

NAVY SMALL BUSINESS INNOVATION RESEARCH PROGRAM  
Submitting Proposals on Navy Topics

Phase I proposal (5 copies) should be addressed to:

Topics #1 through #9

Office of Naval Research  
800 North Quincy Street  
BCT #1. Room 528  
Arlington, VA 22217  
Attn: Code 400 SBIR Program, Topic No. \_\_\_\_

Topics #10 through #14

Commanding Officer  
Naval Medical Research & Development Command  
Bethesda, MD 20814  
Attn: Code NMC-NCR SBIR Program, Topic No. \_\_\_\_

Topics #15 through #31

Headquarters, Naval Electronic Systems Command  
Department of the Navy  
Washington, D.C. 20363  
Attn: Code OOK SBIR Program, Topic No. \_\_\_\_

Topics #32 through #35

Joint Cruise Missiles Project Office  
Director of Contracts  
Washington, D.C. 20363  
Attn: Code JCM-28 SBIR Program, Topic No. \_\_\_\_

Topics #36 through #41

Naval Supply Systems Command  
Washington, D.C. 20376  
Attn: Code SUP-033 SBIR Program, Topic No. \_\_\_\_

Topics #42 through #52

Headquarters, U.S. Marine Corps  
Washington, D.C. 20380  
Attn: Code LBC-2 SBIR Program, Topic No. \_\_\_\_

Topics #53 through #65

Commander  
Naval Sea Systems Command  
Department of the Navy  
Washington, D.C. 20362  
Attn: Code NAVSEA-0035 SBIR Program, Topic No. \_\_\_\_

Topics #66 through #93

Naval Surface Weapons Center, White Oak  
Silver Spring, MD 20910  
Attn: Code S-02 SBIR Program, Topic No. \_\_\_\_

Topics #94 through #95

Commander  
Naval Weapons Center  
China Lake, CA 93555  
Attn: Code 005 SBIR Program, Topic No. \_\_\_\_

Topics #96 through #97

Naval Underwater Systems Center  
New London Laboratory  
New London, CT 06320  
Attn: Code 10 SBIR Program, Topic No. \_\_\_\_

Topics #98 through #100

David Taylor Naval Ship Research & Development Center  
Bethesda, MD 20084  
Attn: Code 003 SBIR Program, Topic No. \_\_\_\_

Topic #101

Commanding Officer  
Naval Coastal Systems Center  
Panama City, FL 32407  
Attn: Code 401 SBIR Program, Topic No. \_\_\_\_

Topic #102

Naval Ocean Systems Center  
271 Catalina Blvd.  
Bldg. A-33 Room 1602W  
San Diego, CA 92152

Topics #103 through #109

Commanding Officer  
Naval Weapons Support Center  
Crane, Indiana 47522  
Attn: Code 605 SBIR Program, Topic No. \_\_\_\_

Topics #110 through #115

Naval Training Equipment Center  
Orlando, FL 32813  
Attn: Code N-6 SBIR Program, Topic No. \_\_\_\_

Topics #116 through #117

Commanding Officer  
Navy Personnel Research and Development Command  
Bldg. 329  
San Diego, CA 92152  
Attn: Code 201B SBIR Program, Topic No. \_\_\_\_

Topics #118 through #147

Headquarters, Naval Air Systems Command  
Department of the Navy  
Washington, D.C. 20361  
Attn: Code AIR-303 SBIR Program, Topic No. \_\_\_\_

N84-001            TITLE: Multi Aperture Optical Systems Research

CATEGORY: Research

DESCRIPTION: Research is sought on optical system concepts providing object directional information via multi aperture systems such as fly-eye systems. The systems of interest would be in the 3-5 and 8-12 micrometer range, must have flexibility in shape for installation, must have potential for low cost, and must be easily manufactured and installed. Concepts for system materials and manufacturing techniques are also of interest. Performance trade offs must be made on system parameter selection.

N84-002            TITLE: Electronics Research

CATEGORY: Research

DESCRIPTION: Proposals are solicited for basic research in electronics. Specific areas of interest include the following: (i) Solid state electronics, with emphasis on electronic materials preparation and characterization, fundamental studies of novel device structures, new fabrication processes, investigation of physical mechanisms applicable to ultra-small electronic components or interconnections between components; (ii) Algorithms and architectures for future VLSI.

N84-003            TITLE: Energetic Cathodes for Rechargeable Lithium Batteries

CATEGORY: Research

DESCRIPTION: The purpose of this work is to explore options for improving cathodes and cathode performance in high energy density rechargeable lithium batteries. Research objectives should include the identification, preparation and characterization of cathode materials more energetic than titanium disulfide. Specific interest is in materials compatible with 2-methyltetrahydrofuran solutions, although research is not limited to these. Candidate materials need not be limited to inorganics; polymer-based materials are of interest.

N84-004            TITLE: Solid State Electrolytes

CATEGORY: Research

DESCRIPTION: Proposals describing research on several aspects of solid state electrolytes are invited. Techniques and approaches to the synthesis and characterization of solid state materials (e.g. polymers) in which ionic conduction is high are sought. Research can include the development of techniques for preparing and processing of solid state ionically conducting materials, investigations of solid-solid interfacial phenomena which control ionic motion across such interfaces, and the formulation and exploration of potential applications of solid electrolytes. Specific materials of interest include polymers, glasses and anionic conductors.

N84-005            TITLE: Sensing of Atmospheric Variable Constituents and Properties

CATEGORY: Exploratory Development

DESCRIPTION: Proposals are being invited addressing observational approaches to marine boundary layer problems. Techniques and ideas are sought for in-situ instrumentation for moisture, aerosols, visibility and/or remote sensing instrumentation for glide slope visibility and cloud base height. Instrumentation should be adaptable to shipboard and/or other locations. Proposals submitted should also give consideration to rapid processing and readout and effective display of data.

N84-006            TITLE: Ocean Instrumentation

CATEGORY: Research

DESCRIPTION: Proposals are being solicited in support of new developments in ocean instrumentation. Emphasis will be on work related to devices which measure physical, geophysical, biologic and acoustic features both in-situ and remotely, and on devices which, if feasible, are expendable. Examples of such devices, and the properties to be measured are: (a) an in-situ device to measure fluctuations in the temperature and velocity microstructure of the ocean volume, (b) an efficient high power (200 dB), low frequency (125 Hz), broadband (50 Hz) acoustic source deployable on moorings up to 2 Km below the ocean surface to examine acoustic paths and mesoscale and basin-wide physical features of the ocean volume by acoustic tomography, (c) an in-situ biological sorter to examine the macrozooplankton of the ocean volume, and (d) an ultra high capacity (100 megabyte), low power, digital remote device for ocean bottom use in measuring seismic, acoustic, or other ocean bottom signals. In addition, new navigational techniques which can enhance all of the above measurements with accuracy and precision appropriate to each, are to be considered.

Emphasis will be on device production where a complete system is proposed and, if feasible, which are rapid-measuring or expendable and which involve simple deployment in the appropriate configuration.

Proposals may involve the improvement of existing techniques as well as component improvement. Utility to the basic research community to be given high priority.

N84-007            TITLE: Quality Control for Automated Manufacture of Energetic Materials

CATEGORY: Research

DESCRIPTION: Energetic nitramine (RDX/HMX) particle filled elastomers are increasingly being used in tactical missile propellants, gun propellants and explosive warheads produced using batch manufacturing techniques. Chemically cross linked rubbers (urethane) and physically cross linkable thermo-plastic elastomers filled for example, with particles of RDX, HMX, aluminum, or ammonium perchlorate are in various stages of development for these applications. Automated manufacture of these materials is limited by the processing science base which is necessary to predictably minimize hazards. Control of the quality of energetic materials manufactured using high throughput, continuous processing techniques is also necessary to assure reproducibility and performance reliability. Knowledge of the physics that will permit online intrusive techniques to be devised that will sense variations in ingredient particle number density and size is needed. Knowledge of the effects of quality variations on propellant and explosive performance is also essential.

N84-008            TITLE: Interactive Voice Work-Station for Problem Analysis

CATEGORY: Advanced Development

DESCRIPTION: In a task environment where an operator's visual and psychomotor efforts must be directed elsewhere, additional communication links can be sustained through a voice-inquiry system. That system will require at least a capacity of 100 words, with a capability of expansion to a larger vocabulary, and a speech-recognition training period of no more than 3 trials per word. The system will allow for connected-word recognition of at least 5 words in the implementation of the operator's queries. The success rate of the recognition system shall be no less than 96% in a quiet task environment. Interaction with a database and a rule-based algorithm is required so that there is a synthesized voice output to a given task solution in near real-time. The system will store the intermediate products of the problem solution so that the user may inquire about their values and states.

An interdisciplinary approach that utilizes concepts from engineering psychology, computer science, and signal processing should define an interactive system for solution of problems in near real-time.

N84-009            TITLE: Molecular Biology and Bioelectronics

CATEGORY: Research

DESCRIPTION: Recent advances in immunological, protein and lipid technology permit the preparation of highly specific reagents that can recognize particular cell populations, infectious particles and surface molecules. The development of microgranule and microsphere techniques permit the packaging of toxic and other biological reagents in forms that are not toxic to cells until ingestion by the cells. The attachment of highly specific antibodies or lectins to the microsphere surfaces can allow the delivery of toxic or other chemicals, contained within the sphere, to selected cells. Immunoglobulins (antibodies), enzymes and lectins can be coupled to microcarriers, to plastics and to surfaces of semiconductors. The protein activity is usually stabilized as a result of such attachment and therefore this technology has industrial applications. The successful attachment of antibodies, prepared against nerve cells, to semi conductive surfaces may be important in the development of novel molecular electronic devices and of sensors, both having primary interest to the Navy. Research on the attachment of antibodies, enzymes and lectins to the external surfaces of microcarriers and semiconductors with regard to retention of biological activity is appropriate. Studies on the efficacy of coupling the microsphere to the protein reagents, before or after loading with the encapsulated ligand, is appropriate in this category. An example of the semiconductor studies would be the demonstration that antibodies that were coupled covalently to semiconductor surfaces, such as silicon or gallium arsenide, retained their ability to bind cells with appropriate surface antigens. The demonstration that electrical discharge of the semiconductor stimulated the electrical depolarization of the attached cells would be of interest.

N84-010            TITLE: Preparation of USP-grade, Pyrogen-free Water

CATEGORY: Advanced Development

DESCRIPTION: A system of dual reverse osmosis, ion exchange, carbon and ultra filtration treatment is being developed for water purification aboard ships. This system will produce USP-grade pyrogen-free, sterile, injectable water for use in preparation of blood wash solutions and resuscitation fluids. The following are required prior to system procurement: Technical and operational evaluation; modifications to accommodate to sources and grade of water; a docking device for sterile filling of fluid bags.

