENT VORTICES GENERATED BY THE SHIP'S SUPERSTRUCTURE CHANGE DIRECTION AND INTENSITY WITH THE MAGNITUDE AND DIRECTION OF THE WIND OVER DECK (WOD) AS WELL AS WITH THE PITCHING AND ROLLING MOTIONS OF THE SHIP. THE CURRENT PRACTICE FOR INSURING SAFE OPERATIONS WITH A PARTICULAR HELICOPTER/SHIP COMBINATION IS TO PERFORM DYNAMIC INTERFACE (DI) TESTING UNDER VARIOUS WOD AND SHIP'S MOTION CONDITIONS. THE PROCESS OF DI TESTING COULD BE EXPEDITED IF THE VELOCITIES IN THE AIRWAKE FIELD COULD BE ACCURATELY MEASURED, MODELED, AND EVEN PREDICTED AT VARIOUS WOD CONDITIONS. PREVIOUS ATTEMPTS TO MEASURE THE AIRWAKE FIELD AROUND SCALE MODELS OF SHIPS USING WIND TUNNELS HAVE PRODUCED QUESTIONABLE RESULTS. COMPUTATIONAL FLUID DYNAMICS HAS ALSO BEEN SUED TO PREDICT THE AIRWAKE FIELD, BUT IT REMAINS TO VALIDATE THE PREDICTIONS WITH FULL-SCALE MEASUREMENTS. REMOTE WIND SENSORS EMPLOYING LASER DOPPLER VELOCIMETRY OFFER PROMISE FOR MAPPING THE FULL-SCALE THREE-DIMENSIONAL SPATIAL- AND TIME-DEPENDENT AIRWAKE FIELD. TWO OBJECTIVES ARE ADDRESSED BY THIS PROPOSAL: (1) TO DEVELOP A PLAN FOR PROCESSING AND ANALYZING THREE-DIMENSIONAL AIRWAKE DATA COLLECTED WITHIN THE RECOVERY ENVELOP OF AN AIR-CAPABLE SHIP USING A REMOTE WIND SENSOR, AND (2) TO CONSIDER HOW THE PROCESSED DATA COULD BE USED IN ADVANCE OF DI TESTING FOR BOTH REAL-TIME AND NON-REAL-TIME MODELING AND ENGINEERING ANALYSIS OF AIRWAKE DISTURBANCES ON AIRCRAFT.

TANG C B INC
8 BICENTENNIAL DR
LEXINGTON, MA 02173
CONTRACT NUMBER:
CHARLES TANG
TITLE:
AN OBJECT-ORIENTED DATABASE APPROACH FOR COMPUTERIZED NAVAL NETWORK PHONE BOOK
TOPIC# 40 OFFICE: SPAWAR IDENT#: 36960

RESEARCH AND DEVELOPMENT ON DATABASE MANAGEMENT TECHNIQUES FOR NAVY MESSAGE ADDRESS ARE HEREIN PROPOSED IN ANSWER TO THE NAVY REQUIREMENTS FOR A COMPUTERIZED, SPEEDY, DYNAMIC, NETWORK PHONE BOOK. AN

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OBJECT-ORIENTED DATABASE APPROACH IS TAKEN TO BUILD THE PHONE BOOK BASED ON AN EXISTING DBMS PRODUCT db VISTA. SUCH A TREE-LIKE DATABASE STRUCTURE PERMITS THE USER-DEFINED ATTRIBUTE TYPE AND FACILITATES CONVERSION OF DISTINGUISHED USER NAMES INTO NETWORK ADDRESSES. THE TRADEOFF OF DIFFERENT NETWORK ARCHITECTURES (CENTRALIZED, DISTRIBUTED OR HYBRID) LEADS TO THE PROPOSED SOFTWARE COMPONENTS OF AN USER AGENT AND SERVICE AGENT FOR A FLEXIBLE PHONE BOOK INSTALLATION. IN A SYSTEM DESIGN DOCUMENT WE SUGGEST SIX MODULES FOR THE WHOLE PHONE BOOK SYSTEM. A PHASE I PROTOTYPE SUPPORTING A CENTRALIZED ENVIRONMENT, CONSISTS OF A PROGRAMMING INTERFACE, THE PHONE BOOK ENGINES, AND A PORTION OF THE SERVICE AGENT.

TANNER RESEARCH INC
128 W DEL MAR BLVD
PASADENA, CA 91105
CONTRACT NUMBER:
JOHN TANNER
TITLE:
NEURAL NETWORK BASED TARGET RECOGNITION
TOPIC# 160 OFFICE: NSWC IDENT#: 36146

REAL-TIME OBJECT ACQUISITION, TRACKING AND RECOGNITION REQUIRE MASSIVE COMPUTATIONAL BANDWIDTH. WE PROPOSE TO RESEARCH AND DEVELOP CUSTOM INTEGRATED CIRCUITS THAT WILL PERFORM THESE TASKS AT THE FOCAL PLANE, USING INTEGRATED PHOTOSENSORS AND ANALOG COMPUTING NETWORKS. PHASE I WILL INCLUDE THE DESIGN AND FABRICATION OF TET CHIPS TO PROVE THE FEASIBILITY OF OUR DEVELOPMENT. OUR APPROACH WILL UTILIZE STANDARD READILY AVAILABLE CMOS BULK INTEGRATED CIRCUIT TECHNOLOGY SO PRODUCTS ARISING FROM THIS R&D CAN BE FABRICATED RELIABLY AND ECONOMICALLY BY A NUMBER OF VENDORS. WE HAVE ALREADY DEMONSTRATED USING THIS TECHNOLOGY TO FABRICATE CONTINUOUS-TIME ANALOG COMPUTING CIRCUITS INTEGRATED WITH PHOTOSENSORS TO EXTRACT VELOCITY OF A MOVING IMAGE. WE HAVE ALSO SHOWN THE FEASIBILITY OF USING FLOADING-NODES TO PROVIDE NON-VOLATILE STORAGE OF ANALOG VOLTAGES. THESE VOLTAGES CAN BE USED TO CONTROL THE OPERATION OF THE CHIP THUS IMPLEMENTING THE CAPABILITY TO LEARN OR BE TRAINED IN THE FIELD. THE SAME ADAPTATION MECHANISM CAN BE USED TO COMPENSATE FOR FABRICATION NON-UNIFORMITIES. THIS PROPOSED RESEARCH APPLIES OUR

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EXPERIENCE TO THE CHALLENGING AND IMPORTANT PROBLEM OF REAL-TIME RECOGNITION AND MAY LEAD DIRECTLY TO INEXPENSIVE PRODUCTS WITH WIDE APPLICABILITY COMMERCIALLY AND TO THE MILITARY.

TANNER RESEARCH INC
128 W DEL MAR BLVD
PASADENA, CA 91105
CONTRACT NUMBER:
JOHN TANNER
TITLE:
PHOTODETECTORS FOR OPTICAL SIGNAL PROCESSING
TOPIC# 161 OFFICE: NSWC IDENT#: 36154

WE PROPOSE TO INVESTIGATE, DEVELOP, AND HAVE FABRICATED A HIGH-SPEED IMAGING SENSOR BASED ON A CUSTOM MOS INTEGRATED CIRCUIT. THE SENSOR WILL HAVE ANALOG-TO-DIGITAL CONVERTERS ON-CHIP TO PRODUCE HIGH SPEED DIGITAL VIDEO DATA FOR TRANSMISSION OFF-CHIP. THIS SENSOR WILL BE AN EXTENSION OF OUR CURRENT DEVELOPMENT OF A 256x256 PIXEL SENSOR THAT OPERATES AT FRAME RATES OF 2000 FRAMES/SECOND. OUR APPROACH WILL UTILIZE STANDARD READILY AVAILABLE CMOS BULK INTEGRATED CIRCUIT TECHNOLOGY SO PRODUCTS ARISING FROM THIS R&D CAN BE FABRICATED RELIABLY AND ECONOMICALLY BY A NUMBER OF VENDORS. WE HAVE DEMONSTRATED THE FEASIBILITY OF FABRICATING PHOTOSENSOR ARRAYS USING STANDARD CMOS PROCESSES. ON-CHIP CIRCUITS PROVIDE SCANNING, LOGARITHMIC COMPRESSION (OPTICAL), AMPLIFICATION, SAMPLE-AND-HOLD, MULTIPLEXING, AND ROW AND COLUMN DECODING. WE HAVE DEMONSTRATED CUSTOM CMOS IMAGERS IN OUR LABORATORY THAT OPERATE AT FRAME RATES IN EXCESS OF 1000 FRAMES/SECOND. WE PRESENTLY HAVE A DESIGN JUST BACK FROM FABRICATION THAT IS PROJECTED TO OPERATE IN EXCESS OF 2000 FRAMES/SECOND. THE DEVELOPMENT OF A HIGH-SPEED VIDEO SENSOR WITH INTEGRATED A/D CONVERTERS IS A NATURAL EXTENSION OF THIS PRIOR WORK AND LEADS DIRECTLY TO AN INEXPENSIVE PRODUCT WITH WIDE APPLICABILITY IN COMMERCIAL, ACADEMIC, AND MILITARY MARKETS.

TANNER RESEARCH INC
128 W DEL MAR BLVD
PASADENA, CA 91105
CONTRACT NUMBER:
JOHN TANNER
TITLE:
IC DESIGN HARDWARE/SOFTWARE PROTOCOLS AND FORMATS
TOPIC# 171 OFFICE: NWC IDENT#: 36211

SUBMITTED BY

A VARIETY OF HARDWARE AND SOFTWARE VENDORS SUPPLY PARTIAL SOLUTIONS TO THE NAVY'S NEEDS FOR CAE/CAD WORKSTATIONS FOR INTEGRATED CIRCUIT DESIGN. SERIOUS PROBLEMS ARISE WHEN PORTIONS OF A DESIGN NEED TO BE TRANSFERRED BETWEEN WORKSTATIONS OF DIFFERENT VENDORS. VALUABLE ENGINEERING TIME IS LOST AND ERRORS CAN BE INTRODUCED IN TRANSFERRING A DESIGN FILE OR REENTERING A DESIGN ON A DIFFERENT MACHINE. WE PROPOSE TO REDUCE ERRORS AND ENGINEERING TIME BY DEVELOPING A SYSTEM OF HARDWARE AND SOFTWARE TO GREATLY FACILITATE DESIGN TRANSFER. HARDWARE. DURING PHASE I, WE WILL IDENTIFY THE FILE TRANSFER PHYSICAL FORMATS AND PROTOCOLS FOR THE COMMON NAVY WORKSTATIONS AND SPECIFY IN DETAIL THE INTERMEDIATE HARDWARE REQUIRED TO TRANSFER DESIGN FILES BETWEEN WORKSTATIONS. SUCH HARDWARE WILL BE INEXPENSIVE AND AVAILABLE OFF-THE-SHELF. SOFTWARE. THE PROBLEM OF INCOMPATIBLE FILE FORMATS MAY BE SOLVED BY TRANSLATION SOFTWARE. WE WILL IDENTIFY THE FILE FORMATS MOST COMMONLY USED BY THE NAVY DURING THE INTEGRATED CIRCUIT DESIGN PROCESS AND SPECIFY THE FUNCTION OF A SET OF SOFTWARE TRANSLATORS TO CONVERT BETWEEN THE FORMATS. DURING PHASE I, WE WILL ALSO WRITE ONE OF THESE TRANSLATORS AND DELIVER TO THE NAVY SOFTWARE THAT CONVERTS BETWEEN TWO MASK LAYOUT FORMATS: CIF AND CALMA GDS II.

