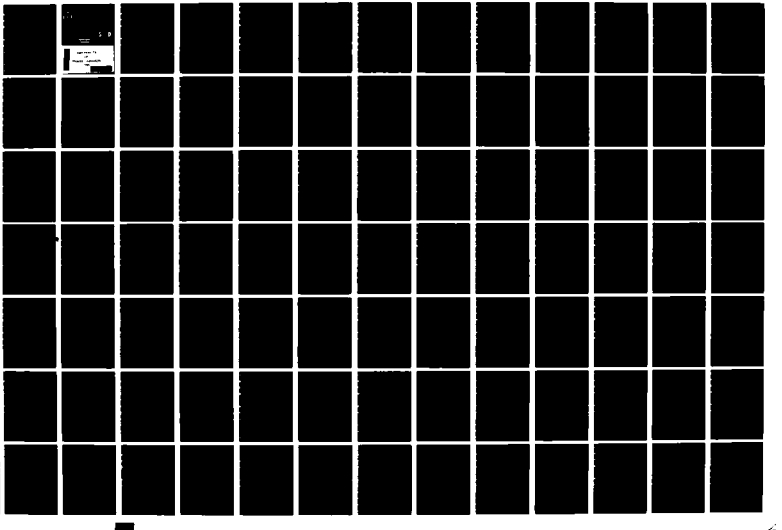
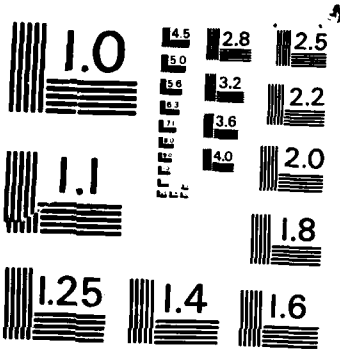
AD-A166 900 DEFENSE SMALL BUSINESS INNOVATION RESEARCH PROGRAM (SBIR) ABSTRACTS OF PHASE I AWARDS 1985(U) DEPARTMENT OF DEFENSE WASHINGTON DC 1985 1/4

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(2)

The Department of Defense

DoD Departments/Agency:

Department of the Army

Department of the Navy

Department of the Air Force

Defense Advanced Research Projects Agency

Defense Nuclear Agency

Strategic Defense Initiative Organization

DEFENSE SMALL BUSINESS INNOVATION RESEARCH PROGRAM (SBIR)

AD-A166 900

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PREFACE

On August 15, 1985 and October 23, 1985 Secretary of Defense Caspar W. Weinberger announced the selection of small business firms whose proposals under Phase I of the Fiscal Year (FY) 1985 Department of Defense (DoD) Small Business Innovation Research (SBIR) Program will be funded upon successful completion of contract negotiations.

The selection of 542 proposals, from small business research and development (R&D) contractors, was made from 3,571 proposals received by the Military Departments, the Defense Advanced Research Projects Agency (DARPA), the Defense Nuclear Agency (DNA), and the Strategic Defense Initiative Organization (SDIO) in response to the FY 1985 solicitations distributed on October 1, 1984 and January 1, 1985.

In order to make information available on the technical content of the Phase I projects supported by the Department of Defense SBIR Program, this report presents the abstracts of those proposals which have resulted in contract awards. Further, the name and address of the firm performing the work are given for those who may desire additional information about the project.

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

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INTRODUCTION

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

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

	FY 1983	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988
Percentage	0.1	0.3	0.5	1.0	1.25	1.25
Estimated Dollars	16.7M	43M	79M	160M	240M	262M
Actual Awarded Dollars	20.6M	44.6M	78.2M			

Objectives:

Objectives of the DoD SBIR Program include stimulating technological innovation in the private sector, strengthening the role of small business in meeting DoD research and development needs, fostering and encouraging participation by minority and disadvantaged persons in technological innovation, and increasing the commercial application of DoD-supported research or research and development results.

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

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

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

Selection Criteria

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

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

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

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

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

Reviewers base their conclusions only on information contained in the proposal. Final funding decisions are made on the basis of the criteria stated above along with considerations of such factors as duplication with other ongoing work and the overall program balance.