N84-011            TITLE: Visual Screening for Naval Aviation Candidates

CATEGORY: Advanced Development

DESCRIPTION: The visual exams, tests, and procedures used to screen naval aviator candidates at military enlistment processing stations need to be improve. The visual testing system must be accurate, reliable and easy to operate (automation is highly desirable). Tests used must be relevant to naval aviation operational requirements and designed to make cheating difficult. The system must be portable, inexpensive, and easy to maintain.

N84-012            TITLE: Organization-wide, Integrated, Electronic Communication Network

CATEGORY: Management and Support

DESCRIPTION: The Navy medical research and development organization is composed of eleven activities in the United States and overseas. Communication could be greatly enhanced by a fully

integrated network of word processors and automatic data processing (ADP) equipment. Even though each activity has ADP capability there is currently no electronic communication (i.e., electronic mail or data transfer). Concepts and ideas are solicited for an ADP system that would allow such interaction. The research should include a determination of requirements and provide discussion on feasibility and cost effectiveness.

N84-013            TITLE: Evaluation of the Navy Occupational Health Information Monitoring System

CATEGORY: Exploratory Development

DESCRIPTION: A Navy Occupational Health Information Monitoring System (NOHIMS) is being developed for collecting, processing and displaying medical and environmental data for use in occupational illness and accident prevention programs. The NOHIMS effort requires the preparation of an evaluation plan to assess efficiency and savings in cost, time, and manpower, resulting from the use of this automated information system in a Navy regional medical command and the Navy Environmental Health Center, Norfolk, Virginia.

N84-014            TITLE: Organization of Research and Administrative Historical Files

CATEGORY: Management and Support

DESCRIPTION: Historical files of the Naval Medical Research and Development Command are stored in file cabinets. Organization of these files could be enhanced to provide more efficient access and occupy less space. Concepts and ideas are solicited for a system of organizing the data for quick and easy reference. Cost effectiveness of the proposed system must be addressed.

N84-015            TITLE: Basic Research in Electronics

CATEGORY: Research

DESCRIPTION: Focused basic research studies in electronics are of interest to NAVELEX in the areas of electronic materials development and fundamental device studies with emphasis on novel approaches to achieve goals of Navy interest e.g., improved radiation hardness.

N84-016            TITLE: Low Power HF Surface Wave Communications

CATEGORY: Exploratory Development

DESCRIPTION: Low power (less than 1W) HF communications is required with a minimum data rate of 1,000 bites per second over ranges of 300 to 500 nautical miles. The transmitting antenna must be suitable for relatively small oceanographic buoys not exceeding 6' in height and 18" in diameter. The receiving antenna and radio must be portable and suitable for operation on a ship or vehicle hoisted on the beach. The data rate and ranges indicated must be achievable year round over open ocean conditions through a diurnal cycle. Hardware demonstration is desired to show performance at some site to be selected along the east coast. Support studies will project performance for different reasons and locations.

N84-017            TITLE: Satellite Fleet Broadcast Reception

CATEGORY: Engineering Development

DESCRIPTION: Develop a simple, inexpensive means of expanding the capability of the existing satellite fleet broadcast receiver (AN/SSR-1) to permit the reception of the fleet broadcast channel from more than one satellite simultaneously and replacing the existing crystal controlled frequency selection method with a synthesized technique.

N84-018            TITLE: Small System Applications for SSN Communications

CATEGORY: Advanced Development

DESCRIPTION: A technology assessment is required to investigate state-of-the-art data bus architectures for small systems applications and determine applicability of different architectures to submarine exterior communications.

The investigation of submarine communications system display requirements will assess applicability of video displays to the submarine exterior communications system for system status, system configuration, operator aids, etc.

N84-019            TITLE: Data Bus Technology/Application Study

CATEGORY: Advanced Development

DESCRIPTION: Data busses are a military necessity in many diverse, and expanding applications. The technology has wide interest at the federal, national (civil) and international levels (both civil and NATO). A survey is required to: (1) identify those organizations involved in developing and/or applying this technology; (2) determine the extent of data bus standardization for various applications; (3) determine trends in technology; (4) identify advantages (including estimated cost savings) and disadvantages experienced with different media, media access techniques, topologies, signal techniques or other technical characteristics identified as peculiar to data bus technology; and (5) summarize for reference the results of the survey.

N84-020            TITLE: Frequency Agile Multi-coupler

CATEGORY: Advanced Development

DESCRIPTION: Since the introduction of the HAVE QUICK anti-jamming WSC-3 radios in the fleet, frequency management and antenna proliferation problems have created radio jamming. The development of a frequency hopping multi-coupler in the UHF band for shipboard use will minimize these radio jamming problems.

N84-021            TITLE: VLF Transmit Antenna Design

CATEGORY: Exploratory Development

DESCRIPTION: A transport VLF (25-30 KHz) transmit system is being defined. The radiating element would be either the 3,000 foot tether of a tethered aerostat or a top loaded (12 radial top hat) 1,000 foot tower. The design may be applicable to either radiating element, but application to both is preferred. Design work is required to achieve an antenna efficiency of twenty percent or better, assuming a 0.0001 mho/meter ground conductivity. The hardware, including any necessary support equipment, must be reasonably transportable. The desirable features of the design are related to restrictions on site selection, installation in five days by a crew of ten people can be used as nominal upper limits for acceptability.

N84-022            TITLE: Applications for "Personal Computer" Within NAVELEX

CATEGORY: Advanced Development

DESCRIPTION: Characterization of engineering, clerical and recordkeeping functions with NAVELEX. Estimation of efficiency increases in "throughput", decreases in cost or time and space savings, if any, resulting from the introduction "Personal Computers" to the Command. Document thresholds and assumptions which if changed would influence the conclusion (i.e., cost of individual terminals, cost of memory, etc.).

N84-023            TITLE: Automated Air Traffic Control

CATEGORY: Exploratory Development

DESCRIPTION: Study the many facets of automated aircraft control in the air traffic control application with particular emphasis on the utilization of traffic control application with particular emphasis on the utilization of JCS PUB-10 (TADIL-C), and compatibility and interoperability with JFIDS and GPS. Develop algorithms, control equations and computer software modules to demonstrate implementation of these concepts.

N84-024            TITLE: High Resolution Beam-forming for Acoustic and HF Signals

CATEGORY: Research

DESCRIPTION: The use of arrays of HF or acoustic sensors to provide information about the location and progress of ships at sea which emit radio and acoustic spectra can be greatly enhanced via the use of new signal processing techniques which take advantage of the wealth of improvements available to perform sophisticated digital processing tasks. Among these is a family of software algorithms described as eigenvector/eigenvalue solution techniques. These can be used to perform a type of optimized adaptive solution to the azimuth/elevation beam forming problem which simultaneously requires minimum aperture of the array and a minimum number of array elements compared to conventional techniques. Furthermore, clean copies of signals can be derived in the presence of multi-path, allowing both improved multi-array coherent processing and improved message analysis. What is needed immediately for a thorough evaluation of these techniques using real array data with the real noise characteristics, the latter being difficult to model.

N84-025            TITLE: Low Cost Packaging of Electronic Equipment which Meets Navy Specifications

CATEGORY: Engineering Development

DESCRIPTION: The hostile environments in which Navy and Marine Corps electronic equipment must operate increases the cost of such equipment by as much as two to five times the cost of equivalent commercial systems. The purpose of this task is to: (a) Analyze the relevant military specifications which control the packaging of Navy Electronic equipment, (b) Analyze the current materials and packaging technology, (c) Determine if there are materials, techniques, methods, standards, etc., which show promise of reducing the cost of military packaging to (say) no more that 150% of commercial packaging costs. The effort shall produce a report which describes the possibilities and opportunities for reducing costs. The report shall also propose a one-to-two year program during which the possibilities and opportunities can be evaluated by building and testing prototype packaging of selected electronic equipment.

N84-026            TITLE: EMI Prediction

CATEGORY: Research

DESCRIPTION: Develop analytical techniques to predict task force Electromagnetic Interference (EMI) levels resulting from natural and man-made electromagnetic emissions. Techniques to predict EMI levels at specific shipboard emitter locations is required.

N84-027            TITLE: Multi-Color IR Sensor Technology

CATEGORY: Exploratory Development

DESCRIPTION: A new, affordable multi-color infrared sensor technology has been developed using multiple layers of epitaxial semiconductor alloy films. Spectral sensitivity, which ranges from 2 to 15 microns, is controlled by the alloy composition of the layers. Such integrated layers sensors could impact heavily on infrared guidance, fuzing and surveillance systems. The sensor's ability to generate signals in different electrical channels corresponding to the different IR colors in the scene, enables the system to distinguish between real and false targets. The technology, however, must be industrialized before it can be used in military systems.

N84-028            TITLE: Digital Dosimeter Prototype Development

CATEGORY: Exploratory Development

DESCRIPTION: NSWC/WO has demonstrated a novel concept for a personnel radiation dosimeter which is inherently digital and quite sensitive. The device is made from standard semiconductor chips. The concept is to count the errors produced from standard semiconductor memory circuits. The count of errors is a direct measure of the radiation dose to which the device has been exposed. The prototype device should incorporate various converters to control the response. It will probably make use of hybrid circuit technology. In addition to Navy applications the device should have wide use in the civilian radiation protection area.

A small business responding to this solicitation should have the capability of designing and building small lots of digital circuits using purchased chips. A capability of fabricating hybrid circuits would be a definite asset. Knowledge of radiation dosimetry would be a plus but is not essential.

N84-029            TITLE: Imaging Infrared Scene Projection

CATEGORY: Exploratory Development

DESCRIPTION: A device is required for projecting realistic dynamic infrared scenes to imaging sensors in the laboratory. The primary requirement is in the 3 to 5 um spectral band. At least 500 lines of information are required over a 6 degree field-of-view, updated at a 60 hz field rate. The device must be capable of producing at least 100 shades of grey and the frame-to-frame flicker must be no more than 5 percent. The apparent source temperature range is from zero to 600 degrees centigrade.

N84-030            TITLE: Broadband (Multioctave) Components and Monopulse Networks

CATEGORY: Advanced Development

DESCRIPTION: The increasing use of d-band (10 to 20 GHz) and K-band (20 to 40 GHz) for radar directed gun systems, missile homing systems, data links, battlefield portable radars, and surveillance has

outpaced the capabilities of counter antiradiation and ESM equipments. New theory and techniques for increased bandwidth and upper frequency extension are needed for stripline components and networks. New TEM stripline geometries that reduce the critical tolerance requirements but allow mass production with low cost manufacturing techniques are urgently required.