TECHNOLOGY DEVELOPMENT INC
PO BOX 519 - RTE 4
ROLLA, MO 65401
CONTRACT NUMBER:
DR JON WHITE
TITLE:
REFORMULATION OF RECLAIMED PBX MATERIALS FOR COMMERCIAL USE
TOPIC# 166 OFFICE: NSWC IDENT#: 36188

DISPOSAL OF DEMILITARIZED EXPLOSIVES IS A GROWING ENVIRONMENTAL CONCERN. THE CONVERSION OF DEMILITARIZED EXPLOSIVES INTO A COMMERCIAL EXPLOSIVE COULD PROVIDE A COST EFFECTIVE MEANS OF DISPOSAL WHILE POTENTIALLY REDUCING DRILLING COSTS BY REDUCING THE REQUIRED SIZE OF BOREHOLES. PHASE I PROPOSES TO DETERMINE THE FEASIBILITY OF FORMULATION PBX EXPLOSIVES DEMILITARIZED BY WATERJET INTO COMMERCIAL ROCK BLASTING EXPLOSIVES. THE GOAL IS TO INCORPORATE THE WASHOUT WATER, PROCESS WATER, CHARCOAL FILTER MATERIAL, PBX AND BINDER INTO THE FINAL EXPLOSIVE. THE FINAL EXPLOSIVE WILL BE CHARACTERIZED BY

SUBMITTED BY

A MODERATE BURNING RATE, A HIGH HEAT OF EXPLOSION, AND PRODUCTION OF LARGE GAS VOLUMES. IN ADDITION TO MODIFICATIONS OF PBX WASHOUT MATERIALS, THE EFFORT WILL INCLUDE THE EVALUATION OF A PROPOSED PROCESS DESIGN FOR RECLAIMING DEMILITARIZED EXPLOSIVES.

TECHNOLOGY SERVICE CO IC
10628 DUTCHTOWN RD
KNOXVILLE, TN 37932
CONTRACT NUMBER:
STERLING B JOHNSTON
TITLE:
EXPERT SYSTEM FOR JOINING COMPOSITE MATERIALS
TOPIC# 12 OFFICE: ONT IDENT#: 37338

THE AMOUNT OF INFORMATION ABOUT JOINING COMPOSITE MATERIALS IS LARGE AND POORLY STANDARDIZED, MAKING IT DIFFICULT FOR THE MATERIALS ENGINEERING TO MAKE OPTIMUM DESIGN DECISIONS. A COMPUTERIZED COMPOSITE JOINING INFORMATION SYSTEM IS NEEDED TO HELP THE DESIGN ENGINEER SYNTHESIZE THE AVAILABLE KNOWLEDGE IN A USEFUL AND PRODUCTIVE WAY. ONE SOLUTION TO THIS PROBLEM IS THE DEVELOPMENT OF A COMBINED EXPERT AND DATABASE SYSTEM OF COMPOSITE JOINING INFORMATION. SUCH A SYSTEM WILL HELP THE ENGINEER BY SCREENING THE AVAILABLE INFORMATION FOR WHAT IS OPTIMALLY APPLICABLE TO A PARTICULAR JOINING SITUATION OR QUESTION. IN ORDER TO DEMONSTRATE THE FEASIBILITY OF A COMPLETE SYSTEM, A PROTOTYPE EXPERT SYSTEM FOR COMPOSITE JOINING PROCEDURES WILL BE DEVELOPED. THIS EXPERT SYSTEM WILL BE INTEGRATED WITH AN EXISTING PERSONAL COMPUTER (PC) DATABASE SYSTEM OF COMPOSITE MATERIALS, ADHESIVES, PROCEDURES AND COMPUTER-AIDED-DESIGN (CAD) DRAWINGS.

TERRA TEK INC
400 WAKARA WY
SALT LAKE CITY, UT 84108
CONTRACT NUMBER:
ANIL MAHYERA
TITLE:
DEVELOPMENT OF AN INNOVATIVE COST-EFFECTIVE SEALANT FOR CONCRETE AIRFIELD PAVEMENTS
TOPIC# 191 OFFICE: NCEL IDENT#: 37777

SUBMITTED BY

THERE IS AN EMPHATIC NEED FOR RESEARCH INTO DEVELOPMENT OF NEW COST-EFFECTIVE MATERIALS TO SEAL AND RESEAL CONCRETE AIRFIELD PAVEMENT JOINTS. PRESENT METHODS/MATERIALS EMPLOYED RESULT IN INADEQUATE SERVICE LIFE OF THE JOINTS BECAUSE OF MATERIAL DETERIORATION DUE TO 1) HIGH TEMPERATURE JET EXHAUST BLASTS, 2) LOADING/ENVIRONMENTALLY INDUCED STRESSES, AND 3) INADEQUATE FUEL/SOLVENT RESISTANCE. THESE DEFICIENCIES LEAD TO MATERIAL FAILURE OR FAILURE OF THE BOND BETWEEN THE SEALANT AND HOST CONCRETE, EVENTUALLY CAUSING POTENTIALLY SERIOUS PROBLEMS WITH THE AIRFIELDS. PROPOSES HEREIN IS AN EXPERIMENTAL APPROACH THAT INVOLVES 1) SELECTING A SILICONE SEALANT WITH PROPERTIES THAT ESSENTIALLY MEET THE SOLVENT RESISTANCE, WEATHERING, AND MECHANICAL DEGRADATION STANDARDS, 2) ENHANCING THE SEALANT'S ADHESION TO CONCRETE BY CREATING SUPERIOR INTERFACIAL CHEMICAL BONDS WITH THE USE OF A SPECIAL COUPLING AGENT, AND 3) COVERING ITS SURFACE WITH A VERY HIGH-TEMPERATURE-RESISTANT ABLATIVE OR OTHER LOW THERMAL CONDUCTIVITY COATING TO WITHSTAND JET BLAST EFFECTS. THIS PROPOSED STUDY, TO ASSESS THE FEASIBILITY OF THE ABOVE DESCRIBED INNOVATIVE AND PROMISING APPROACH, IS ANTICIPATED TO RESULT IN SIGNIFICANTLY EXTENDED SERVICE PERFORMANCE OF CONCRETE PAVEMENT JOINT SEALANTS, ESPECIALLY UNDER THE EXTREME TEMPERATURES AND STRESSES DEVELOPED DURING NORMAL OPERATING CONDITIONS.

TPL INC
1549 CLORIETTA NE
ALBUQUERQUE, NM 87112
CONTRACT NUMBER:
MARK L PERRY
TITLE:
THE USE OF RECLAIMED PBX MATERIALS AS BLASTING AGENTS
TOPIC# 166 OFFICE: NSWC IDENT#: 36189

ORDNANCE RECLAMATION ACTIVITIES RESULT IN A SURPLUS OF PLASTIC BONDED EXPLOSIVES (PBXs). AS CURRENTLY FORMULATED, THESE MATERIALS ARE TOO ENERGETIC FOR COMMERCIAL BLASTING APPLICATIONS. PBXs COULD BE MODIFIED THROUGH THE USE OF LOW DENSITY FILLERS TO GENERATE APPROPRIATE EXPLOSIVE CHARACTERISTICS. SUCH MATERIALS COULD REDUCE DRILLING REQUIREMENTS FOR BLASTIN PURPOSES, THUS, ACHIEVING COST SAVINGS. USERS OF BLASTING AGENTS ARE COST-DRIVEN, NOT PERFORMANCE

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DRIVEN, NECESSITATING A SIGNIFICANT BREAKTHROUGH IN COST AND/OR PERFORMANCE TO PENETRATE THE MARKET. TPL WILL COMBINE WITH NEW MEXICO TECH'S CENTER FOR EXPLOSIVES TECHNOLOGY RESEARCH TO ANALYTICALLY AND EXPERIMENTALLY DETERMINE THE EXPLOSIVE CHARACTERISTICS OF FILLER-MODIFIED PBXs. ECONOMIC AND BLASTING STUDIES WILL BE CONDUCTED TO DEFINE PERFORMANCE REQUIREMENTS. TAILORED PULSE FRACTURING, A NOVEL MULTIPLE FRACTURE CREATION PROCESS, WILL BE EVALUATED FOR BLASTING PURPOSES USING THESE MATERIALS. DETONATION PRESSURE, DETONATION VELOCITY, AND HEAT OF EXPLOSION VALUES WILL BE DEVELOPED AS A FUNCTION OF FILLER-PBX FORMULATION. ECONOMIC AND PERFORMANCE REQUIREMENTS WILL BE ESTABLISHED. THE FEASIBILITY OF PULSE FRACTURING WILL BE ADDRESSED. THE TPL/CETR TEAM HAS THE NECESSARY EXPLOSIVES, ROCK FRACTURING, AND FIELD ENGINEERING EXPERTISE TO SUCCESSFULLY CONDUCT THIS PROGRAM.