FY 1983 Program

For the FY 1983 Phase I SBIR program, the three Services and the Defense Agencies selected more than 400 R&D topics which were included in the solicitation. The following is a breakout of the proposals received and the number of proposals selected on which Phase I contracts were awarded:

	Number of Topics	Proposals Received	Phase I Awards
Army	182	1121	96
Navy	131	944	67
Air Force	75	496	100
DARPA	8	128	12
DNA	10	88	8
	406	2777	283

From these FY 1983 Phase I awards, the following Phase II awards have been made: Army - 48, Navy - 45, Air Force - 49, DARPA - 8 and DNA - 2. Funds for the two-year Phase II effort are being made available incrementally.

FY 1984 Program

The DoD FY 1984 solicitation contained 566 topics. Approximately 42,000 solicitation brochures for the FY 1984 DoD SBIR Phase I contract program were mailed. The announcement of proposals selected for negotiations was made by the Secretary of Defense on August 1, 1984. Listed below are the number of proposals received and contracts awarded:

	Number of Topics	Proposals Received	Phase I Awards
Army	111	761	81
Navy	147	847	98
Air Force	283	1212	163
DARPA	17	107	15
DNA	8	80	12
	566	3007	369

Selections from the 369 FY 1984 Phase I awards for negotiation of Phase II contracts are as follows: Army 17, Navy 49, Air Force 71 and DARPA 7. Total Phase II awards resulting from the FY 1984 Phase I awards are expected to reach 150.

FY 85 Program

The SBIR solicitation of Phase I proposals for FY 1985 began with the selection of 491 research and development topic descriptions of need by the military services, DARPA, and DNA. The topics were consolidated into a single DoD solicitation brochure which was distributed on October 1, 1984 and closed on January 31, 1985. Also for FY 85 the (SDIO) had 18 topics in a Supplemental DoD Solicitation released on January 1, 1985 with a closing date of March 31, 1985. Results are as follows:

	Number of Topics	Proposals Reeceived	Phase I Awards
Army	111	808	125
Navy	138	851	110
Air Force	218	1272	236
DARPA	17	130	14
DNA	7	95	18
SDIO	18	415	39
Total	509	3571	542

Summary

Presentation of the technical abstracts which describe the nature of the funded FY 1985 Phase I SBIR projects is the main purpose of this report. Proprietary information is not provided in these abstracts, therefore, technical details may be missing. For this reason, the report supplies the names of individuals in the small business firms who may be contacted should more information be needed on a specific project.

FISCAL YEAR 1985

SUBMITTED BY	DEPT	AWARDED AMOUNT
A E S CORP PO BOX 2093 PEABODY, MA 01960 JAMES WEST	AF	$ 25,000

TITLE:
DECTECTION AND DIRECTION FINDING OF SPREAD SPECTRUM COMMUNICATIONS
TOPIC: 5 OFFICE: ASD/ENG

THE AES CORPORATION HAS DEVELOPED A NOISE PROCESSOR (NP). THE PROCESSOR HAD THE ABILITY TO DETECT A SIGNAL OF KNOWN PULSE WIDTH BURIED DEEP WITHIN THE R.F. NOISE FLOOR OR ELECTRONIC JAMMING. THE COMBINATION OF PROPRIETARY HARDWARE AND SOFTWARE ALLOWS THE NP TO SEARCH FOR A VERY EXACT SIGNAL. THE SIGNAL PARAMETERS ARE PROGRAMMED INTO THE SOFTWARE. THE TWO CONCURRENT PROCESSORS ARRIVE AT THE PROBABILITY OF SIGNAL DETECTION, EACH LOOKING FOR A TOTALLY DIFFERENT SIGNAL CHARACTERISTIC. A DECISION IS THEN MADE BY A THIRD PROCESSOR AS TO WHETHER THE SIGNAL IS THERE BY PROBABILITIC ANALYSIS.