N84-031            TITLE: Photodeposition of Metal for Multilayer Printed Circuit Boards

CATEGORY: Exploratory Development

DESCRIPTION: Devise a method of photodeposition of metals useful in printed circuits and hybrid circuits to meet the following requirements. (1) Metal runs no wider than 0.002 inch; (2) Spaces between metal runs no wider than 0.002 inch; (3) Demonstrate ability to fabricate multiple layers of metal runs in dielectric materials suitable for electronics applications.

N84-032            TITLE: Tactical Weapons Effectiveness Study of a Land Attack Missile Using an Autonomous Forward Looking Sensor to Improve Terminal Accuracy

CATEGORY: Exploratory Development

DESCRIPTION: The cruise missile type weapons can provide long range attack against land based targets using conventional warheads. The desire is to provide a non-nuclear option for certain critical high value targets. Some of the target types will require precision terminal homing to achieve a kill using conventional warheads.

The purpose of this study will be to evaluate the effectiveness of various forward-looking sensors (IIR, LASER, MMW, RAC, etc.) and algorithms to achieve the precise terminal homing required. Because of the long range it is desired that this be autonomous. The targeting aspects to do mission planning for a tactical weapon shall be addressed in terms of requirements, assets required and quick response time.

N84-033            TITLE: Compile and Investigate Advance DSMAC Algorithms to Improve Operational Performance

CATEGORY: Exploratory Development

DESCRIPTION: The cruise missile uses a Digital Scene Matching Area Correlation (DSMAC) system for precision update of its inertial system. This task is to compile and investigate advance correlation algorithms, feature recognition or other updating schemes.

Part one will evaluate algorithms and techniques that are compatible with its existing DSMAC hardware, mission planning hardware, software and operational limitations.

Part two will evaluate new and optimum techniques within the practical limits of hardware, software and operational use.

N84-034            TITLE: Evaluate the Technical Feasibility of a Flush Mounted Radar Altimeter Antenna with a Controllable Radiation Pattern (Beam Steering)

CATEGORY: Advanced Development

DESCRIPTION: This task is to evaluate the technical feasibility of a flush mounted antenna system that has a radiation pattern controllable in two axis by the missile inertial platform to compensate for missile air vehicle attitudes. The antenna system must be compatible with the present missile radar altimeter system

that requires separate transmit and receive antennas with isolation greater than 85dB. The purpose is to provide a beam steerable antenna that always points at the ground with low sidelobes and medium to high gain in beam for good tracking and high ECM resistance in a dynamic environment. The antenna system must be nuclear hardenable in production.

N84-035            TITLE: Effectiveness Study of Cooperative Target Recognition and Homing

CATEGORY: Exploratory Development

DESCRIPTION: The cruise missile systems may be enhanced by exploiting threat radiations for target classification, recognition and guidance aiding (homing). This study would compile and evaluate the effectiveness of the various Electronic Support Measures (ESM) concepts for use in a missile platform. The missions will include cueing for both ships and land type targets (Defense Suppression, C3, Radar, etc.). The study should include various receiver techniques and algorithms including classical ESM, FMOP, EFTs, and unintentional radiated emissions and provide an analysis of the mission planning aspects of obtaining and using the required signatures.

N84-036            TITLE: Encoding of Color Graphics Image

CATEGORY: Advanced Development

DESCRIPTION: Microcomputer based systems which can be used to produce specific types of color graphics presentation materials are now available. A scheme for the digital encoding of these images is required in order to permit the archival of these images and their transmission to aid replication on a variety of output devices.

N84-037            TITLE: Effect of Print on Demand Capabilities on Documentation Management

CATEGORY: Advanced Development

DESCRIPTION: The availability of electronic page printers has made it possible to store and print copies of forms and documents such as specifications, standards, instructions, etc. as needed. An assessment of the economic impact traditional documentation management practices.

N84-038            TITLE: The Use of "Expert Systems" Theory in Inventory Control Applications

CATEGORY: Advanced Development

DESCRIPTION: The objective of this effort is to develop and test the procedures to utilize "Expert Systems" Theory in inventory control and maintenance repair decision making. At inventory control points, recommendations on procurement quantities are generated by programmed decision rules (reorder level, reorder point). Review of these recommendations are made by commodity managers utilizing their experience and expertise. This expertise needs to be incorporated into "Expert Systems" procedures.

N84-039            TITLE: Availability Centered Inventory Model (ACIM) Utilization Requirements

CATEGORY: Management and Support

DESCRIPTION: Determine the specifications needed to utilize the ACIM (Availability Centered Inventory Model) in an inventory control point data processing environment. The ACIM will be used for determining

levels of supply support. Specifications are to include hardware configuration and software requirements needed to exercise the model.

N84-040            TITLE: Determination of Spares and Repair Part Prices

CATEGORY: Advanced Development

DESCRIPTION: Develop techniques for verifying the reasonableness of spares and repair part prices prior to contract award including the possibility of utilizing online visual display of the item to be procured.

N84-041            TITLE: Model for Assessment of Contractor Performance

CATEGORY: Advanced Development

DESCRIPTION: Develop a model (techniques) for assessing contractor performance. Effort is to include the identification and measurement of relevant parameters indicating the success of the contractor in meeting performance objectives.

N84-042            TITLE: Minefield Location and Identification System

CATEGORY: Exploratory Development

DESCRIPTION: Design and construct an instrument or system that can locate and identify minefields up to 20 miles from the operator; conversely, a "negative" indicator from the item must occur only when no minefields are present.

Item must be transportable on a tactical wheeled vehicle and maintainable and operable in a combat environment.

N84-043            TITLE: Development Plan for Modernization MTACCS

CATEGORY: Exploratory Development

DESCRIPTION: The modernization of the components of tactical ground command and control systems due to advancing technology and changing functional needs, requires a 5 to 10 year development cycle. Since modernization is outside the scope of normal maintenance and modification, research and development is required to accomplish product improvements. The systems of MTACCS are developing, however planning must be undertaken now to incorporate product improvement in functionality, survivability, endurance and capability. A plan is needed to identify appropriate areas for product improvement and to acquire the necessary products. Specific projects being considered currently are fiber optics for MIFASS/TCO\*\* & PLRS,\*\*\* increase memory density for MIFASS\*\*\*\* mass memory units, incorporation of NBC protection, use of Kevlar armor plating, software improvements/upgrades/interface for MIFASS/TCO and PLRS, upgrade of PLRS computer, large screen display for MIFASS/TCO and interface to TWSEAS\*\*\*\*\* from PLRS and MIFASS/TCO.

N84-044            TITLE: Optimum Payload Sizes for Tactical Vehicle Fleet of Future

CATEGORY: Management and Support

DESCRIPTION: Tactical Vehicle Fleet (TVF) currently has three (3) elements: the light fleet having a payload capacity of two (2) tons; the medium fleet having a payload capacity of four (4) to six (6) tons; and

a heavy fleet having a payload capacity of ten (10) to twenty-five tons with the capacity to tow trailers with up to seventy tons. Considering current and future roles of the Marine Corps, it is necessary to determine the optimum payload for each element of tactical vehicle fleet to meet future Marine Corps needs.

N84-045            TITLE: Tactical Nuclear Effects Automated Processing Systems

CATEGORY: Advanced Development

DESCRIPTION: The Defense Nuclear Agency (DNA) has sponsored the development of CROM nuclear effects modules to be used in the TI-59 handheld calculator; this system is employed for predicting weapons effects. Initial evaluations indicate the CROM modules potentially enhance weapon employment capabilities and defensive predictions. Effort will include a review of the DNA program status, collection of updated CROM modules and supporting software methodology, and an evaluation of each module/user's guide to determine their suitability aspects associated with the CROM modules and similar TI-59 solid-state software modules used in conjunction with mortar and artillery conventional weapons employment. A detailed summary report is required at the completion of the project.

N84-046            TITLE: Tactical Air Operations Central (TAOC) – 1985 System Reconfiguration

CATEGORY: Engineering Development

DESCRIPTION: Current system design utilizes four 8' x 8' x 20' ANSI/ISO shelters to house all system communication, processing, display and cooling equipment. Although four Tactical Air Operations Modules (TAOMs) will comprise one TAOC, the current EDM TAOM weight is near 15,000 pounds. Both current and projected shelter handling equipment in Marine Corps inventory precludes ease of shelter movement.

A study is required to identify TAOM reconfigurations designed to decrease shelter weight and decrease shelter size without significant increase in system lift requirements and to ensure that no system capability degradation resulted from any reconfiguration.

N84-047            TITLE: Mechanical Sandbag Filler

CATEGORY: Advanced Development

DESCRIPTION: Design and construct a mechanical item to fill and close securely at least 600 sandbags per hour. Item should be motor operated, operable by one person in a combat environment, and transportable by tactical vehicles.

N84-048            TITLE: IV&V of the Software Development of the TCO SYSTEM

CATEGORY: Engineering Development Support

DESCRIPTION: Software for the Tactical Combat Operations System in accordance with the redefined functional requirements for the system is being developed. This software will be integrated with the MIFASS software to produce a joint MIFASS/TCO system. The process is expected to begin with data and control flows, proceed through PPS, PDS, PDD, and code and end with unit and system integration. Marine Corps Development personnel require assistance in independent verification and validation of the software effort. MIL-STD-1679A will be the appropriate software development standard. Required is a plan for verification and validation.

N84-049            TITLE: Advanced Automated Wargame Study

CATEGORY: Exploratory Development

DESCRIPTION: Prepare a study for the direction and scope of a follow on automated war game system to replace the current Tactical Warfare Simulation Evaluation Analysis System (TWSEAS). The current system is used to control tactical exercises which afford tactical decision training to Marine commanders and their staffs. The study should look at future concept of employment of such a Tactical Simulation system as well as in the aviation and combat service support areas. The study should identify proposed hardware configurations, software capabilities, life cycle costs, system growth and interfaces to current Marine Corps tactical systems (MIFASS, TCO, PLRS, TAOC-85, etc.)

N84-050            TITLE: Atmospheric Modeling of Chemical, Biological and Obscurant Clouds over Amphibious Operations

CATEGORY: Exploratory Development

DESCRIPTION: In order to operate effectively during amphibious operations, the Marine Corps must be able to predict the behavior of chemical, biological, and/or obscurant clouds which may be present on the battlefield. These clouds may represent a threat or they may be retaliatory, but their behavior must be predictable in order for ground/air forces to maneuver around or through them. Considerable efforts have previously been expended for atmospheric modeling but little has been done to model amphibious operation conditions such as salt fog, salt water, beachhead atmospheric turbulence, etc.

This study is to develop an integrated predictive capability for use by U.S. Marine Corps forces to realistically describe atmospheric behavior of chemical, biological, and/or obscurant clouds on amphibious battlefield. The developed model must consider realistic topography, atmospheric conditions, urban/country structural characteristics, threats, and munition inventory. Marine Corps scenarios are recommended for study. The resultant model must be capable of use for development of doctrine and tactics, for training, and for real-time battlefield operations. A detailed summary report shall be provided at the completion of the task together with a reproducible copy of the model software and a users manual.