TPL INC
1549 GLORIETTA NE
ALBUQUERQUE, NM 87112
CONTRACT NUMBER:
MARK L PERRY
TITLE:
IDENTIFICATION OF IGNITION CRITERIA FOR LOW VULNERABILITY AMMUNITION (LOVA) PROPELLANTS
TOPIC# 94 OFFICE: NAVSEA IDENT#: 36593

LOVA PROPELLANTS ARE DESIGNED TO RESIST THERMAL THREATS, THUS INCREASING WEAPON SYSTEMS SURVIVABILITY. THE RESULTANTS CHARACTERISTICS MAKE THESE MATERIALS DIFFICULT TO IGNITE WITH CONVENTIONAL MATERIALS, RESULTING IN VARIABLE PERFORMANCE. LACK OF A RELIABLE IGNITER SYSTEM THREATENS DEPLOYMENT OF THESE NEEDED PROPELLANTS. LOVA IGNITION CRITERIA ARE NEEDED FOR IGNITER SYSTEM DEVELOPMENTS. NUMEROUS IGNITION STUDIES HAVE BEEN CONDUCTED, BUT, DRIVEN BY WEAPONIZATION REQUIREMENTS, SYSTEMATIC CRITERIA EXAMINATIONS HAVE BEEN LIMITED. AN INTEGRATED EXPERIMENTAL AND ANALYTICAL METHODOLOGY IS PROPOSED TO OVERCOME THESE SHORTCOMINGS. PROBABLE FIRST-ORDER CRITERIA WILL BE PRELIMINARILY STUDIED IN TWO CLOSED-BOMB INSTRUMENTS. DIMENSIONLESS GROUP ANALYSIS WILL BE EVALUATED AS A DATA CORRELATION TECHNIQUE TO DEFINE CRITERIA. CORRELATIONS WITH EXISTING DATA WILL BE ATTEMPTED. PHASE I RESULTS SHOULD GENERATE

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TENTATIVE CRITERIA RANKING. VALIDITY OF DIMENSIONLESS GROUP ANALYSIS METHOD SHOULD BE ESTABLISHED. METHODOLOGY FOR COMPREHENSIVE PHASE II EXPERIMENT AND ASSOCIATED DESIGNS WILL BE FORMULATED. TPL HAS EXTENSIVE EXPERIENCE IN ADVANCED IGNITER DESIGNS TO MEET RIGID PRESSURE-TIME REQUIREMENTS AND IS INVOLVED IN LOVA PROPELLANT RESEARCH. NEW MEXICO TECH'S CENTER FOR EXPLOSIVE RESEARCH WILL PROVIDE ENERGETIC MATERIALS EXPERTISE AND TEST FACILITIES AND DIAGNOSTIC INSTRUMENTATION. THE TEAM REPRESENTS A COMPREHENSIVE CAPABILITY FOR THE PROPOSED EFFORT.

TRACTELL INC
4490 NEEDMORE RD
DAYTON, OH 45424
CONTRACT NUMBER:
DR EUGENE E JONES
TITLE:
SMARTPART: A DATA LOGGING AND RETRIEVAL STRUCTURAL AND/OR REPARABLE COMPONENTS
TOPIC# 173 OFFICE: NAVAIR IDENT#: 37618

THIS ADVANCED DEVELOPMENT EFFORT PROVIDES A PHYSICAL DEVICE FOR REAL-TIME EMBEDDING AND RETRIEVAL OF LOGISTICS DATA TO TRACK SELECTED STRUCTURAL PARTS ON AIRCRAFT (OR OTHER WEAPON SYSTEMS). THE SPECIFIC RESEARCH INNOVATION IS CALLED THE SMART-PART, WHICH IS A STAND-ALONE INFORMATION LOGGING DEVICE TO BE EMBEDDED ON A VARIETY OF WEAPON SYSTEM STRUCTURAL PARTS, AND WILL STORE AND RETRIEVE (EMIT) SPECIFIC DATA ON DEMAND. THE SMART-PART COULD BE EMBEDDED INTO A HOST COMPONENT AS A MODULE DURING MANUFACTURE, OR COULD BE BONDED ONTO THE COMPONENT AS A TEMPLATE DURING RETROFIT. IN EITHER FORM, THE SMART-PART IS EXTERNALLY POWERED AND INTERROGATED THROUGH A RADIO-FREQUENCY PROBE. THIS DEVICE WILL HAVE A NON-VOLATILE MEMORY CAPABLE OF DATA RETENTION FOR TEN YEARS. THIS EFFORT WILL DEFINE THE OPERATING CONSTRAINTS OF SUCH A DEVICE; METHODS OF DATA COMMUNICATION; AND MAN-MACHINE CONSIDERATIONS. THE INITIAL APPROACH INVOLVES A RADIO FREQUENCY (RF) COMMUNICATION AND POWER TRANSFER BASED ON PRIOR SUCCESSFUL RESEARCH EFFORTS BY THE OFFEROR.

TREADWELL CORP
85 OXFORD DR
MOONACHIE, NJ 07074
CONTRACT NUMBER:
RICHARD J LAWRANCE
TITLE:
CLOSED LOOP SYSTEM FOR AIRCRAFT LAUNCHING
TOPIC# 179 OFFICE: NAVAIR IDENT#: 37663

SUBMITTED BY

THE LAUNCHING OF A VARIETY OF AIRCRAFT FROM AIRCRAFT CARRIERS IS PRESENTLY PERFORMED WITH OPEN LOOK CONTROL OF A STEAM CATAPULT. WITH INCREASES IN AIRCRAFT WEIGHT, A GREATER VARIETY OF AIRCRAFT AND VARYING WEAPONS SUITES CARRIED, THE STEAM GENERATION SYSTEMS ARE BEING PUSHED TO THEIR LIMITS. IF A CLOSED LOOP SYSTEM WERE INSTALLED, THE OPTIMUM USAGE OF THE STEAM AND THE EFFECTIVE AND SAFE LAUNCHING OF VARIOUS AIRCRAFT WITH VARYING WEAPONS SUITES COULD BE ACCOMPLISHED. THE PRESENT SYSTEM RELIES ON A NOMOGRAM AND MANUAL SETTING OF A FIRST STAGE HYDRAULIC VALVE ORIFICE, WHICH CONTROLS A LARGE HYDRAULIC VALVE WHICH CONTROLS THE STEAM VALVE. THIS SYSTEM PROVIDES A CONSTANT FLOW, WHEREAS A VARIABLE FLOW RATE TO MATCH THE AIRCRAFT'S ACCELERATION AND SPEED WOULD BE MORE EFFICIENT. TREADWELL CORPORATION PRESENTLY PROVIDES A UNIQUE VALVE AND CLOSED LOOP ELECTRIC CONTROL SYSTEM FOR HIGH PRESSURE GAS FLOW CONTROL FOR USE ON U.S. NAVY NUCLEAR SUBMARINES. THIS CONTROL SYSTEM COULD BE MODIFIED TO PROVIDE CLOSED LOOP CONTROL OF HYDRAULIC FLUID FOR THE LAUNCHING OF AIRCRAFT. THE TREADWELL VALVE NEED ONLY BE MODIFIED TO PROVIDE THE NECESSARY FLOW CONTROL OF HYDRAULIC FLUID, THE CONTROL CIRCUIT WOULD PROBABLY NOT HAVE TO BE MODIFIED SINCE IT PRESENTLY OPERATES FROM A PRESSURE SENSOR FEED BACK INPUT.

TRIANGLE RESEARCH & DEVELOPMENT CORP
PO BOX 12696
RSCH TRIANGLE PK, NC 27709
CONTRACT NUMBER:
RICHARD A McKINNEY
TITLE:
IMPROVED CONTAINMENT SYSTEMS INFLATION SYSTEMS AND DESIGNS FOR NAVY LIFE RAFTS
TOPIC# 124 OFFICE: NAVSEA IDENT#: 35788

THIS PHASE I EFFORT WILL INVESTIGATE THE TECHNICAL FEASIBILITY OF DEVELOPING INNOVATIVE, IMPROVED METHODS OF: ENCAPSULATING LIFE RAFTS TO PREVENT DAMAGE DURING STOWAGE AND TRANSPORT; PROVIDING A COMPLETELY RELIABLE INFLATION SYSTEM FOR INFLATABLES; AND INCORPORATING MODERN MATERIALS ADVANCES IN THE MANUFACTURE OF LIFE RAFTS. THE EFFORT WILL ALSO DETAIL PRELIMINARY DESIGN IMPROVEMENTS TO LIFE RAFTS. RECENTLY DEVELOPED PACKAGING MATERIALS WILL BE TESTED FOR THEIR ABILITY TO

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STABILIZE AND PROTECT LIFE RAFTS FROM DAMAGE THAT CAUSES INFLATION FAILURE. NEW DEVELOPMENTS IN INFLATION SYSTEMS FOR AIRBAG CRASH PROTECTION SYSTEMS WILL BE EXAMINED AS POTENTIAL SOURCES OF MORE RELIABLE INFLATION SYSTEMS FOR RAFTS. COMPONENTS OF THE MARK 6 LIFE RAFT WILL BE REVIEWED FOR REPLACEMENT WITH NEWER DESIGNS AND MATERIALS, INCLUDING THE COATED CLOTH CURRENTLY USED. THE OVERALL DESIGN OF THE LIFE RAFTS WILL BE REVIEWED TO IMPROVE RELIABILITY, STABILITY, AND RIGHTABILITY, AND PRELIMINARY DRAWINGS PREPARED.

TRICOR SYSTEMS INC
400 RIVER RIDGE DR
ELGIN, IL 60123
CONTRACT NUMBER:
RICHARD K BUCK
TITLE:
LONG RANGE STAND-OFF SURVEILLANCE SYSTEM
TOPIC# 172 OFFICE: NAVAIR IDENT#: 37604

THERE EXISTS A NEED FOR A LONG RANGE STAND-OFF SURVEILLANCE CAMERA SYSTEM. THIS CAMERA WILL BE HELICOPTER MOUNTED AND OPERATED OUTSIDE THE THREAT UNBRELLA AT DISTANCES OF APPROXIMATELY 60,000 FEET. PRESUMABLY THE VEHICL ALTITUDE WILL BE FAIRLY LOW RESULTING IN SIGNIFICANT IMAGE DEGRADATION DUE TO THE INTERVENING ATMOSPHERE. ANOTHER MAJOR COMPLICATION WILL BE THE MECHANICAL VIBRATION AND ACOUSTICAL NOISE FROM THE HELICOPTER ROTOR. THIS PROPOSAL WILL ATTEMPT TO DETERMINE A TECHNICALLY FEASIBLE COMBINATION OF OPTICS, SENSORS, STABILIZATION LOOPS, AND DISPLAYS WHICH WILL YIELD A COST EFFECTIVE, MINIATURE SURVEILLANCE SENSOR WHICH WILL GENERATE IMAGES IN REAL TIME USEFUL IN TARGET IDENTIFICATION. THE EFFECTS OF ATMSOPHERE AND VIBRATION ON THE MODULATION TRANSFER FUNCTION AND THE SENSOR WILL BE MODELED IN COMPUTER SOFTWARE. TRICOR'S OPTICAL ENCOUNTER (OPEC) DETECTION MODEL, AND ITS RETINAL IMAGE MODULATION (RIMM) WILL BE USED TO GENERATE ARTIFICIAL TARGET DATA AND THEN MODIFY THIS INFORMATION TO SIMULATE THE IMAGE COLLECTED BY THE SENSOR. MOTION BLUR CAN ALSO BE ADDED TO THIS ANALYSIS. THIS SOFTWARE MODELING WILL ALLOW EVALUATION OF COMPARISONS BETWEEN DIFFERENT TYPES OF SENSORS AND DIFFERENT DEGREES OF MOTION COMPENSATION. THE STUDY WILL CONCLUDE WITH DESCRIPTION OF HARDWARE FOR STABILIZATION AND DISPLAY.