ABARIS 1254 ST ALBERTS RENO, NV 89503 WILLIAM L MURPHY	AF	$ 50,000

TITLE:
EXPERT SYSTEM FOR JOB AIDING IN COMPOSITE AIRCRAFT ULTRASONIC INSPECTION
TOPIC: 205 OFFICE: AMD/RDO

ABARIS PROPOSES TO DEVELOP A PORTABLE EXPERT SYSTEM THAT WILL AID THE FIELD OR ORGANIZATIONAL TECHNICIAN IN THE INTERPRETATION OF ULTRASONIC NON-DESTRUCTIVE INSPECTION FOR THE DETERMINATION OF THE SCOPE, MAGNITUDE, AND IMPACT OF INTERNAL DAMAGE TO COMPOSITE LAMINATE STRUCTURE. ONE OF THE MAJOR PROBLEMS FACING THE AIR FORCE IS THE IMPACT OF NEW ADVANCED COMPOSITE STRUCTURAL MATERIALS ENTERING OPERATIONAL SERVICE. THE GRAPHITE AND KEVLAR FIBERS EPOXY AND BISMALEIMIDE RESINS, ETC; OFFER SIGNIFICANT WEIGHT REDUCTIONS AND OPERATIONAL ADVANTAGES, BUT REQUIRE COMPLETELY DIFFERENT INSPECTION TECHNIQUES TO ASSESS THE POTENTIAL OF DAMAGE. VISIBLE DAMAGE IS NOT A GOOD INDICATOR OF THE MAGNITUDE OF INTERNAL DAMAGE. THE ULTRASONIC INSPECTION EQUIPMENT REQUIRES EXPERTISE THAT MAY NOT BE AVAILABLE TO ORGANIZATIONAL OR BATTLE DAMAGE REPAIR TEAMS. THE PROPOSED SYSTEM

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SUBMITTED BY	DEPT	AWARDED AMOUNT

WOULD CONSIST OF A PORTABLE COMPUTER BASED EXPERT SYSTEM, LOW COST, LIGHTWEIGHT PORTABLE ULTRASONIC SCANNING EQUIPMENT AND APPROPRIATE METHODS OF DIGITIZING THE TRANSDUCER POSITION AND ACOUSTICAL OUTPUT. THE PROPOSED SYSTEM WOULD INTERPRET THE OUTPUT AND PROVIDE A GRAPHIC PRESENTATION OF THE LOCATION.

ABARIS AF $ 50,000
1254 ST ALBERTS
RENO, NV 89503
WILLIAM L MURPHY
TITLE:
EXPERT SYSTEM FOR JOB AIDING IN COMPOSITE AIRCRAFT STRUCTURE REPAIR
TOPIC: 205 OFFICE: AMD/RDO

ABARIS PROPOSES A DEVELOPMENT EFFORT TO RESEARCH THE PROBLEM AND CONCEPTUALIZE AN EXPERT SYSTEM TOOL FOR JOB AIDING OF THE REPAIR OF ADVANCED COMPOSITE AIRCRAFT STRUCTURE. THE SYSTEM WOULD CONSIST OF EXPERT SYSTEMS SOFTWARE, KNOWLEDGE OF AIRCRAFT COMPOSITE DESIGN, INSPECTION, AND REPAIR TECHNIQUES, STRUCTURAL ANALYSIS TOOLS, COMPUTER AIDED DESIGN ENGINEERING DATA BASE, AND VIDEO DATA STORAGE SYSTEMS. THE U.S. AIR FORCE HAS A NEED FOR JOB AIDING TOOLS TO REDUCE THE IMPACT OF AIRCRAFT MAINTENANCE OF THE LOGISTICS AND MAINTENANCE SYSTEMS. A MAJOR PROBLEM FACING THE AIR FORCE IS THE IMPACT OF NEW STRUCTURAL MATERIALS ENTERING OPERATIONAL SERVICE. THE NEW ADVANCED COMPOSITES; GRAPHITE AND KEVLAR FIBERS, EPOXY AND BISMALEIMIDE RESINS, ETC., OFFER SIGNIFICANT WEIGHT REDUCTIONS AND OTHER OPERATIONAL ADVANTAGES, BUT REQUIRE DIFFERENT INSPECTION AND REPAIR TECHNIQUES THAN THE METALS THEY REPLACE. THE PROPOSED SYSTEM WILL HAVE APPLICATION TO BATTLE DAMAGE, ORGANIZATIONAL, INTERMEDIATE, AND DEPOT LEVEL REPAIR OF ADVANCED COMPOSITE AIRCRAFT STRUCTURE. THE BASIC EXPERT SYSTEM COULD BE EXPANDED TO INCLUDE ALL STRUCTURAL ELEMENTS OF THE AIRCRAFT.