N84-051            TITLE: Preplanned Product Improvement Program (P3I) Plan for MIFASS/TCO

CATEGORY: Management & Support

DESCRIPTION: The MIFASS System is currently in full scale engineering development. The TCO system is currently being reduced in scope and redefined. The current plan calls for the integration of these two systems into a single system, MIFASS/TCO, during production. Numerous software capabilities were deferred in MIFASS, new system interfaces are developing and additional requirements are emerging. TCO expects to incrementally develop capabilities and implement them in MIFASS/TCO in an evolutionary manner. A plan is needed to determine the product improvement to MIFASS/TCO and establish a chronological implementation plan for developing and integrating these product improvements. Close liaison with Marine Corps Development personnel will be required to establish the appropriate priorities of product improvements. While the product improvements will mostly be software capabilities, the P3I plan will also consider hardware improvements and upgrades where appropriate.

N84-052            TITLE: Ground Approach and Obstacle Avoidance Indicator for Parachutists

CATEGORY: Exploratory Development

DESCRIPTION: Design and construct a Ground Approach and Obstacle Avoidance Indicator for Parachutists. This is envisioned as a small (150 cm or less) sonar/acoustic device to be worn by

parachutists participating in night/reduced visibility parachute jumps. The device must provide the descending parachutist visibility parachute jumps. The device must provide the descending parachutist with a continuous indication of his distance above the ground once he has descended to within 250 feet (500 feet desired) above ground level (AGL). The device must also provide similar range indication of distance to obstacles in the approach path of a parachutist flying a high glide ratio, ram-air parachute. The device must be covert in the electromagnetic spectrum.

N84-053            TITLE: Fast Curing, High Build Epoxy Coating Systems

CATEGORY: Engineering Development

DESCRIPTION: Develop a coating system-including, application equipment and procedures capable of applying a 0.012-0.016 inch (dry film thickness) epoxy coating which is fully cured and ready for use within eight hours after application. The system developed must be compatible with normal shipyard production procedures (e.g., application by brush, roller or spray at ambient temperatures of 5 to 30 degrees C). The coating must be resistant to oils and fuels, and protect steel and aluminum from corrosion by seawater. Systems based on fast curing epoxy resins, applied using heated proportional mixing equipment is one approach to developing such a system. The systems developed must meet OSHA regulations.

N84-054            TITLE: Analytical Model for X-D Braided FRP Composites

CATEGORY: Research

DESCRIPTION: Analytical predictive methodologies based on classical laminations theory with extensive supporting computer capabilities have been developed for conventional Laminated Fiber Reinforced Plastic (FRP) composites. However, a new class of FRP composite materials has been developed with improved toughness properties based on a skeletal, multidirectional braided fiber reinforcement through the thickness as opposed to conventional laminar construction. This new class of materials in addition to its inherent resistance to delamination and ability to localize damage, can be braided to complex net shapes and be rigidized with resin to meet structural needs. Numerous, Naval applications are possible such as masts, structural panels, sonar domes, propeller shafts, propellers, rudders, diving planes, sonar windows etc. One of the present limitations that hinders a greater interest in this X-D braided composite material is a fundamental understanding of its mechanical behavior. Thus it is proposed to develop an analytical capability to define performance of this X-D composite as a function of constructional variables including directionality of reinforcement, reinforcement fraction, and resin fraction. These analytical results would then be experimentally verified under a separate effort.

N84-055            TITLE: Pollution Abatement from Navy-Ships

CATEGORY: Exploratory Development

DESCRIPTION: New pollution compliance requirements, as well as applicable laws and treaties, require the navy to develop the appropriate technology and hardware to abate pollution arising from the operation of Navy ships. New or advanced pollution abatement concepts or systems are sought in air, sewerage and wastewater, oils and oily wastes, hazardous materials and solid waste.

N84-056            TITLE: Fuel Contamination Quality Assurance Test

CATEGORY: Exploratory Development

DESCRIPTION: The presence of solid particulates, free water, undesirable petroleum-products, and contaminants in diesel marine fuel adversely affects the performance and durability of shipboard engine

components. A continuous in-line monitor is needed to measure the concentration of contaminants present in Navy fuels at any point along the fuel distribution system. A fuel contamination quality control system is needed to determine the performance of fuel purification systems, the cleanliness of fuel storage and distribution systems, and also be capable of identifying the nature of fuel contaminants. Proposals are requested identifying unique approaches to investigate the feasibility of developing reliable, fuel contaminant quality assurance tests.

N84-057            TITLE: Approaches to Processing Subsurface Data

CATEGORY: Exploratory Development

DESCRIPTION: For many problems involving subsurface vehicles, large amounts of data must be processed to find ocean bottom objects or features. Tethered vehicles are limited in data transmission rates and are subject to noise problems. Efficient pre-processing algorithms utilized with hardware on-board the vehicles would reduce the data rate to the surface, but allow higher rates of speed for ocean surveys.

N84-058            TITLE: Submarine Depth Excursion Recording System

CATEGORY: Engineering Development

DESCRIPTION: Develop a self-contained and automated depth excursion recording system for use on submarines. A realistic cyclic load spectrum and lifetime definition is needed to project the fatigue life of submarine hull structures and make rational surveillance decisions. The depth excursion information is used to establish cyclic load spectrum.

The installation and operation of the system will be on least interference basis. Phase II could include developing a specification and a monitoring plan.

N84-059            TITLE: Electronic Radar beam Scanning

CATEGORY: Research

DESCRIPTION: Develop innovative approaches and new techniques, software and hardware in the area of agile beam, electronically scanned antennas. The objectives are to: provide future electronic scanning technology for application in equipments having improved characteristics in areas of cost and weight; provide wideband electronic scanning technology suitable for widespread use in Navy systems, so that the functional promise of electronic scanning principles becomes in fact universally available in Navy electromagnetic systems, and not just in high cost applications.

N84-060            TITLE: Doppler Sonar

CATEGORY: Exploratory Development

DESCRIPTION: Some high definition sonar systems require sonar platform motion estimation accuracies that cannot be achieved using state-of-the-art Doppler sonar navigators. Presently, the best Doppler sonar systems have error levels of approximately 0.1 kt rms, while an error level of 0.01 kt rms is required to meet desired sonar performance goals. A precision Doppler sonar is to be designed and constructed which will meet the desired error level, 0.01 kt rms, and provide this accuracy with 1 to 2 sec averaging times. The sonar platform normally operates at 3 to 10 knots speed within 10 meters of the bottom; therefore, the sonar operating frequency and other critical parameters must be selected accordingly.

N84-061            TITLE: Adhesive Systems

CATEGORY: Engineering Development

DESCRIPTION: High failure rates of underwater equipment have occurred because of poor durability and corrosion resistance of rubber to metal bonds which are exposed to seawater. Commercial adhesive systems are presently used to produce the rubber to metal bonds, and some are better than others.

The objective of this work is to develop an adhesive system(s) to bond neoprene rubber to carbon steel, aluminum, bronze, monel, and stainless steel for an expected lifetime of 15 years in a seawater environment. The one or more adhesive systems must be specified as to composition, preparation procedures, quality control and analysis procedures, and application procedures including surface preparation. Laboratory testing, including accelerated life testing, shall be performed to prove the durability and corrosion resistance of the bond.

N84-062            TITLE: Accelerated Life Testing (ALT)

CATEGORY: Engineering Development

DESCRIPTION: Reductions in sonar transducer life cycle costs can be achieved by extending the operational lifetime of the units. This can be accomplished by optimum use of materials and prove design practices to improve the unit durability and tolerance to the seawater environment. However, methods are needed that will determine in the laboratory in a relatively short time what the expected real lifetime expectancy will be.

The objective is to develop in improved understanding of and predictive methods for determining the reliability and life expectancy of sonar transducers by accelerated life testing (ALT).

The approach should be to study the basis for ALT, especially in the situation where multiple aging mechanisms are operating simultaneously. Known aging modes such as rubber-to-rubber bonding, rubber-to-metal bonding, electrochemical reactions of the rubber and metal, changes in the rubber properties with time, permeation, and others will be modeled to relate the results of ALT to expectancies in real time. The appropriateness of ALT will be determined. The ALT procedure will be modified to reflect improvements in the understanding of the methodology and generalized to a composite unit ALT procedure for the complete transducer.

N84-063            TITLE: Reproducibility of Piezoelectric Ceramics

CATEGORY: Exploratory Development

DESCRIPTION: The variability of piezoceramic properties – physical, electrical and mechanical – are well known in the industry by manufacturers and users alike. The variability relates directly, but not in a simple way, to composition and processing variables and emerges from lot to lot from a single supplier and from supplier to supplier. This creates problems for both the manufacturer and user alike. The manufacturer lives with lower than desired yields while the user must deal with delivery problems and often marginal performance and quality, which in turn affects transducer manufacturing yield, performance, and reliability.

The objective is to improve the reproducibility of lead zirconatelead titanate ceramics for sonar transducers.

One approach to the objective would be to develop an improved compositional control. The first step would be to develop analytic procedures for determining the chemical and structural composition of the material. Correlations could be established between impurity levels and microstructure and the electroelastic properties of production lead zirconate titanate.

Another approach would be to investigate improved process controls for the production of the ceramic. The process steps in question are raw material selection and qualification, mixing and granulation, calcinations, grinding, power conditioning, forming, firing, machining, electroding, poling, property measurements, and quality control.

Firms responding should have experience in all aspects of piezoelectric ceramic manufacturing.

N84-064            TITLE: Submarine Piping

CATEGORY: Engineering Development

DESCRIPTION: Develop and qualify for use in nuclear submarine non-metallic, light weight, high strength piping. Includes the develop of adequate fabrication procedures for attaching pipe sections to each other and piping fittings, such as elbows, tees, and valves.

N84-065            TITLE: Mine-Detection and Computer-Aided Classification

CATEGORY: Exploratory Development

DESCRIPTION: Develop innovative techniques for sonar signal processing and approximation of the target size for synthetic target imaging and classification of mine size targets.

N84-066            TITLE: Proton Radiation

CATEGORY: Research

DESCRIPTION: Proton radiation effects on frequency controlled crystals.

N84-067            TITLE: CTI-1561 Chip Set

CATEGORY: Engineering Development

DESCRIPTION: Develop complex testability models for the CTI-1561 chip set used for MIL-STD-1552B bus communication.

N84-068            TITLE: Polymide Quartz Multilayer Board

CATEGORY: Advanced Development

DESCRIPTION: Ceramic integrated circuit packages have thermal mismatch when mounted on the standard epoxy fiberglass multilayer board. If a polymide quartz multilayer board. If a polymide quartz multilayer board could be developed, it would provide a much closer thermal expansion match with the ceramic package.