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TRIDENT SYSTEMS INC
3554 CHAIN BRIDGE RD - STE 200
FAIRFAX, VA 22030
CONTRACT NUMBER:
NICHOLAS E KARANGELEN
TITLE:
MULTI-WARFARE ARCHITECTURE METHODOLOGY AND CASE TOOL EMPLOYMENT
TOPIC# 48 OFFICE: SPAWAR IDENT#: 37002

THIS PROJECT WILL DEVELOP A METHODOLOGY FOR THE DEVELOPMENT, CAPTURE AND ANALYSIS OF MULTI-WARFARE ARCHITECTURES USING COMPUTER AIDED SYSTEMS ENGINEERING (CASE) TOOLS. THE METHODOLOGY WILL BE DERIVED FROM THE SPAWAR PD-80 METHODOLOGY AND TOOLS GROUP WORK. THE METHODOLOGY WILL THEN BE EXERCISED BY CAPTURING A MULTI-WARFARE FORCE ARCHITECTURE IN TERMS OF FUNCTIONAL FLOW DIAGRAMS, DATA DICTIONARY AND PROCESS SPECIFICATIONS USING THE SPAWAR SELECTED CASE TOOL, TEAMWORK. FINALLY THE CONSISTENCY CHECKING CAPABILITIES OF TEAMWORK WILL BE DEMONSTRATED ON THE MULTI-WARFARE ARCHITECTURE DATABASE AND A RESOURCE LIBRARY WILL BE DEVELOPED IN PREPARATION FOR THE PHASE I EFFORT WHERE FUNCTIONS WILL BE MAPPED TO RESOURCES TO CONSTRUCT A IMPLEMENTATION MODEL OF THE ARCHITECTURE IN ADAS.

TRIDENT SYSTEMS INC
3554 CHAIN BRIDGE RD - STE 200
FAIRFAX, VA 22030
CONTRACT NUMBER:
GARY J GROSICKI
TITLE:
AN OBJECT-ORIENTED APPROACH TO MULTIWARFARE ARCHITECTURE ASSESSME
TOPIC# 17 OFFICE: SPAWAR IDENT#: 37297

THE PROPOSAL DESCRIBES AN APPROACH TO PROTOTYPE A STRUCTURED DESIGN ANALYSIS TOOL FOR THE ASSESSMENT OF NAVAL FORCE ARCHITECTURES. USING AN OBJECT ORIENTED MODEL DESIGN (OOD) FOR IMPLEMENTATION ON A MICRO OR MINI COMPUTER. THE OOD WILL BE GEARED TO ACCEPT INPUTS DIRECTLY FROM THE SPAWAR ARCHITECT'S OPTIONS. A GRAPHIC INTERFACE PACKAGE

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WILL ALSO BE DESIGNED TO ENABLE RAPID DEFINITION OF SCENARIO, THREAT AND ARCHITECTURE. THIS PROJECT WILL RESULT IN A WORKING PROTOTYPE SYSTEM AND DEMONSTRATION.

TRIDENT SYSTEMS INC
3554 CHAIN BRIDGE RD - STE 200
FAIRFAX, VA 22030
CONTRACT NUMBER:
NICHOLAS E KARANGELEN
TITLE:
HIGH FIDELITY ASW C3I SIMULATION FOR MULTI-PROCESSOR COMPUTING ENVIRONMENTS
TOPIC# 23 OFFICE: SPAWAR IDENT#: 37419

THIS PROJECT WILL DEVELOP THE REQUIREMENTS FOR A HIGH FIDELITY ASW C3 MODEL AND WILL DESIGN CODE INTEGRATE AND TEST A PROTOTYPE OF THE MODEL WHICH INCORPORATES THE KEY DESIGN FEATURES. THE PROTOTYPE WILL BE AN EVENT DRIVEN TIME STEP MONTE CARLO MODEL CONSTRUCTED USING OBJECT ORIENTED PROGRAMMING TECHNIQUES. THE PORTABLE HIGH LEVEL LANGUAGE C WILL BE USED TO CODE THE MODEL AND THE GKS STANDARD GRAPHICS INTERFACE WILL BE USED FOR THE DISPLAYS. SUB MODELS WILL BE DESIGNED TO ROW AS INDEPENDENT CONCURRENT PROCESSES TO SUPPORT THE EMPLOYMENT OF HIGH PERFORMANCE MULTI-PROCESSOR ARCHITECTURES.

TRYMER CO
9503 CAPITAL VIEW DR
AUSTIN, TX 78747
CONTRACT NUMBER:
JON M SCHROEDER
TITLE:
ADVANCED SYSTEMS AND CONCEPTS FOR FUTURE NAVAL WARFARE
TOPIC# 18 OFFICE: SPAWAR IDENT#: 37257

THIS PAPER PROPOSES AN ADVANCED KINETIC ENERGY WEAPONS SYSTEM THAT WILL SUPPORT NAVAL MISSION WORLD WIDE. THE WARFARE CONCEPT IS BASED ON AN ELECTROMAGNETIC LAUNCH CONCEPT WHERE LARGE NUMBERS OF 150 kg PROJECTILES ARE LAUNCHED IN ANTICIPATION OF A CONFLICT. THE PRO-

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JECTILES WOULD BE BOOSTED INTO 120 MINUTE ORBITS BY SMALL SOLID ROCKETS. THE PROJECTILES COULD BE CALLED DOWN INDIVIDUALLY BY FORCES UNDER ATTACK BY PROGRAMMING DE-ORBIT BURNS FOR PROJECTILES NEARING THE TARGET. THE PROJECTILES WOULD STEER IN AIR TO IMPACT THE TARGET. THE ABILITY TO BUILD UP AND REDUCE AT WILL, THE STORE OF KINETIC WEAPONS IN LOW EARTH ORBIT COULD HAVE A CHILLING EFFECT ON THE AGGRESSOR BECAUSE THESE WEAPONS WOULD BE VISIBLE WITH FIELD GLASSES AT NIGHT. TECHNOLOGY EXISTS TODAY TO LAUNCH PROJECTILES INTO SPACE, STORE, AND GUIDE THEM INDIVIDUALLY OR IN MASS TO TARGETS ANYWHERE ON EARTH. THE WEAPONS COULD BE USED TO DEFEND SHIPS, AIRCRAFT, AND LAND FORCES SIMULTANEOUS. THE COST TO DEVELOP THIS SYSTEM AND THE TECHNICAL AND ENVIRONMENTAL RISKS WILL BE DEVELOPED AS WELL AS A METHODOLOGY FOR PLACING A PROTOTYPE SYSTEM IN OPERATION.

TSI INC
PO BOX 64394 - 500 CARDIGAN RD
ST PAUL, MN 55164
CONTRACT NUMBER:
LESLIE M JENSON
TITLE:
LASER DOPPLER VELOCIMETER IN TRANSIENT IMPELLER FLOWS
TOPIC# 178 OFFICE: NAVSEA IDENT#: 37652

A LASER DOPPLER VELOCIMETER SYSTEM TO MEASURE TRANSIENT IMPELLER FLOW FIELDS IS PROPOSED. THIS SYSTEM, USING FIBER OPTICS, WILL MEASURE BOTH TANGENTIAL AND RADIAL COMPONENTS OF VELOCITY SIMULTANEOUSLY. THE HARDWARE AND ASSOCIATED SOFTWARE WILL BE SPECIALLY DESIGNED TO COLLECT AND ANALYZE DATA FROM THE TRANSIENT OPERATING CONDITIONS FROM START-UP TO ACHIEVING FULL SPEED. A THREE-AXIS TRAVERSE MECHANISM WILL PROVIDE THE MOVEMENT OF THE MEASURING VOLUME FOR FLOW MAPPING. THE SAME LDV SYSTEM CAN BE ADAPTED TO MEASURE THE AXIAL COMPONENT OF VELOCITY ALSO. THE WORK PROPOSED WILL USE A SYSTEMATIC APPROACH IN SELECTING A SUITABLE OPTICAL SYSTEM, SIGNAL PROCESSOR, AND DEFINE THE SOFTWARE. ASPECTS SUCH AS DATA COLLECTION, SEEDING, AND IMPROVING MEASURMENT ACCURACY WILL ALSO BE FOCUSSED UPON.

TUSKEGEE RESEARCH INSTITUTE
5739 BRIDLE PATH CT
MONTGOMERY, AL 36116
CONTRACT NUMBER:
JOHN FOSTER
TITLE:
AUTOMATED CLASSIFICATION AND DETECTION OF SONAR SIGNALS USING A PATTERN RECOGNITION EXPERT SYSTEM
TOPIC# 145 OFFICE: NSWC IDENT#: 35988

SUBMITTED BY

THE GOAL OF THIS RESEARCH PROJECT IS THE DEVELOPMENT OF A PATTERN RECOGNITION EXPERT SYSTEM FOR AUTOMATED CLASSIFICATION AND DETECTION OF SONAR SIGNALS. THE EXPERT SYSTEM WILL BE COMPOSED OF TWO PARTS: i) FRONT END SIGNAL PROCESSING SYSTEM TO EXTRACT POWER SPECTRUM PARAMETERS, AND ii) AN EXPERT SYSTEM WHICH WILL MAKE DECISIONS ON THE POWER SPECTRUM PARAMETERS BASED UPON A RULE-BASED LIBRARY. THE ULTIMATE GOAL OF THIS EFFORT IS AN AUTOMATED SYSTEM WHICH CAN DETECT AND CLASSIFY BOTH ACTIVE AND PASSIVE SONAR SIGNALS IN NOISY ENVIRONMENTS (LESS THAN -10 dB SNR). BASED UPON PRELIMINARY WORK IN THIS AREA, AN EXPERT SYSTEM HAS BEEN PREVIOUSLY DEVELOPED WHICH CAN EFFECTIVELY DETECT NARROWBAND AND BROADBAND SIGNALS IN -20 dB TO -30 dB SNR ENVIRONMENTS. APPLICATION OF ADDITIONAL CLASSIFICATION RULES WILL FURTHER ENHANCE THE EXISTING SYSTEM SO THAT UNIQUE CLASSIFICATION CAPABILITIES CAN BE ACHIEVED IN NOISY ENVIRONMENTS. THE PHASE I PROPOSED RESEARCH WILL BE COMPOSED OF THE FOLLOWING STAGES: i) COMPUTER MODELING OF EXPERT SYSTEM, ii) RULE-BASE DEVELOPMENT, iii) SYSTEM INTEGRATION AND REAL-TIME TESTING. ONCE THE BASIC PRINCIPLES OF PHASE I HAVE BEEN ESTABLISHED, PHASE II & III EFFORTS WILL INCORPORATE FULL-SCALE DEVELOPMENTAL EFFORTS TOWARDS AN OPERATIONAL SYSTEM.

UBC INC
8405-A BENJAMIN RD
TAMPA, FL 33634
CONTRACT NUMBER:
PATRICK E CRANE
TITLE:
INTEGRATED EHF TRANSCEIVER/ANTENNA EMPLOYING ELECTRONIC SCANNING FOR SURVEILLANCE APPLICATIONS
TOPIC# 202 OFFICE: NOSC IDENT#: 37868

UBC, INCORPORATED, AN ENGINEERING FIRM PERFORMING RESEARCH, DEVELOPMENT, AND CONSULTING IN ADVANCED TECHNOLOGY OVER THE ENTIRE ELECTROMAGNETIC SPECTUM, SPECIALIZING IN MILLIMETER WAVE AND INFRARED SENSORS, PROPOSES AN SBIR PROGRAM TO PROVIDE A DESIGN AND SUPPORTING ANALYSIS LEADING TO AN EHF (75-110 GHz) LOW NOISE SURVEILLANCE SENSOR EMPLOYING ELECTRONIC SCANNING AND PROVIDING AN ACTIVE SEARCH BACK UP MODE. THE PROPOSED PROGRAM BUILDS UPON WORK BEING EXECUTED IN Ka

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BAND (26-40 GHz) AND Q BAND (33-50 GHz) AT UBC, INC. AND DEMONSTRATING THE VIABILITY OF OUR PATENTED TECHNOLOGY. THE TECHNOLOGY AFFORDS THE OPPORTUNITY TO PROVIDE BROADBAND ELECTRONICALLY SCANNED EHF SURVEILLANCE USING TODAYS TECHNOLOGY WHILE PROVIDING LOW COST, LIGHT WEIGHT, LOW PROFILE, HIGH PERFORMANCE SYSTEMS AT ALL MICROWAVE AND MILLIMETER WAVE FREQUENCIES. THE NEAR TERM BENEFIT TO THE US GOVERNMENT IS ENORMOUS, IN THAT A LARGE BURDEN IS REMOVED FROM THE MMIC PROGRAMS NOW IN PLACE AND FUNDED BY DARPA. THE REQUIREMENT ON THESE PROGRAMS TO DEVELOP SOLID STATE MODULES COMPATIBLE WITH PHASED ARRAY ACTIVE APERTURES IS ESSENTIALLY REMOVED IF THE TECHNOLOGY PROPOSED HEREIN IS ULTIMATELY SUCCESSFUL.

ULTRAMET
12173 MONTAGUE ST
PACOIMA, CA 91331
CONTRACT NUMBER:
ANDREW J SHERMAN
TITLE:
NOVEL ACOUSTIC DAMPING MATERIALS
TOPIC# 8 OFFICE: ONR IDENT#: 37582

IMPROVED MATERIALS HAVING A HIGH DAMPING CAPACITY, COMBINED WITH GOOD MECHANICAL PROPERTIES AND SUITABLE FOR STRUCTURAL USES, ARE NEEDED IN A VARIETY OF APPLICATIONS. AMONG THE AREAS IN WHICH ACOUSTIC DAMPING IS DESIRABLE ARE IMPROVING THE RESPONSE AND ACCURACY OF TRACKING, POINTING, AND GUIDANCE SYSTEMS; INCREASING "STEALTH", AS WELL AS PERSONNEL COMFORT; AND ISOLATING AND/OR PROTECTING SENSITIVE EQUIPMENT. IN THIS PHASE I PROGRAM, ULTRAMET PROPOSES TO DEVELOP AND INVESTIGATE THE POTENTIAL OF A UNIQUE NEW CLASS OF MATERIALS HAVING CONTINUOUS CERAMIC AND METAL MATRICES, FABRICATED BY INFILTRATING A METAL MATRIX INTO A RETICULATED, HIGH-MODULUS CERAMIC FOAM BY CHEMICAL VAPOR INFILTRATION (CVI), A VARIATION OF THE CHEMICAL VAPOR DEPOSITION (CVD) PROCESS. THIS INNOVATIVE MATERIAL WILL POSSES THREE-DIMENSIONAL INTERCONNECTED MATRICES OF BOTH CERAMIC AND METAL PHASES, OFFERING THE MODULUS AND DIMENSIONAL STABILITY OF A CERAMIC WITH THE FRACTURE TOUGHNESS AND FABRICABILITY OF A METAL. ADDITIONALLY, THE VAST DIFFERENCE IN ELASTIC MODULI BETWEEN THE TWO PHASES WILL PROVIDE SIGNIFICANT ACOUSTIC DAMPING CAPACITY, PARTICULARLY SUITED FOR LOW-FREQUENCY ATTENUATION. THIS STIFF, STRONG

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CERAMIC/METAL MATRIX COMPOSITE WILL REPRESENT A SIGNIFICANT ADVANCE OVER CURRENT TECHNOLOGY.

UNIQUE MOBILITY INC
3700 S JASON ST
ENGLEWOOD, CO 80110
CONTRACT NUMBER:
WILLIAM M ANDERSON
TITLE:
LIGHTWEIGHT ELECTROMECHANICAL ACTUATOR
TOPIC# 83 OFFICE: NAVAIR IDENT#: 36488

UNIQUE MOBILITY HAS INVENTED A NOVEL MEANS OF CONSTRUCTING A BRUSHLESS DC MOTOR WHICH CAN OPERATE AT HIGH SPEEDS WITH HIGH EFFICIENCY AND HIGH POWER OUTPUT. AN IMPORTANT FIELD OF USE THAT NEEDS TO BE EXPLORED IS IN AVIATION AND AEROSPACE APPLICATION WHERE HIGH POWER DENSITY SERVO AND GEAR MOTORS CAN REPLACE HYDRAULIC ACTUATOR IMPROVING EFFICIENCY, RELIABILITY AND SURVIVABILITY. THE PHASE I TECHNICAL OBJECTIVE IS TO DESIGN A LIGHTWEIGHT ELECTRO-MECHANICAL LINEAR ACTUATOR FOR AIRCRAFT AND MISSILE CONTROL SURFACES.

UNIVERSAL ENERGY SYSTEMS INC
4401 DAYTON-XENIA RD
DAYTON, OH 45432
CONTRACT NUMBER:
ERIK S BUCK
TITLE:
LOW COST ELECTRON GUN
TOPIC# 114 OFFICE: NAVSEA IDENT#: 36863

AS A FIRST STEP LEADING TO A LOW-COST TRAVELING WAVE TUBE (TWT) UES WILL CONDUCT RESEARCH INTO THE FABRICATION OF NEGATIVE ELECTRON AFFINITY (NEA) SEMICONDUCTOR CATHODES. IF A HIGH CURRENT DENSITY CATHODE (E.G., 25 A/cm(2)) IS ACHIEVED, A LOW-COST ELECTRON GUN FOR TWTs WILL BE DESIGNED.

UNIVERSAL ENERGY SYSTEMS INC
4401 DAYTON-XENIA RD
DAYTON, OH 45432
CONTRACT NUMBER:
RABI BHATTACHARYA
TITLE:
DEVELOPMENT OF BULK DENSITY Al(2)O(3) THIN FILMS
TOPIC# 136 OFFICE: NSWC IDENT#: 37995

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THIN FILMS OF Al(2)O(3) ARE USUALLY DEPOSITED BY TECHNIQUES SUCH AS CVD OR ACTIVATED REACTIVE EVAPORATION. THESE PROCESSES, HOWEVER, REQUIRE A RATHER THIGH (800-1200 DEG C) SUBSTRATE TEMPERATURE WHICH RESULTS IN THE DIFFUSION OF SUBSTRATE MATERIAL INTO THE COATING, THUS, MODIFYING THE COATING PROPERTIES. BULK DENSITY FILMS ARE NOT COMMONLY PRODUCED BY THESE TECHNIQUES. WE PROPOSE TO USE ION BEAM ASSISTED (IBA) ELECTRON BEAM EVAPORATION TECHNIQUE TO FABRICATE BULK DENSITY Al(2)O(3) ON CARBON AND SILICON SUBSTRATES. LOW ENERGY (500Ev-1500eV) 0-1 IONS WILL BE USED TO BOMBARD THE Al(2)O(3) FILMS DURING DEPOSITION BY ELECTRON BEAM EVAPORATION. RUTHERFORD BACKSCATTERING SPECTROMETRY (RBS) IN COMBINATION WITH CROSS SECTION TRANSMISSION ELECTRON MICROSCOPY (X-TEM) WILL BE USED TO EVALUATE THE DENSITY OF THIN FILMS.

UNIVERSAL TECHNOLOGY CORP
4031 COLONEL GLYNN HWY
DAYTON, OH 45431
CONTRACT NUMBER:
DR HOWARD E BETHEL
TITLE:
TURBULENCE EFFECTS ON TURBINE BLADE FILM COOLING
TOPIC# 195 OFFICE: NAPC IDENT#: 37791

THIS PROJECT WILL DETERMINE THE FEASIBILITY OF A COUPLED COMPUTATIONAL/EXPERIMENTAL APPROACH TO IMPROVE OUR UNDERSTANDING OF THE EFFECTS OF TURBULENCE ON FILM COOLING OF TURBINE BLADES. A DETAILED LITERATURE SEARCH WILL BE CONDUCTED ON THIS SUBJECT AND DOCUMENTED IN A PC-BASED, USER-FRIENDLY DATA BASE. AN IMPROVED COMPUTATIONAL APPROACH WILL BE DEFINED AND USED TO IDENTIFY EXPERIMENTAL DATA NECESSARY TO PROVIDE REQUIRED EMPIRICAL DATA FOR THE COMPUTATIONAL MODEL. AN EXPERIMENTAL PROGRAM TO OBTAIN THIS DATA WILL BE DEFINED BASED ON A REVIEW OF AVAILABLE FACILITIES AND INSTRUMENTATION CAPABILITIES. EXECUTION OF THE COMPUTATIONAL MODEL AND EXPERIMENTAL PROGRAM WILL OCCUR IN FOLLOWING PHASES.