N84-069            TITLE: The Physics of Metal Matrix Composites

CATEGORY: Advanced Development

DESCRIPTION: The use of metal matrix composites in advanced missiles and guidance systems in particular is at the introductory level at this point in time. A concentrated development program is required to improve our understanding of the physical properties of these materials, its applications in areas where stability, and low weight are of critical importance could be of significant benefit.

N84-070            TITLE: Use of Robotics in Automatic Factory Assembly

CATEGORY: Advanced Development

DESCRIPTION: The application of robotics in other industries has already shown improvements in quality control, time and cost savings, and reliability. Future applications of robotics to specialized very low volume manufacturing processes should be developed. The above factors are of principle interest. Low volume is in the range of 10 to 100 per month.

N84-071            TITLE: Improved Inspection Techniques

CATEGORY: Exploratory Development

DESCRIPTION: High Z metallic material is spray deposited on metal surface packages for some design applications. It is important for these applications that the coating be continuous and without holes.

Current inspection of this process is slow by conventional techniques. An improved, non-destructive technique is required.

N84-072            TITLE: Evaluation of Functions Represented by Grid Points

CATEGORY: Advanced Development

DESCRIPTION: A future guidance system might have to derive gravity from a set of values stored on a three dimensional grid of points around a trajectory. The optimum approach requires a tradeoff between the interpolation function, the number and regularity of the grid points, the computer filing system, speed and memory. Another guidance application would be the derivation of a map in map matching guidance. What is desired is a generalized algorithm and associated techniques which would allow specialization of the algorithm for a particular application to yield an efficient computer program.

N84-073            TITLE: PROM Programming Methodology

CATEGORY: Engineering Development

DESCRIPTION: The method of programming a PROM\* (i.e. the characteristics of the programming pulse (amplitude, ramp, how many, etc.)) affects the reliability of the blown fused-link. New technology PROMs (such as Titanium – Tungsten) have not been studied from the viewpoint of military programmability. This should determine what factors affect the reliability of the blown link and what their values should be in order to guarantee a reliable “blow.”

N84-074            TITLE: Urethane Materials

CATEGORY: Advanced Development

DESCRIPTION: Non-MBOCA urethane compounds having similar physical and casting properties of current MBOCA urethane compounds need to be developed.

N84-075            TITLE: Toxic Gas Detection Equipment

CATEGORY: Advanced Development

DESCRIPTION: The suitability of current portable instrumentation for detecting toxic gases from burnt propellant needs to be assessed. Development requirements of new state-of-the-art portable equipment to detect lead oxides, hydrogen sulfide, hydrogen cyanide and nitrous oxides should be determined.

N84-076            TITLE: Rotation Measurement Techniques

CATEGORY: Exploratory Development

DESCRIPTION: A means of measuring relative rotation between components with an accuracy of several arc-seconds needs to be developed. Measurement range is less than a degree and the components are permitted to translate one inch with respect to each other. Measurement and recording device must be self contained and compact.

N84-077            TITLE: Aging of Non-Metallic materials

CATEGORY: Advanced Development

DESCRIPTION: The change in material properties; elongation, static and dynamic stiffness, hardness etc., for non-metallic materials used in systems as a function of time and temperature need to be investigated along with the physical mechanisms by which these changes occur. Methods for predicting long term aging characteristics or preferably minimizing these changes needs to be identified.

N84-078            TITLE: Corrosion Resistance Evaluation Techniques

CATEGORY: Advanced Development

DESCRIPTION: Develop advanced techniques to evaluate the corrosion resistance of prototype hardware, such as by using potentiometric surveys. Evaluation techniques should employ accelerated testing and a means for predicting real time behavior.

N84-079            TITLE: Improved Remote Distance Measurement Techniques

CATEGORY: Advanced Development

DESCRIPTION: Compact and reliable means of measuring distances of up to 500 inches with an accuracy of .005 inches are needed during launch tube and mount tube manufacture, final matching and installation/assembly.

N84-080            TITLE: Improved Shipboard (Submarine) Velocity and Sea Environment Sensors

CATEGORY: Advanced Development

DESCRIPTION: During underwater missiles launches, accurate data on sea environment and relative underwater speed will help increase the probability of successful launch. Shipboard sensors that are accurate and practical (reliable, compact, maintenance free, etc.) to measure the sea environment (i.e. wave height, sea state) and relative speed across the deck (low speed flow meters concepts to measure cross flow) are required.

N84-081            TITLE: Underwater Launch Hydrodynamic Modeling

CATEGORY: Advanced Development

DESCRIPTION: Improved analytical modeling of hydrodynamic phenomena in such areas as cavity flows, separation and wakes, boundary layer separation, etc. is needed to support predictive models of underwater launch/flight trajectories of missiles up to missile surface broach. Theoretical/experimental efforts leading to efficient and practical analytical computer models are sought.

N84-082            TITLE: Mathematical Techniques/Modeling/Simulation – Automatic Translation Techniques

CATEGORY: Research

DESCRIPTION: Develop an automated procedures, process or algorithm to translate optical imagery (photographs) into radar reflective maps useful in terminal guidance while correcting and retaining the precision of the optical reference.

N84-083            TITLE: Modeling SLBM Underwater Launch Trajectories

CATEGORY: Research

DESCRIPTION: Develop an algorithm or model to the underwater trajectory (including broach) of an SLBM missile tacking into account ship position and attitude, submarine induced turbulence, current, current slew, varying water properties surface effects (wind, wave, and current) and the hydrodynamic shape of the missile.

N84-084            TITLE: Global Positioning Satellite

CATEGORY: Advanced Development

DESCRIPTION: Study to determine feasibility of using Global Positioning Satellite to obtain vehicle heading and attitude to within 1 degree.

N84-085            TITLE: Fracture Toughness of Bonded Composite Components Category

CATEGORY: Exploratory Development

DESCRIPTION: Determine material and strength characteristics of various materials that have been bonded by epoxy bonds. Develop testing methods similar to Charpy V Notch testing techniques determining fracture toughness or bonded elements.

N84-086            TITLE: Improved Non-Destructive Test Methods for Detecting Un-bonds in Large Bonded Components

CATEGORY: Exploratory Development

DESCRIPTION: Explore new improved non-destructive test methods to detect cracks, voids, un-bonds between materials that have been bonded with epoxy type bonds. Determine analysis methods to determine effects of un-bonding in such structures.

N84-087            TITLE: Fiber to Resin Ratio Measurement

CATEGORY: Advanced Development

DESCRIPTION: Rocket motor cases are made from high strength fibers (Kevlar or graphite) which form a composite with resins – usually epoxy types. In conducting failure assessment of chambers, it is difficult to ascertain the resin content of the composite at the failure origin. A method to ascertain fiber to resin ratio by weight for finite sections of chamber in the cured composite would aid in understanding composite failure mechanisms.

N84-088            TITLE: Binder-Filler Interaction in Hi-Energy Propellants Category

CATEGORY: Research

DESCRIPTION: Strategic Missiles require rocket motors with high solids loading and energetic binders and plasticizers. The interactions of the binder and filler materials are critical in determining the physical properties and thus the useability of propellant formulations. Basic studies would include interaction of binders and fillers as they relate to physical properties including the effects of moisture and other environmental factors. Particular emphasis should be in the area of PEG (Poly Ethylene Glycol) binders highly loaded with HMX and Aluminum.

N84-089            TITLE: Very High Level Simulation

CATEGORY: Exploratory Development

DESCRIPTION: Modern day electronic systems are of a level of complexity which currently prohibits adequate design verification prior to hardware implementation. Computer simulation tools at the transistor and gate level are extremely powerful when used at the lower levels of design. However, there is a need to model to various subsystems at a sufficiently high level of abstraction such that the entire system may be simulated.

The system is to be viewed as a finite number of partial physical subsystems with real world inputs and outputs, digital and analog. The simulation should also be capable of “standing-in” for any single subsystem or all of the subsystems in verifying the composite system. This, of course, represents both a software or hardware/software simulation.

Invited are proposals which conceive of such a system consisting of a two phase effort: establishing the definition followed by actual implementation leading to feasibility demonstration. Proposals for “tangible” improvements in logic simulators will not be considered.

N84-090            TITLE: Replacement of Isocon Tubes to Real Time X-Ray Imaging Systems

CATEGORY: Advanced Development

DESCRIPTION: High Energy Real Time Radiographic (HERTR) systems are used to inspect large solid rocket motors. One component of such system is isocon tubes. These isocon tubes have a high usage rate and limited life in the field.

Also, a low yield of acceptable isocon tubes from the producer creates a serious maintenance/logistic problem. A more reliable isocon tube for HERTR systems or a substitute device with better reliability would result in a significant savings of time and resources.

N84-091            TITLE: Composite Pressure Vessel Damage Assessment

CATEGORY: Advanced Development

DESCRIPTION: Strategic missile rocket motors utilize high strength to weight fiber composites for the motor pressure vessels. The missiles are subject to various movements and handling which can inflict damage which is not always visually detectable. Efforts to investigate the pressure vessel and to develop useable and cost effective non-destructive testing to assess the extent of damage would allow more effective use of missile assets; of particular interest are Kevlar-epoxy and Graphite-epoxy chambers.

N84-092            TITLE: Mobile Robot for Hazardous Duty

CATEGORY: Exploratory Development

DESCRIPTION: Design a mobile robot system for application in Navy hazardous duty operations such as fire-fighting and ordnance loading. Investigate requirements, feasibility, and alternative approaches.

N84-093            TITLE: Chemical Synthesis of Energetic Materials and Intermediates

CATEGORY: Exploratory Development

DESCRIPTION: Perform chemical synthesis of energetic intermediates needed for the synthesis of new explosive and propellant ingredients. Perform scaled-up synthesis (1 to 50 pounds) of explosive and propellant ingredients. The explosive/propellant ingredients and intermediates include aliphatic nitro and nitramine compounds as well as nitrate esters.

N84-094            TITLE: Deposition of Low Defect Density Optical Coatings

CATEGORY: Exploratory Development

DESCRIPTION: Develop a suitable coating technique for the fabrication of low defect concentration coatings (defect size 1-10 microns, defect density less than 100 per cm per micron of coating).

1. Evaluate alternate approaches such as ion beam deposition and vacuum evaporation.
2. Deposit coatings using standard process and an appropriate modification designed to reduce particle counts.
3. Evaluate the results using scanning electron microscopy.
4. Submit samples for final evaluation.

N84-095            TITLE: Low Cost Simple Thrust Vector Control

CATEGORY: Exploratory Development

DESCRIPTION: Thrust Vector Control (TVC) has been under study by the Navy, Air Force, Army and NASA for numerous years. Various concepts have been investigated including moveable nozzle, jet vanes and jet tabs; each concept having its own merits.