UNIVERSITY RSCH ENGINEERS & ASSOCS INC
1-2 OAK RIDGE DR
MAYNARD, MA 01754
CONTRACT NUMBER:
THOMAS F CALLAHAN
TITLE:
AUTOMATED ELECTRONIC PARTS PACKAGING AND HANDLING SYSTEM
TOPIC# 60 OFFICE: NSSC IDENT#: 37094

SUBMITTED BY

ACCORDING TO A 1983 STUDY, DOD'S EXPENDITURE FOR ELECTRONIC COMMODITIES CONSTITUTES OVER ONE THIRD ($15 BILLION) OF THE TOTAL ANNUAL COST FOR ALL MILITARY SYSTEMS AND THE RATIO IS EXPECTED TO INCREASE IN THE YEARS AHEAD. SIGNIFICANT COST REDUCTION COULD BE REALIZED IF AUTOMATION FOR LOW VOLUME ASSEMBLY AND REPAIR OPERATIONS COULD BE ACHIEVED. THE FIRST STEP TOWARD AN AUTOMATION GOAL IS TO DEVELOP A STANDARD ELECTRONIC COMPONENT PACKAGE (SECP) THAT INCORPORATES FEASURES THAT FACILITATE RELIABLE MECHANICAL HANDING (SPROCKET HOLES IMILAR TO MOTION PICTURE FILM) AS WELL AS PART PROTECTION, ORIENTATION, AND IDENTIFICATION (BAR CODE). THESE FEATURES WOULD PROMOTE AN AUTOMATIC STORAGE, RETRIEVAL, AND DELIVERY SYSTEM (SRDS) AND SEMI-FLEXIBLE AUTOMATIC ASSEMBLY EQUIPMENT. THE BAR CODE ATTACHED TO EACH STANDARDIZED PACKAGE WOULD PROVIDE THE PHYSICAL LINK BETWEEN THE COMPONENT (PAKAGE), THE EQUIPMENT SYSTEM CONTROL SOFTWARE AND THE MANAGEMENT CONTROL AND INFORMATION SYSTEM SOFTWARE (WORK SCHEDULES, INVENTORY CONTROL, JOB LABOR AND MATERIAL COST, ETC.). THE SECP CONCEPT IN CONJUNCTION WITH THE SRDS OVERCOMES THE COMPLEXITIES OF MECHANICALLY GRASPING AND STORING A VAST ARRAY OF PARTS (EACH WITH A DIFFERENT GEOMETRY). THE TWO INVESTIGATORS HAVE A TOTAL OF 60(+) YEARS EXPERIENCE IN THE DESIGN OF AUTOMATIC MATERIAL HANDLING EQUIPMENT AND HAVE BEEN INVOLVED IN ELECTRONIC ASSEMBLY FOR 15(+) YEARS.

VAN DYKE J G & ASSOCS INC
6701 ROCKLEDGE DR - STE 250
BETHESDA, MD 20817
CONTRACT NUMBER:
AKIHARU YASUDA
TITLE:
GRAPHIC DISPLAY SYSTEM FOR NAVAL TACTICAL COMMUNICATIONS MANAGEME
TOPIC# 42 OFFICE: SPAWAR IDENT#: 36970

THE MANAGEMENT AND CONTROL OF COMMUNICATIONS HAS BECOME AN INCREASINGLY COMPLEX AND FORMIDABLE TASK WITHIN THE NAVAL ELECTRONICS ENVIRONMENT. THE MULTITUDE OF DIFFERENT COMMUNICATIONS CIRCUITS, THE GROWTH OF LOCAL AREA NETWORKS, THE NONSTATIC GEOGRAPHIC TOPOLOGY, AND MASS OF POSSIBLE DATA MAKE IT EXTREMELY HARD FOR THE COMMUNICATIONS SPECIALIST TO IDENTIFY AND CORRECT COMMUNICATIONS PROBLEMS. THE

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INFORMATION MUST BE FILTERED TO PROVIDE THE COMMUNICATIONS SPECIALIST THE MINIMUM AMOUNT OF DATA TO CORRECTLY MONITOR AND SOLVE COMMUNICATIONS PROBLEMS. ULTIMATELY THIS INFORMATION MUST BE DISPLAYED TO THE SPECIALIST IN A USER FRIENDLY FORMAT TO INSURE RECOGNITION OF PROBLEMS/POSSIBLE PROBLEMS, TO FURTHER ANALYZE THE PROBLEM AND TO RECOMMEND OR PERFORM PREVENTATIVE MEASURES. GRAPHIC DISPLAY SYSTEMS USING MULTIPLE COLORS CAN PROVIDE THE BEST USER FRIENDLY INTERFACE.

VERITAY TECHNOLOGY INC
PO BOX 305 - 4845 MILLERSPORT HWY
EAST AMHERST, NY 14051
CONTRACT NUMBER:
EDWARD B FISHER
TITLE:
IDENTIFICATION OF IGNITION CRITERIA FOR LOW VULNERABILITY AMMUNITION (LOVA) PROPELLANTS
TOPIC# 94 OFFICE: NAVSEA IDENT#: 36594

LOW VULNERABILITY AMMUNITION (LOVA) PROPELLANTS ARE FORMULATED TO RESIST IGNITION BY VARIOUS THERMAL THREATS AND TO BURN POORLY AT ATMOSPHERIC PRESSURE. THESE FEATURES ALSO MAKE RELIABLE IGNITION IN GUN SYSTEMS A DIFFICULT PROBLEM. THE PROPOSED PROGRAM IS DESIGNED TO PROVIDE EXPERIMENTAL AND ANALYTICAL PROCEDURES BY WHICH THE PHYSICAL AND CHEMICAL ENVIRONMENTS THAT FOSTER IGNITION MIGHT BE IDENTIFIED AND EVEN FURTHER ENHANCED. THE PROPOSED APPROACH INVOLVES TAILORING AN IGNITER FORMULATION TO BE CHEMICALLY REACTIVE WITH LOVA PROPELLANT DECOMPOSITION SPECIES. BY ANALYZING GAS SAMPLES AND BY QUANTIFYING HEAT OF COMBUSTION FOR LOVA PROPELLANT ALONE, IGNITER CONCEPT ALONE, AND A COMBINATION OF LOVA PROPELLANT AND IGNITER, TENDENCIES TOWARD FAVORABLE CHEMICAL REACTIVITY CAN BE IDENTIFIED. FINALLY, BY PERFORMING A FACTORIAL IGNITION EXPERIMENT USING PROMISING IGNITER FORMULATIONS, THE PHYSICAL AS WELL AS CHEMICAL FACTORS CAN BE RANKED ACCORDING TO IGNITER FORMULATION AND GEOMETRICAL DESIGN PARAMETERS.

VIA-SAT INC
6120 PASEO DEL NORTE - #J-2
CARLSBAD, CA 92009
CONTRACT NUMBER:
STEVEN HART
TITLE:
EXPERT SYSTEM TOOL FOR MULTI-LEVEL SECURITY FOR CSS TECHNICAL ABSTRACT
TOPIC# 38 OFFICE: SPAWAR IDENT#: 36945

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OUR PROPOSAL DESCRIBES AN INNOVATIVE ANALYSIS TOOL FOR DESIGN OF TRUSTED COMSEC ARCHITECTURES FOR THE NAVY'S COMMUNICATIONS SUPPORT SYSTEM (CSS) MULTI-MEDIA NETWORK. OUR RESEARCH RESPONDS TO WELL-RECOGNIZED NAVY CONCERNS REGARDING COMSEC ARCHITECTURE FOR CSS. (FOR INSTANCE, SEE SECTION 2.3.6, COMSEC ARCHITECTURE, OF "COMMUNICATION SUPPORT SYSTEM (CSS) INTEGRATED SATCOM", NAVSPAWAR, PD 50.) WE PROPOSE AN EXPERT SYSTEM MODELING CSS ARCHITECTURE AT USER EQUIPMENT, INTERFACE UNIT, PLATFORM LAN, LINK AND MULTI-NETWORK CONTROLLER, RED AND BLACK RADIO ROOM, AND RF MEDIA LEVELS, AND THE SECURITY ATTRIBUTES OF THEIR HARDWARE, SOFTWARE, AND INTERCONNECTION ELEMENTS. THE TOOL USES SECURITY RULES DERIVED FROM THE NATIONAL COMPUTER SECURITY CENTER "RED BOOK" TO DETERMINE THE SECURITY STATUS OF THE ARCHITECTURE. USING RULE PROCESSING WE CAN AUTOMATICALLY ASSIGN SECURITY ATTRIBUTES TO NETWORK ELEMENTS AND AID IN CERTIFICATION OR OPTIMIZATION. OUR PROPOSAL IS BASED ON A VIA-SAT IRAD PROTOTYPE MULTI-LEVEL SECURE NETWORKING EXPERT SYSTEM. IT IMPLEMENTS THE KNOWLEDGE-BASE AND SOME SECURITY RULES TO DEMONSTRATE FEASIBILITY OF THE CONCEPT. OUR PROPOSAL DESCRIBES A PHASE I CONTRACT TO EXTEND THE CAPABILITIES OF OUR IRAD TOOL, TAILORING THE KNOWLEDGE AND RULE BASE MODELS FOR CSS. DELIVERABLES FOR PHASE I INCLUDE DESCRIPTIONS OF THE MODELS AND A SOFTWARE DEMONSTRATION.

VIA-SAT INC
6120 PASEO DEL NORTE - J2
CARLSBAD, CA 92009
CONTRACT NUMBER:
STEVEN HART
TITLE:
MULTI-MEDIA DYNAMIC CONTROL ALGORITHMS
TOPIC# 44 OFFICE: SPAWAR IDENT#: 36983

VIA-SAT IS PLEASED TO PRESENT THIS PROPOSAL FOR INVESTIGATION INTO MULTI-MEDIA CONTROL ALGORITHMS. WE ARE PROPOSING AN INNOVATIVE APPROACH TO SOLVE THE MOST DIFFICULT PROBLEM IN NETWORK CONTROL ALGORITHM DESIGN: THAT OF MEASURING THE PERFORMANCE OF DESIGN ALTERNATIVES. WE HAVE DEVELOPED THE CONCEPT OF A USEFUL, SYSTEM-WIDE SERVICE-ORIENTED METRIC, AS AN IDEAL WAY OF TELLING IF A CANDIDATE MULTI-LINK ALGORITHM IS WORKING WELL (FORM BOTH A SUBSCRIBER POINT

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OF VIEW, AND A GLOBAL NETWORK POINT OF VIEW). IN SEARCH OF A GOOD SET OF CONTROL ALGORITHMS, WE WILL DEVELOP MODELS FOR SYSTEM PERFORMANCE, SYSTEM TRAFFIC, RF LINK PERFORMANCE, AND DEVELOP FOR THE NAVY A SIMULATOR BASED ON THESE MODELS. WE APPLY THE SIMULATOR AND THE MODELS TO CANDIDATE ALGORITHMS, TO SHOW HOW A FINAL SELECTION OF CONTROL ALGORITHMS MAY BE MADE.

VIA-SAT INC
6120 PASEO DEL NORTE - #J-2
CARLSBAD, CA 92009
CONTRACT NUMBER:
STEVEN HART
TITLE:
MULTINET CONTROLLER ARCHITECTURE
TOPIC# 46 OFFICE: SPAWAR IDENT#: 36990

VIA-SAT IS PLEASED TO PRESENT THIS PROPOSAL FOR INVESTIGATION OF THE HARDWARE/SOFTWARE ARCHITECTURE FOR A MULTIMEDIA MULTINETWORK CONTROLLER. THIS PROPOSAL DESCRIBES A PHASE I SBIR PROGRAM TO PERFORM AN EXTENSIVE, REALISTIC, AND THOROUGH INVESTIGATION INTO THE REQUIREMENTS, CAPABILITIES AND AVAILABILITY OF APPROPRIATE HARDWARE AND SYSTEMS SOFTWARE FOR A SUCCESSFUL MULTINET CONTROLLER DEVELOPMENT AND FIELDING. WE PROPOSE AN AGGRESSIVE AND INNOVATIVE APPROACH INTO SOLVING THE PROBLEM, INCLUDING THE USE OF PERFORMANCE MODELING AND MONTE-CARLO SIMULATION. WE HAVE ALSO PROPOSED TO USE THE EXISTING UNT MULTILINK CONTROLLER ARCHITECTURE AS A STARTING POINT FOR OUR INVESTIGATION INTO THE AVAILABILITY AND CAPABILITIES OF COMMERCIAL OFF-THE-SHELF EQUIPMENT AND REAL-TIME SOFTWARE. THE UNT MULTILINK CONTROLLER HARDWARE AND SYSTEM SOFTWARE WAS FURNISHED BY VIA-SAT TO THE NAVY UNDER A PREVIOUS CONTRACT.

VIA-SAT INC
6120 PASEO DEL NORTE - #J-2
CARLSBAD, CA 92009
CONTRACT NUMBER:
MARK DANKBERG
TITLE:
NETWORK PROTOCOLS FOR UHF MULTI-USER TRAFFIC
TOPIC# 47 OFFICE: SPAWAR IDENT#: 36995

SUBMITTED BY

VIA-SAT IS PLEASED TO PRESENT THIS PROPOSAL FOR AN INNOVATIVE TECHNIQUE FOR UHF SATCOM MULTI-USER NETWORK PROTOCOLS THAT OPERATE UNDER NAVY UHF DAMA TDMA-1 VIRTUAL CIRCUITS. THE PROPOSED APPROACH MEETS THE REQUIREMENTS OF THE SOLICITATION ANNOUNCEMENT IN THAT IT IS A GENERAL PURPOSE SYSTEM THAT CAN BE APPLIED TO A VARIETY OF COMMUNICATIONS SERVICES (EG. TTY, DIGITAL VOICE, FORMATTED DATA, IMAGES), AND A VARIETY OF CONNECTIVITIES (EG. POINT-TO-POINT, BROADCAST, MULTI-CAST). THE PROTOCOL IS FLEXIBLE AND CAN BE DYNAMICALLY RECONFIGURED TO MEET CHANGING USER REQUIREMENTS, AS WELL AS CHANGES IN RELATIVE PRIORITIES AMONG DIFFERENT SERVICES. THE PROPOSAL INCLUDES AN OVERVIEW OF NAVY UHF SATCOM ARCHITECTURE, INCLUDING THE BENEFITS OF OPERATING UNDET TDMA-1. WE THEN DEVELOP A CANDIDATE ARCHITECTURE USING TDMA-1 VIRTUAL CIRCUITS. FINALLY WE INTRODUCE AN INNOVATIVE APPROACH THAT SUBSTANTIALLY REDUCES SERVICE SET-UP LATENCY WHILE OFFERING AS MUCH AS AN ORDER OF MAGNITUDE THROUGHPUT EFFICIENCY IMPROVEMENT FOR MANY NETWORK TYPES. THE PROPOSED PHASE I PROGRAM INCLUDES DOCUMENTATION OF NETWORK REQUIREMENTS, TRAFFIC MODELING, *PROTOCOL DEFINITION*, SYSTEM SIMULATION, QUANTITATIVE METRICS OF NETWORK PERFORMANCE, AND THE FINAL REPORT. DELIVERABLES UNDER THE PROPOSED FIRM-FIXED PRICE PHASE I PROGRAM INCLUDE A MID-TERM BRIEFING, A FINAL REPORT, AND A DELIVERABLE NETWORK COMPUTER SIMULATION.

VISI-COM LABS INC
11590 W BERNARDO CT - STE 220
SAN DIEGO, CA 92128
CONTRACT NUMBER:
CHARLES C SCHOOLER
TITLE:
HIGH SPEED TRACKER ALGORITHMS STUDY
TOPIC# 80 OFFICE: NAVAIR IDENT#: 36444

EXTENDED KALMAN FILTERS GENERALLY PROVIDE VERY GOOD PERFORMANCE AGAINST EVEN HIGHLY MANEUVERING TARGETS, BUT THE PROCESSING TO IMPLEMENT SUCH A FILTER IS EXTREMELY HIGH. BY CONTRAST, MANY A-B FILTERS CAN OFTEN BE SIMPLY IMPLEMENTED IN EITHER HARDWARE OR FIRMWARE, BUT AT SOME COST IN PERFORMANCE. NUMEROUS IMPROVEMENTS TO A-B FILTERS HAVE BEEN PROPOSED TO INCREASE PERFORMANCE, BUT THE

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ATTENDANT INCREASE IN PROCESSING IS OFTEN IGNORED. FOR BOTH KALMAN AND A-B FILTERS, THERE HAVE BEEN FEW ATTEMPTS TO COMBINE THE TAILORED IMPROVEMENTS TO PRODUCE A FILTER THAT IS PRECISELY MATCHED TO ITS REQUIREMENTS, AND WHICH INCLUDES CONSIDERATION OF PROCESSOR REQUIREMENTS IN THE PROCESSING OF MIXING AND MATCHING FILTER DESIGN CONSIDERATIONS. THIS RESEARCH EFFORT WILL PROVIDE A SUMMARY OF FILTER DESIGN OPTIONS THAT EMPHASIZE THE "WHAT" IS BEING ACCOMPLISHED OVER THE "HOW" OF ITS DERIVATION. SIMULATIONS OF DIFFERENT FILTERS WILL BE ACCOMPLISHED USING EXISTING CODES TO PROVIDE THE TRACKING DATA. A METHODOLOGY IS PROPOSED THAT WILL ADD PROCESSOR REQUIREMENTS AS AN ADDITIONAL MEASURE OF MERIT, WHICH WILL BE USEFUL IN SELECTING OPTIONS FOR INCLUSION IN A DESIGN.

VISI-COM LABS INC
11590 W BERNARDO CT - STE 220
SAN DIEGO, CA 92128
CONTRACT NUMBER:
CLIFTON L COOKE
TITLE:
COMMUNICATIONS RESOURCE MANAGEMENT ALGORITHMS
TOPIC# 39 OFFICE: SPAWAR IDENT#: 36952

WITHIN THIS PROPOSAL, PROBLEMS ASSOCIATED WITH THE DEVELOPMENT OF COMMUNICATIONS RESOURCE MANAGEMENT ALGORITHMS ARE ADDRESSED. THE PROPOSAL SPECIFICALLY DDRESSES RESOURCE MANAGEMENT SOLUTIONS AS THEY RELATE TO THE COMMUNICATIONS SUPPORT SYSTEM (CSS). A HYPOTHESIS IS GIVEN WHICH COULD AID IN THE EFFICIENT UTILIZATION OF COMMUNICATION CHANNELS WITHIN THE CSS SCENARIO AND AN EXPERT SYSTEM APPROACH TO A SOLUTION IS PRESENTED. THE HYPOTHESIS DYNAMICALLY ORGANIZES THE NETWORKS BASED ON THE SUBSCRIBERS REQUIREMENTS RATHER THAN ASSIGNING SUBSCRIBERS TO A FIXED SET OF NETWORKS. THE PROPOSAL ADDRESES SUCH ISSUES AS KNOWLEDGE REPRESENTATION, EXPERT KNOWLEDGE ACQUISITION COSTS, IDENTIFICATION OF PLATFORM CAPABILITIES AND CONSTRAINTS, AND IDENTIFICATION OF MAN-MACHINE INTERFACE REQUIREMENTS. DURING THE PHASE I EFFORT IT IS PROPOSED TO DEVELOP A SMALL SCALE PC-BASED PROTOTYPE OF THE SYSTEM. THIS PROTOTYPE WILL DEMONSTRATE SOME OF THE CONCEPTS INVOLVED IN APPLYING EXPERT SYSTEMS TECHNOLOGY TO THE CSS RESOURCE MANAGEMENT PROBLEM.