A new, simple low cost TVC system is needed for application to Navy tactical missiles. A system is needed which can function for about 3-4 seconds, but which will not degrade the missile's propulsion system performance significantly. The system should occupy minimum volume (or missile length) and is envisioned as a variation of the movable nozzle concept, but significantly more cost effective.

N84-096            TITLE: Impact of Short Term Memory on Combat Control

CATEGORY: Research

DESCRIPTION: The rates of information transfer/exchange involved in modern combat control environments requires significant amounts of information to be stored in short term memory. Current research indicates that an individual's short term memory capacity is not only finite but directly influenced both by the type/format of the information being remembered and the input of additional similar information. Without rehearsal information in short term memory is rapidly lost and the input of additional similar information leads to a more rapid degradation of the previously stored information (interference).

The proposed research will investigate short term memory functioning in a combat control environment with the specific forms of information formats and interference caused by new information inputs. The anticipated outcome is a greater understanding of short term memory functioning given the unique types of information associated with a combat control environment. This insight should provide the potential for modification of information formats to reduce/eliminate interference and may also provide insight into training techniques to facilitate short term memory functioning in the combat control environment.

N84-097            TITLE: Improved Tonpizl Transducer Head Masses

CATEGORY: Exploratory Development

DESCRIPTION: Modern use of sonars with new and more complex signal waveforms, will require high power active bandwidths of 30% and bandwidths of 60% for passive operation. Two options are seen for modifying the currently used Tonpizl transducers to this end; (1) increasing the radiating area and (2) decreasing the head mass.

The use of standard materials in routine designs to achieve these goals results in a flexing piston face with an unacceptable biomodal response.

If a head mass is designed with a low density but with high flexural stiffness, it is believed that the flexural resonance will be moved well out of the operating band. It is further believed that a material such as beryllium has the necessary characteristics to allow such a design.

It is proposed here to design such a head mass. Beryllium will be used as the most likely material of choice, and will be compared to metal matrix and plastic composite materials. A "test bed" transducer element will be constructed evaluate the results. Transmitting and receiving responses will be measured, as well as other pertinent electroacoustic characteristics. Holographic analysis will be performed, supplemented with finite element techniques.

N84-098            TITLE: Current Induced Instability in a Conducting Fluid

CATEGORY: Exploratory Development

DESCRIPTION: The primary asset of a liquid metal current collector is the ability to carry very high current density with low electrical losses. Current densities up to 30,000 amps/sq. in. have been observed experimentally. Recent experimental results at high current densities suggest that instabilities may occur at very high current densities which can interrupt the current flow through the collector. It is reasonable to expect an upper limit to exist for current density through a liquid metal based on considerations of pinch effect and other instabilities which occur in plasmas. It is also reasonable to assume that the presence of a properly oriented magnetic field could, to some extent, alleviate such instabilities.

Conduct a theoretical analysis of current transport in a liquid metal (NaK0 under the conditions characteristics of both a free surface and positive containment current collector. Determine the current

density limitations as a function of current collector type, characteristic dimensions, and fluid properties. Consider the effect of magnetic fields on the occurrence of instabilities.

N84-099            TITLE: Conditions Necessary for Hydrodynamics Stability in Liquid Metal Sliprings

CATEGORY: Exploratory Development

DESCRIPTION: Satisfactory operation of a liquid metal current collector depends on the ability to maintain a stable flow of the liquid in the slipring annulus. At very high tip speeds, instabilities have been observed in test devices wherein the liquid metal ceases to remain the collector gap. These instabilities may be caused by a combination of hydrodynamic effects and interactions at the gas liquid interface.

Some types of current collectors overcome these effects by positive containment of the liquid with a controlled leak rate. In these cases the liquid metal is collected and returned to the active region through an external pumping system. The above instabilities in this case may affect the collection of the liquid in the slipring annulus. The presence of transport current and/or magnetic fields may alleviate or aggravate the situation depending on the collector design and operating conditions. An understanding of the conditions which give rise to these instabilities and, conversely, conditions necessary to prevent their occurrence would be of great benefit in the design of current collector systems for long term generation at high tip speeds.

Analyze theoretically the hydrodynamic interactions present in a current collector slipring annulus at high (turbulent) tip velocities. Analyze the interactions occurring at the gas-liquid interface. Determine the combination of conditions necessary to maintain a stable flow condition. Determine the effects of currents and magnetic fields on the flow stability and characteristics. Extend this analysis to the case of discrete collector sites located around the slipring periphery.

N84-100            TITLE: Improved Portable Water Disinfection System for Ships

CATEGORY: Advanced Development

DESCRIPTION: Navy ships generate their own potable water by evaporation of seawater. This water is stored in large tanks and distributed throughout the ship by piping systems. In order to safeguard the health of shipboard personnel, this water must be disinfected and a rapid means of confirming this must be available. Past and present shipboard disinfection systems employ sodium hypochlority solutions, powdered calcium hypochlorite and, most recently, bromine impregnated on a resinous material. Disinfection employing hypochlorite is inexpensive, but requires the storage of hazardous materials. Bromine impregnated resins are expensive and are restricted in the levels of disinfection achievable. The objective of this task is to define a disinfection technology board system. Emphasis should be placed on safety, maintainability/reliability, cost and manning requirements. Comparisons with existing shipboard systems should be made. The subjects of corrosion, disinfection level achievable, and method to confirm disinfection and state of development of this technology should be addressed. Information should be presented to document feasibility for a shipboard system.

N84-101            TITLE: Acoustic Sea Bottom Classifier

CATEGORY: Exploratory Development

DESCRIPTION: Mines buried in the sea bottom are difficult to detect and pose a significant threat to our ships. Current and projected buried-mine mine countermeasures systems have low area clearance rates. Therefore, it is desirable to deploy these systems only in areas where it has been established that mines will bury. To avoid inefficient use of resources, it is desirable to perform a rapid acoustic survey of the suspected minefield where mines are likely to bury. Develop a rapid survey sonar having parameters

selected to permit acoustic wave penetration of the bottom and signal processing algorithms devised to permit characterization of those engineering properties of the bottom from mine burial probability may be derived.

N84-102            TITLE: Advanced ASW Weapons Technology Evaluation Strategy

CATEGORY: Exploratory Development

DESCRIPTION: With the demonstrated improvements in the Soviet submarine force over the past decade, the effectiveness of current and planned inventories of U.S. undersea weapons is being challenged. Shortfalls are becoming apparent in air and surface deployed ASW weapons and very little technology development is being done beyond the advanced Light weight Torpedo (ALWT). The Naval Ocean Systems Center recognizes this need and is currently planning a Tech Base program in support of high potential advanced concepts.

In the process of identifying the most appropriate concepts and technologies to pursue, a scientific or quantitative decision making process which considers risk (loss) versus worth (gain) will be required. Proposals are requested for development of an evaluation strategy for selecting the most promising concepts/technologies packages for future ASW weapons. The evaluation strategy should contain technologies and criteria for assessing relative risks, costs and performance.

N84-103            TITLE: Passive Variable Resistance Techniques

CATEGORY: Advanced Development

DESCRIPTION: Thermal stability and the absence of large thermal gradients are key design elements in maintaining accuracy through improved stability of critical alignments and also aids improved performance of the inertial components for guidance systems in missiles.

A technique whereby the thermal resistance across a heat flow path can vary as a function of the heat flux present would result in improved thermal stability in critical areas. In particular, the development of a compact passive variable thermal resistance device should represent a unique advance in thermal design.

N84-104            TITLE: Anti-Reflective Window Coatings

CATEGORY: Advanced Development

DESCRIPTION: Light detectors are used for star sensing which in turn provides information for position fixing in space. In order to gather as much star light as possible, it is important to transmit the light to the detector and reduce reflections to an absolute minimum. Anti-reflective coatings applied directly to all windows in the light path would lead to improved design capabilities. This effort then is directed at seeking highly efficient anti-reflective coatings and also having long term stability in varying environments.

N84-105            TITLE: Evaluation of Undershoot Effects on NMOS Microcircuits

CATEGORY: Advanced Development

DESCRIPTION: The effects of negative voltage pulses (resulting from signal reflections) on the input signal pins on NMOS technology microcircuits are largely unknown. A test and evaluation program which identifies and quantifies immediate and long term performance and reliability degradation as a function of NMOS device type and/or input structure, negative voltage pulse amplitude and duration, and other

electrical and environmental parameters is required in order to properly specify and apply NMOS devices in military electronic systems.

N84-106            TITLE: EPROM Evaluation

CATEGORY: Advanced Development

DESCRIPTION: There is a need for an evaluation of the applicability of UV EPROMs and EEPROMs for military use. Past work has shown that exposure to sunlight may be deleterious to UV EPROMs. Program retention is of prime importance to military applications. Effort should be undertaken that will define the effects of environment on data retention (i.e. what conditions will affect data retention and how much).

N84-107            TITLE: Development of Metallic Surfaces with Very High Light Absorption Capability

CATEGORY: Advanced Development

DESCRIPTION: Stellar inertial guidance requires star images to be detected with a high probability of acquisition. Stray light reflected from the sunshield or other surfaces in the light path to the detector creates background noise which reduces the signal to noise ratio and hence the probability of acquisition.

There is a future need for the development of a new, very non-reflective and very durable surface which will not allow stray light from the sun, moon, earth, or plume to scatter off its surface into the stellar detector.

N84-108            TITLE: Non-Flooding Portable Pressure Calibrator

CATEGORY: Engineering Development

DESCRIPTION: The Portable Pressure Calibrator presently used is a self-contained portable system designed for the calibration of pressure gauges, transducers, and other pressure measuring devices. The system is designed to route and control gases to a master indicator and test circuit.

Develop a non-flooding Portable Pressure Calibrator (PPC). The current models of the PPCs are frequently flooded when operated. These flooded units must be returned to the vendor for repair at significant expense.

N84-109            TITLE: Pre-Faulted Modules for Training Systems

CATEGORY: Advanced Development

DESCRIPTION: Pre-Faulted Modules are inserted in tactical hardware in training systems to enhance training on maintenance and casualty procedures. Advanced tactical system diagnostics have rendered many Pre-Faulted Modules useless. If a Pre-Faulted Module is inserted prior to system startup, the automated diagnostic will terminate the startup process and automatically locate the fault. A technique must be developed whereby faults can be activated during operational sequence, thus requiring the student to recognize system degradation, respond with appropriate casualty procedures and ultimately locate and replace the faulted component. A remote triggering method, timer or other technique must be developed for application primarily on standard electronic modules. Modification of the tactical hardware, except for the Pre-Faulted Module, should be avoided. The module should not be recognized by the student as a Pre-Faulted Module until it is removed.