WAGNER D H ASSOCS
450 MAPLE AVE E - STE 206
VIENNA, VA 22180
CONTRACT NUMBER:
DR DAVID P KIERSTEAD
TITLE:
HIGH-SPEED TRACKER ALGORITHMS STUDY
TOPIC# 80 OFFICE: NAVAIR IDENT#: 36445

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ADVANCES IN SIGNAL COLLECTION AND PROCESSING CAPABILITIES HAVE PLACED EVER INCREASING DEMANDS ON INFORMATION PROCESSING CAPABILITIES. INCREASED DATA RATES AND SENSOR CAPABILITIES HAVE ALSO INCREASED THE IMPORTANCE OF CORRELATION TECHNIQUES. THIS HAS LED TO A PROLIFERATION OF TRACKING AND CORRELATION ALGORITHMS, BUT THE PROCESS OF SELECTING AMONG VARIOUS MODELS AND TECHNIQUES IS STILL MORE ART THAN SCIENCE. IN FACT, THE SEEMINGLY BEWILDERING ARRAY OF TRACKING ALGORITHMS CURRENTLY AVAILABLE ARE NOT AS DISPARATE AS THEY APPEAR. MOST ARE DERIVED FROM A VERY LIMITED SET OF UNDERLYING COMPONENTS, WITH THEIR DIFFERENCES TRACEABLE TO THE MODELING ASSUMPTIONS BEHIND THESE COMPONENTS AND THE MANNER IN WHICH COMPONENTS ARE COMBINED. WE PROPOSE, IN PHASE I, TO DEVELOP A FRAMEWORK WITHIN WHICH TO STUDY, MEASURE AND COMPARE THE CHARACTERISTICS AND PERFORMANCE OF MODERN, HIGH-SPEED, TRACKING ALGORITHMS, PAYING PARTICULAR ATTENTION TO THE EFFECTS OF THEIR VARIOUS COMPONENTS. THIS EFFORT WILL INCLUDE AN ANALYSIS OF THE IMPLICATIONS OF THE UNDERLYING MODELS AS WELL AS COMPUTER SIMULATIONS DESIGNED TO HIGHLIGHT THE DIFFERENCES BETWEEN ALGORITHMS. THE RESULTS OF THIS EFFORT WILL BE A FUNCTIONING SYSTEM CAPABLE OF ANALYZING THE CHARACTERISTICS OF THE COMPONENTS OF A MODERN TRACKER AND OF THE TRACKER AS A COMPLETE PACKAGE.

WHEELER INDUSTRIES INC
2611 JEFFERSON DAVIS HWY - STE 1200
ARLINGTON, VA 22202
CONTRACT NUMBER:
CHARLES D WILLIAMS
TITLE:
SHIP MANNING REQUIREMENTS PLANNING KNOWLEDGE BASE SYSTEM
TOPIC# 84 OFFICE: NAVSEA IDENT#: 36498

CURRENTLY, OFFICER REQUIREMENTS DETERMINATION IS PERFORMED BY HIGHLY EXPERIENCED AND SPECIALIZED MANPOWER ANALYSTS. A SYSTEM NEEDS TO BE DEVELOPED TO PROVIDE A DEVELOPMENT TOOL TO ASSIST NON-EXPERTS IN ESTIMATING OFFICER MANNING REQUIREMENTS DURING THE EARLY PLANNING PHASES OF EACH NEW SHIP AND SUBMARINE ACQUISITION AND FOR EACH UPGRADE. THIS PROPOSED RESEARCH EFFORT IS INTENDED TO PRODUCE A PROTOTYPE EXPERT SYSTEM TO PERFORM EARLY OFFICER MANNING ESTIMATES, BASED ON SHIP REQUIRED OPERATIONAL CAPABILITIES/PROJECTED OPERATIONAL

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ENVIRONMENT (ROC/POE) INSTRUCTIONS AND OTHER GUIDANCE. THE SYSTEM IS TO BE DEVELOPED USING GURU SOFTWARE AND TO RUN ON A VAX/VMS OPERATING SYSTEM. IT WILL BE TESTED TO SEE IF IT CAN REPLICATE THE RESULTS ACHIEVED BY THE SPECIALISTS NOW PERFORMING THESE ANALYSES, WITHOUT THE AID OF SUCH SYSTEMS. SUCCESSFUL ACCOMPLISHMENT OF THE PHASE I OBJECTIVE WILL DEMONSTRATE THE FEASIBILITY OF FULLY AUTOMATING SHIP MANNING REQUIREMENTS DETERMINATION FUNCTIONS USING KNOWLEDGE-BASED EXPERT SYSTEMS WHICH WOULD BE UNDERTAKEN IN PHASE II.

WINTEC INC
303 WASHINGTON AVE
VALPARAISO, FL 32580
CONTRACT NUMBER:
FRED L BENEDICK
TITLE:
FIBER OPTIC AIRCRAFT/STORES INTERFACES
TOPIC# 175 OFFICE: NAVAIR IDENT#: 37628

MIL-STD-1760 DEFINES A STANDARDIZED ELECTRICAL INTERFACE BETWEEN AIRCRAFT AND STORES. THIS INTERACE AS PRESENTLY DEFINED INCLUDES CONNECTIONS FOR ANALOG, DIGITAL DATA, DISCRETE, AND POWER TYPE SIGNALS. SIGNAL TRANSFER MEDIA INCLUDE COAXIAL CABLE, TWISTED SHIELDED PAIR, AND DISCRETE WIRES. PROVISIONS ARE INCLUDED, HOWEVER, FOR THE FUTURE IMPLEMENTATION OF TWO FIBER OPTIC SIGNAL CONNECTIONS WHICH ARE CURRENTLY UNDEFINED. DUE TO THE INHERENT WIDE BANDWIDTH CAPABILITY OF FIBER OPTIC MEDIA, IT MAY BE POSSIBLE TO COMBINE MANY OF THE PRESENT MIL-STD-1760 SIGNALS CURRENTLY TRANSFERRED OVER SEPARATE WIRE PATHS ONTO A COMMON FIBER OPTIC CONNECTION. THIS COULD RESULT IN A SIGNIFICANT REDUCTION IN AIRCRAFT WIRING AND ASSOCIATED WEIGHT, AS WELL AS ENHANCED IMMUNITY TO ELECTROMAGNETIC INTERFERENCE (EMI). THIS STUDY WILL INVESTIGATE THE EXTENT TO WHICH MIL-STD-1760 AND OTHER AIRCRAFT/STORE INTERFACE SIGNALS (SUCH AS MOTOR FIRE PULSE) MAY FEASIBLY TRANSFERRED OVER THE RESERVED FIBER OPTIC LINES. SIGNAL TRANSFER REQUIREMENTS WILL BE ANALYZED, AND CANDIDATE IMPLEMENTATION APPROACHES WILL BE DEFINED. FINALLY, A RECOMMENDED APPROACH WILL BE SELECTED. REQUIRED TECHNOLOGY DEVELOPMENTS WILL ALSO BE IDENTIFIED.

XIONTECH RESEARCH
1313 - 5TH ST NE/STE 213
MINNEAPOLIS, MN 55414
CONTRACT NUMBER:
ROMEL RIVERA
TITLE:
A LANGUAGE - INDEPENDENT DESIGN ABSTRACTOR AND TREE BASED CONVERT FOR A PROGRAMMING ENVIRONMENT
TOPIC# 149 OFFICE: NSWC IDENT#: 36022

SUBMITTED BY

XIONTECH HAS RESEARCHED AND DEVELOPED TECHNOLOGY FOR LANGUAGE-BASED, LANGUAGE-INDEPENDENT, GRAMMAR-GENERATED INTERACTIVE PROGRAM COMPOSITION. THIS TECHNOLOGY IS COMMERCIALLY AVAILABLE FOR ADA, CMS-2 AND OTHER LANGUAGES. THE OBJECTIVE OF THE PROPOSED RESEARCH IS TO USE THIS TECHNOLOGY TO BUILD A LANGUAGE-INDEPENDENT SYSTEM FOR REVERSE ENGINEERING. IT WILL INCLUDE AN EMBEDDED DESIGN LANGUAGE XDL, A DESIGN ABSTRACTOR XDA, AND A TREE-BASED CONVERTER XTC. XDA AND XTC WILL BE INDEPENDENT OF SOURCE AND DESTINATION LANGUAGES. XDA DESTINATIONS WILL BE PDL'S (INCLUDING XDL) AND EXISTING GRAPHICAL DESIGN TOOLS. THESE TOOLS WILL BE BUILT ON A LAYER OF REVERSE ENGINEERING FUNCTIONS SUCH AS CONNECTIVITY, DATA-FLOW AND CONTROL-FLOW ANALYZERS, WHICH MAY BE USED TO IMPLEMENT MAINTENANCE TOOLS SUCH AS RIPPLE-EFFECT DETECTORS AND PROGRAM SLICERS. THE REVERSE FUNCTIONAL LAYER WILL BE IMPLEMENTED ON TOP OF THE LANGUAGE-INDEPENDENT ARCHITECTURE, ENHANCED BY A NOTATION FOR THE FORMAL SPECIFICATION OF SEMANTICS NEEDED TO SPECIFY SCOPING, NAME RESOLUTION, DBMS ACCESS, DATA AND CONTROL FLOW, AND MULTIPASS ATTRIBUTE EVALUATION TO FACILITATE CONVERSION. THIS WILL BE IMPLEMENTED FIRST FOR CMS-2, ADA AND CMS-2 TO ADA CONVERSION.

XIONTECH RESEARCH INC
1313 - 5TH ST SE/TECHNOLOGY CTR/STE 213
MINNEAPOLIS, MN 55414
CONTRACT NUMBER:
ROMEL RIVERA
TITLE:
A PROTOTYPING METALANGUAGE WITH FORMAL SEMANTICS FOR THE XINOTECH PROGRAM COMPOSER
TOPIC# 1 OFFICE: ONR IDENT#: 37504

XINOTECH HAS RESEARCHED AND DEVELOPED TECHNOLOGY FOR LANGUAGE-BASED, MULTI-LINGUAL, GRAMMAR-GENERATED INTERACTIVE PROGRAM COMPOSITION AND IS COMMERCIALLY AVAILABLE FOR ADA, CMS-2 AND OTHER LANGUAGES. ALTHOUGH THIS TECHNOLOGY PROVIDES A SOLID FRAMEWORK FOR ABSTRACT TREE MANIPULATION, IT DOES NOT HAVE THE REACH TO SUPPORT LANGUAGE PROTOTYPING AND INTERACTIVE SEMANTICS. THE OBJECTIVE OF THE PROPOSED RESEARCH IS TO DEVELOP THE CONCEPTUAL FOUNDATIONS FOR A NEW SOFTWARE ENVIRONMENT MODEL. THIS MODEL WILL CONSIST OF a) A METALANGUAGE,

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INCLUDING A GRAMMAR NOTATION FOR THE LANGUAGE-INDEPENDENT SPECIFICATION OF INTERACTIVE SEMANTIC ANALYSIS, DESIGNED TO SUPPORT EMBEDDED LANGUAGES, EASY LANGUAGE PROTOTYPING AND LANGUAGE REUSABILITY, b) A METALANGUAGE PROCESSOR FOR LANGUAGE GENERATION, c) THE SOFTWARE ARCHITECTURE SUPPORTING INTERACTIVE SEMANTIC EVALUATION, INCLUDING A GLOBAL DATABASE, AND d) A USER INTERFACE TO INTERACTIVELY ACCESS AND UTILIZE THE SEMANTIC INFORMATION. THIS MODEL WOULD BE IMPLEMENTED ON TOP OF THE EXISTING TECHNOLOGY.

NAVY

TOTAL NUMBER OF AWARDS: 323