N84-110            TITLE: Computer Image Generation for Area of Interest and Target Projection

CATEGORY: Exploratory Development

DESCRIPTION: Simulators for training weapons operators who view and track moving targets often use area of interest or target tracking projection displays. This method is attractive in that it keeps system costs down. The Area of Interest (AOI) display would be of even greater effectiveness if costs could be reduced permitting larger quantities to be available for training. Emerging hardware and software advances in computer graphics can significantly reduce the cost and increase performance of Computer Image Generation (CIG) for AOI and target projection in weapons training simulators.

The work would involve the development of a low cost CIG for a single channel AOI and target channel application. The unit as a minimum should perform the same function as the TV camera and aircraft target model which is part of the Navy Air Combat Maneuvering Simulator, Device 2E6. The CIG output would drive a 525 TV line monochrome projector. The CIG target model's position would be computed 60 times per second and be a high performance version of the above minimum development. This version would be capable of producing a color 1024 line display of greater scene complexity with special effects but with low cost techniques as a primary factor.

N84-111            TITLE: Feasibility of Embedded Training in Operational Aircraft

CATEGORY: Exploratory Development

DESCRIPTION: Limited simulator/trainer availability reduces training opportunity and proficiency maintenance. It would appear that software training packages could be developed to interface, or embed, with operational aircraft computer systems. These training "packages" would effectively turn an aircraft into a simulator by enabling the aircraft's avionics and weapon systems to be exercised while still on the flight line (with only electrical power required). At sea, each aircraft would represent a potential simulator which would not otherwise be available. A feasibility analysis and cost benefit analysis of embedded training in operational aircraft is required.

N84-112            TITLE: 3D Simulation Visual Display for Pilot Close Approach Cues

CATEGORY: Exploratory Development

DESCRIPTION: In close approach to terrain a helicopter pilot uses various visual cues including binocular cues, but binocular cues are not normally provided in flight simulation. This project will require some familiarity with close approach tasks, an evaluation of the relevant literature or the use of visual cues and a behavioral study with pilots in a simulator to measure performance with and without binocular cues.

N84-113            TITLE: High gain/Directive Screens for Vehicle Simulation

CATEGORY: Exploratory Development

DESCRIPTION: Many flight simulators for Navy training require a large field of view of the simulated scene for the pilot and this scene is often projected on to a dome screen surrounding him, using color television projectors. The arrangement gives somewhat limited brightness and contrast in the image and requires expensive projectors. Increased brightness and contrast, together with reduced cost by using smaller projectors, could be obtained if a satisfactory directional screen could be developed. The work under this project will include a literature search on previous work in this area, evaluation of various approaches including the use of diffraction patterns (holograms) and various forms of fine structure applied to the screen surface, and a bench demonstration of the chosen approach. A well defined exit pupil of chosen size and shape is required.

N84-114            TITLE: Measurement of Brain Activity for Enhanced Training

CATEGORY: Research

DESCRIPTION: A gross indication of certain electrical aspects of brain function has been available for many years using the electroencephalograph and recent developments, particularly of techniques of magnetic brain field measurement, offer increasingly localized measurement capabilities. A system capable of displaying the pattern of brain activity in real time with fair resolution offers the potential for enhancing training. Certain patterns of activity may be found to be preferable to others in absorbing and retaining information and it may become possible to diagnose a trainee's learning problems and improve his capabilities.

The work will include a literature search and visits to laboratories leading to the setting up of a program of experimental work with subjects.

N84-115            TITLE: ISAR Part Task Trainer Using Voice Transaction

CATEGORY: Exploratory Development

DESCRIPTION: Synthetic Aperture Radar (SAR) has been in use for many years, but Inverse Synthetic Aperture Radar (ISAR) is only now coming into use and a requirement exists to simulate it. ISAR is particularly useful for recognizing ships at extreme range at sea. The image is noisy and distorted in many characteristic ways, which give cues to the vessel's attitude and direction. Recognition of the type of ship and its attitude and motion is a skill that needs practice to acquire.

The work will include visits to Navy activities, evaluation of ISAR imagery and a bench demonstration of a system suitable for ISAR training. It is envisaged that ISAR images will eventually be carried on videodisc and that interaction between the trainee and the trainer will include voice recognition by the trainer of a limited vocabulary.

N84-116            TITLE: Computer-based Development of Steam Propulsion Plant Operator Training (SPPOT) Materials

CATEGORY: Exploratory Development

DESCRIPTION: The existing SPPOT training and development materials are based on laborious paper and pencil analytic tools. The present effort proposes to automate these development tools to make this generation far more efficient while also allowing far easier update capabilities. These activities if successful will lead to prototype development of support tools for a wide range of shipboard training programs.

N84-117            TITLE: Management System Interface and Demonstration for TRIADS CBI Hardware

CATEGORY: Engineering Development

DESCRIPTION: This product development will provide management access to TRIADS hardware system capabilities by providing appropriate data base development, networking of communication facilities, and integration of both graphics and videodisk development (of visual materials). This work will provide a prototype of a larger scale joint services use of hardware and software development tools.

TRIADS is an effort to develop a family of software and hardware to support computer-based instruction in a wide variety of military training and education applications. TRIADS consists of a library of computer-

based instructional programs, sufficiently flexible to support development, delivery, and management to meet most military instructional requirements.

N84-118            TITLE: Naval Aircraft Refueling Alternatives

CATEGORY: Advanced Development

DESCRIPTION: At present the Navy refuels its aircraft on the carrier, shore airbase or from an aerial tanker. Alternative in-flight refueling concepts are desired. The contractor is asked to submit proposals that study various new ways that aircraft can be refueled in-flight. These concepts will be fully developed and analyzed by the contractor. The study will include a section that outlines cost-effective concept demonstration test protocol. Once these concepts are identified and the analysis is complete, the Navy will determine which approaches appear to have the most potential for further investigation.

N84-119            TITLE: Innovative Coatings Research

CATEGORY: Exploratory Development

DESCRIPTION: New methods to incorporate novel coating to investigate:

1. corrosion inhibitors to enable enhances corrosion resistance including arrestment of stress and fatigue corrosion.
2. the chemical composition, microstructure and electrochemical properties to determine the important characteristics of a coating such as adhesion and corrosion protection.
3. coating systems to reduce radar cross section and/or reflectance in the infrared and laser spectrum.

N84-120            TITLE: Polymers for Aviation Materials

CATEGORY: Exploratory Development

DESCRIPTION: Novel studies of polymers to investigate their use:

1. In advanced composites for dual role of both structural elements and radar handling materials.
2. As sealants, adhesives, vibration isolation dampers, foams and fuel tank protections.
3. In cockpit canopies with EMI, laser, EMP protection and nonreflecting infrared insulation.

N84-121            TITLE: Non-Destructive Testing and Inspection Techniques

CATEGORY: Advanced Development

DESCRIPTION: Recent scientific development in the area of ultrasonics internal friction damping, eddy current changes, X-ray line broadening are very useful. It is desired to develop innovative non-destructive testing to determine fatigue damage prior to cracking and/or residual stresses in critical aircraft parts. Another area of interest is the application of innovative ultrasonic measuring techniques to determine the location and size of defects in advanced composites.

N84-122            TITLE: Robotic deck Scrubber

CATEGORY: Engineering Development

DESCRIPTION: Design and construct a robotic deck scrubber to be used in the hanger deck of a carrier to clean up oil spills. Device would be programmable with obstacle avoidance sensors. Device would dispense detergents and contain built in brushes and vacuum system.

N84-123            TITLE: CV Supplemental Wind Sensor Investigation

CATEGORY: Exploratory Development

DESCRIPTION: Effort involves an aerodynamic analysis of existing CV 63 and CVN-68 class wind tunnel three dimensional flow data to provide additional wind sensor locations to supplement free stream measurements. These sensors will provide realistic wind data in the carrier launch and recovery areas. Payoffs include increased safety for aircraft operations and reductions in vessel steaming requirements, estimated at 60,000 barrels of oil (or the equivalent for ships with nuclear power plant) per vessel per year for a 3 knot reduction in ship's speed.

N84-124            TITLE: Multi-AC Electric Motor/Wheel navy Aircraft Handling Vehicle

CATEGORY: Engineering Development

DESCRIPTION: Develop and construct a feasibility demonstrator. Many of the problems with handling aircraft aboard ships are closely aligned with vehicle configuration. Users complaints of instability, poor braking, tire wear, insufficient drawbar pull, large turning radius, large size, difficult to use, etc. can all be improved by the proposed concept. This vehicle would utilize the ability to synchronize the speed of several independent AC motors over a wide speed range by adjustable input power frequency. This control can be achieved at the required power levels, by solid state switching circuitry. The multi-wheeled vehicle will approach the benefits of a tracked vehicle without its mechanical limitations. Some of these limitations are synchronizing tracks or belts, skid steering, and suspension difficulties.

N84-125            TITLE: Pneumatic Lifting Mechanisms for Support Equipment

CATEGORY: Engineering Development

DESCRIPTION: To investigate the relative characteristics and advantages of pneumatic vs. hydraulic lifting/hoisting mechanisms for Support Equipment. Once the advantages are defined a breadboard system such as a potential new spotting dolly lifting mechanism will be designed, built, tested and documented for Engineering Development and evaluation.

N84-126            TITLE: Gas Penetrant Inspection Method Using Krypton Gases

CATEGORY: Exploratory Development

DESCRIPTION: There is a need to quantitatively measure turbine blade coating quality and to locate and size LCF cracks in titanium and nickel base alloy disks with a full field inspection method. Liquid penetrants and eddy current prove unsatisfactory. The greater penetrating power of gases makes this possible through a technique called the Krypton Exposure Technique. This audio radio-graphic process has been used successfully to locate casting flaws in turbine blades. Further exploration on requires R&D to understand the physical chemical barriers of this new breakthrough in NDI.

N84-127            TITLE: Turbine Instrumentation

CATEGORY: Advanced Development

DESCRIPTION: Developments of small, durable instrumentation which will measure temperatures and pressures at actual operating conditions without disturbing the flow stream to a significant extent.

N84-128            TITLE: Ceramic Development

CATEGORY: Advanced Development

DESCRIPTION: development of a durable ceramic that can be applied to turbine hardware which will reduce cooling flow requirements and remain intact over the entire life of the turbine.

N84-129            TITLE: Development of a Test Device and Method to Assess Lubricant Load Carrying Capability Requirements for Modern Aviation Power Drive Systems

CATEGORY: Advanced Development

DESCRIPTION: The Ryder Gear Machine has been the major device used to assess the load carrying capability of lubricants in gas turbine engines and associated drive systems. This method has become costly, at times unreliable and frequently mistrusted as a device for predicting lubricant performance in modern aviation power drive systems. There is a need to thoroughly evaluate the entire range of conditions which exist in the lubricated contacts of current and advanced power drive systems. This assessment should then be used to define the criteria for lubricant evaluation, followed by the development of rational approach to measure lubricant load carrying capacity.

N84-130            TITLE: Radome Design Technology

CATEGORY: Exploratory Development

DESCRIPTION: Perform a survey to determine the radome design and analysis techniques presently in use by industry, academia and government facilities. Identify and explain the theoretical electromagnetic basis of the various methods of approach and delineate the critical features of each technique. Determine the availability of the computer codes for use by the government. Survey results will be used in establishing parametric limits of the various design techniques.

N84-131            TITLE: High Temperature pneumatic Actuator

CATEGORY: Exploratory Development

DESCRIPTION: Design and fabricate a pneumatic actuator for missile applications having a torque output of 1000 inch-pounds, a no-lead slew rate of 400 degrees/second operating from cold gas (helium, nitrogen). This actuator must be capable of operating for at least one minute in 700 F environments. Internal gas cooling may be considered.

N84-132            TITLE: Safe Separation Sensor Accelerometer

CATEGORY: Exploratory Development

DESCRIPTION: This program is needed to obtain a concept for an accelerometer to be used in a safe separation sensor for guided missiles.

The desired accelerometer is a micro miniature device that is not more than one half inch long by one quarter inch wide by one quarter inch thick.

The accelerometer should be able to operate in the range from 0.5 gravity units (G's) to 35 (G's) and should be able to withstand random vibrations, handling shocks, ambient temperatures, aircraft vibrations and shipboard vibrations associated with guided missiles.

N84-133            TITLE: Ultra Linear Microwave Voltage Controlled Oscillator

CATEGORY: Advanced Development

DESCRIPTION: Design an ultra linear microwave voltage controlled oscillator (VCO). Output frequency slope with respect to control voltage must be linear and constant to within 1% over tuning range of 2% of nominal frequency. Center operating frequency of design can be any where from 3 GHz to 10 GHz, but techniques employed to achieve linearity must be adaptable to any frequency within that range. Circuit must be sized to missile applications.

N84-134            TITLE: Low Cost General Purpose Shop Computers

CATEGORY: Engineering Development

DESCRIPTION: Develop a low cost general purpose microcomputer system for use in I-level and O-level maintenance shops. These systems would be used for inventory, workload monitoring and control, personnel work schedules, and general statistics and calculations. The effort would use the popular CFM 2.2, Z80B based microcomputer technology, available from many sources and encompass a packaging development to meet the new FCC radio frequency interference regulations. The system specification would require a more durable case, better power supply protection, and choice of energy sources, with interfaces for common existing military peripherals. This would not be a "militarized" computer in the MIL-STD sense, but a less costly and demanding development task.

N84-135            TITLE: Automated Fiber Optics Measurements

CATEGORY: Advanced Development

DESCRIPTION: The goal of this project is to develop fiber optic (FO) test methods and automated measurement systems to perform FO characterization and life-test measurements. Life-test measurement systems must be self-calibrating for the duration of the test instrumentation for certain fiber optic components since many such tests currently do not exist either in the military or commercial realm. In conjunction with test methods development, advanced development is required to develop instrumentation that can rapidly and accurately characterize FO components at the receiving and inspection level. Many current FO tests require highly trained individuals. Through the incorporation of automation, FO testing can be performed by semi-skilled personnel. This is particularly important as the volume of inspection chores increases as fiber optic systems transition to production.

N84-136            TITLE: Fiber Optic Avionics Retrofit Cable Assembly

CATEGORY: Advanced Development

DESCRIPTION: The goal of this project is to provide retrofit activities a fiber optic cable assembly that is an exact replacement for a metallic wire cable assembly. The electrical connector on either end of the cable would be the same as the former electrical connector on either end of the cable would be the same as the former electrical cable assembly. The electrical/optical and optical/electrical conversion would be done

within the back shell of the electrical connector. Miniaturization of the transduction circuitry will be required. As a first step, the basic problem should be analyzed to identify all the steps needed to accomplish the desired hardware.

N84-137            TITLE: Low Thermal Resistance Interface

CATEGORY: Exploratory Development

DESCRIPTION: Many electronic modules dissipate their heat by conduction to a cold wall. The conductive path from the device to the heat sink contains many resistances. One of the largest of these is at the interface between the module guide rib and the cold wall. A means of reducing this thermal resistance by a method other than through a material state change would allow higher power dissipation. The following parameters apply:

1. A marine environment requires that corrodible materials and galvanic cells be avoided.
2. Cold wall material is anodized on electro-less nickel plated aluminum.
3. Module material is electro-less nickel plated copper or aluminum.
4. Guide rib dimensions are .20 x 3.5 inches.
5. The installed contact pressure must be 25 psi.
6. Any inter fact must be abrasion resistant since the rib is used as a sliding guide for module insertion and extraction.

N84-138            TITLE: Cloud/Sea Clutter background modeling and Clutter-Suppression Signal Processing

CATEGORY: Exploratory Development

DESCRIPTION: This effort is for the development of engineering working models of IR cloud and sea clutter in an IRST environment. The models will support the navy BMAP program and will be developed and be refined interacting with BMAP measurements until substantial agreement with data is achieved. Clutter suppression techniques will then be added for generic IRST systems yielding a simulation code which will exercise various candidate IRST systems.

N84-139            TITLE: Real-Time 3D Computer Vision

CATEGORY: Exploratory Development

DESCRIPTION: Develop passive vision system for robotic and other applications that will provide range and classification of objects in three dimension space in real time (video frame rates).

N84-140            TITLE: Research & Development Assessment & Planning Methodology

CATEGORY: Advanced Development

DESCRIPTION: The utilization of the most appropriate technology is the best means of keeping Naval Aviation ahead of all potential adversaries. The desired methodology would provide a means of assessing and planning those technologies which best meet Naval Air System Command needs. The methodology should allow identification of the best methods of categorizing, prioritizing and allocating of resources to the most promising R&D. Also included should be: the development of means of recognizing viable research and development and ways to recognize the technologies which need resource allocations to develop into mature and useful technologies.

N84-141            TITLE: Tunable VHF/UHF Airborne Cosite Filter

CATEGORY: Exploratory Development

DESCRIPTION: To perform research and development of advanced RF component concepts for use in minimizing interference between collocated VHF and/or UHF radios operating on adjacent frequencies. The advanced concepts shall consider the feasibility of emerging technologies such as hybrid components, microprocessor control, and improved fabrication methodologies. These concepts shall provide the capability of maximum Q, minimum insertion loss, full band operation and minimum size, weight, power and cost.

N84-142            TITLE: High-Temperature Resins

CATEGORY: Research

DESCRIPTION: Generally, the organic resins used as binders in sprayable coatings will begin to decompose at temperatures over 400 F. New resins are needed to produce hard, durable coatings capable of withstanding up to 700 F. (Most silicone resins lack sufficient hardness and adhesion.)

N84-143            TITLE: Optimum Electromechanical Marine Kevlar Cable Design

CATEGORY: Advanced Development

DESCRIPTION: Single and Multiple-conductor underwater cables using Kevlar as the strength member will be designed, fabricated, and tested to determine optimum designs for sonobuoy applications. The compatibility between the stress-strain characteristics of the component members of the electromechanical cable (choice of type of conductor and variation of Kevlar), the type of construction (parallel lay, contrahelically wound, or braided), and the need for jacketing will be addressed.

The problems of conductor z-kinking and column buckling when stressed beyond yield point by the dynamic tension variations of sea conditions and of Kevlar constructions maintaining high strength when subjected to dynamic working over sheaves or cap stands or at terminations will be investigated.

N84-144            TITLE: Slack Line Automatic Mooring System

CATEGORY: Exploratory Development

DESCRIPTION: Long term missions at sea require moored platforms which can survive in the ocean environment.

The Slack Line Automatic Mooring System (SLAMS) concept has the potential to provide the technology to make aircraft deployed moored systems practical.

There are two unique features inherent to this concept. The first is a segmented cable pack with buoyancy modules located at specific stations along its length. These modules support the weight of the cable and prevent it from abraiding on the ocean's bottom, a severe life limiting problem with slack moorings. A primary objective of this effort is to demonstrate the feasibility of automatically deploying this unique cable pack.

The second feature of the SLAMS concept is a split outer housing which is used as a "hydroflap" to sense the cessation of flow on impact with the ocean bottom and initiate deployment of a sensor. Demonstration of the feasibility of this design is the other primary objective of this effort. This effort will address the unique features of the SLAMS concept, i.e. the segmented cable pack and the split skin housing. A

preliminary design will be developed with sufficient flexibility to accommodate modifications. Models will be fabricated. Laboratory tests will be conducted to demonstrated the function of hardware. Deployment tests will be conducted to demonstrate the function of the hardware. Deployment tests will be conducted in the NSW 100 foot mine tank. Based on these tests will be repeated. As a follow-on effort, models will be fabricated for deep deployment demonstration. A demonstration test will be conducted in 2000 feet at Jervis Inlet.

N84-145            TITLE: Water Pulse Jet to Deploy and Orient a Horizontal Array

CATEGORY: Advanced Development

DESCRIPTION: The problem of deploying and orienting a long horizontal line array can be solved by a small propulsion vehicle to pull the array into alignment. One such vehicle is a water pulse jet which may be powered by a gas such as hydrogen. Lithium hydride, when mixed with water, produces hydrogen gas, causing a piston to expel water from a tube, causing the vehicle to move forward. Other gas sources are possible and a unit packageable in an A-size sonobuoy needs to be developed.

N84-146            TITLE: Remote Optical Crack Sensor

CATEGORY: Engineering Development

DESCRIPTION: There is a need for research and development of a remotely monitored fiber optic crack sensor that is sensitive to strain field changes induced by the initiation of a crack. An installed system will incorporate a cluster of sensors bonded in stress critical locations and joined by a common optical fiber. The sensor will include a strain multiplier that would be able to break the fiber and cutoff light continuity at a stage when a small crack first emerges and at a position some distance away from the crack tip. The sensor should be inexpensive and lightweight, and need no additional monitoring equipment. Ultimately, once the optical fiber is broken, the signal indicating a crack has started will be observed by the extinction of a small light display on a panel at a convenient location, thus protecting a small light display on a panel at a convenient location, thus protecting the entire structure from crack induced structural failures.

N84-147            TITLE: Micro-Miniature Emergency Frequency (121.5 and 243 MHz) Distress Alert Receiver

CATEGORY: Advanced Development

DESCRIPTION: Aircraft carrier deck personnel require a means to rapidly detect and locate inadvertently activated aircraft crash beacons. What is envisioned is an extremely low powered, very small battery-operated device easily carried in a pocket, having an audible alarm augmented by an LCD display showing the relative magnitude of the RF signal. The intent would be to guide the user to the aircraft via visual signal strength indications.