ABARIS NAVY $ 49,954
1254 ST ALBERTS
RENO, NV 89503
WILLIAM L MURPHY
TITLE:
LOW COST EXPENDABLE FUEL TANK FOR CARRIER AIRCRAFT
TOPIC: 40 OFFICE: NSSC

THE U.S. NAVY HAS A NEED FOR LOW COST EXPENDABLE FUEL TANKS FOR USE

SUBMITTED BY	DEPT	AWARDED AMOUNT

BY CARRIER AIRCRAFT THAT OCCUPY THE MINIMUM STORAGE SPACE. ABARIS PROPOSES TO CONDUCT AN EXPLORATORY DEVELOPMENT OF THE FABRICATION OF TANKS OF ADVANCED COMPOSITE MATERIALS. TWO CONCEPTS ARE PROPOSED. ONE USES LONGITUDINAL JOINTS OR SPLICES AND WOULD USE EITHER A BLADDER TANK OR A "WET-SKIN" STRUCTURE. THE OTHER USES CIRCUMFERENTIAL JOINTS AND EASILY STORED NESTABLE "BUCKET" SECTIONS. CANDIDATE ALTERNATIVE MATERIAL SYSTEMS WILL BE ANALYZED. A CONCEPTUAL/PRELIMINARY DESIGN OF A LOW COST LIGHTWEIGHT EXPENDABLE EASILY ASSEMBLED FUEL TANK FOR CARRIER AIRCRAFT WILL BE ACCOMPLISHED. A DETAILED WEIGHT ANALYSIS OF THE TANK WILL BE CONDUCTED. A MANUFACTURING COST ANALYSIS OF THE PROJECTED QUANTITY REQUIRED FOR SERVICE USE WILL BE CONDUCTED.

ABEL CO — ARMY — $ 0
STATE RD 774 - BOX 267
PEMBROKE, VA 24136
KENNETH ABEL
TITLE:
BREATHABLE BLOOD BAGS
TOPIC: 89 OFFICE: MED FT. DET

IT IS PROPOSED THAT BLOOD BAGS WHICH HAVE THE CAPABILITY TO MAINTAIN STORED BLOOD IN ITS FULLY OXYGENATED STATE WILL REDUCE RED CELL FRAGILITY AND THEREBY WILL PROLONG THE HALF-LIFE OF THE RED CELL BOTH DURING STORAGE AND FOLLOWING TRANSFUSION. THIS PROJECT WILL ATTEMPT TO VERIFY THAT MAINTAINING BLOOD IN THE OXYGENATED STATE DOES SIGNIFICANTLY REDUCE BLOOD CELL FRAGILITY DURING STORAGE. IT WILL FURTHER VERIFY THAT A NEW LABORATORY PROCESS FOR MAKING MICROPOROUS POLYETHYLENE BLOOD BAGS CAN BE SCALED UP FOR PRODUCTION.

ABIOMED — ARMY — $ 49,679
33 CHERRY HILL DR
DANVERS, MA 01923
DR ROBERT T V KING
TITLE:
RAMAN COVERTED MID-IR LASER
TOPIC: 45 OFFICE: CECOM/NVEO

THE OBJECTIVE OF THIS PROPOSAL IS THE DEVELOPMENT OF A PULSED MID-IR

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SUBMITTED BY	DEPT	AWARDED AMOUNT

LASER IN THE 3.5 TO 4.1 MICROMETER ATMOSPHERIC TRANSMISSION WINDOW. SUCH SPECTRAL SOURCE IS RELEVANT TO A VARIETY OF TACTICAL APPLICATIONS. THE DF CHEMICAL LASER HAS BEEN THE CHOICE, BUT SUFFERS FROM WASTE FUEL MANAGEMENT PROBLEMS. NO OTHER EFFICIENT DIRECT LASING SOURCE IS AVAILABLE. TO OBTAIN SUCH A SOURCE, WE PROPOSE THE USE OF 1.06 MICROMETER (Nd LASER) AND A COMBINATION OF RAMAN SHIFTING GASES SUCH AS HYDROGEN, HYDROGEN HALIDES AND THEIR ISOTOPIC MEMBERS. THIS APPROACH IS FEASIBLE DUE TO CURRENT IMPROVEMENTS IN THE EFFICIENCY OF Nd ION LASING IN GGG HOST CO-DOPED WITH Cr ION, AND THE DEMONSTRATED EFFICIENCY OF THE RAMAN SHIFTING PROCESS. THE KEY TO THE ATTAINMENT OF THE DESIRED WAVELENGTH BAND IS THE MAGNITUDE OF THE GAIN COEFFICIENTS OF THE PROPOSED HALIDE GASES. THE PRIMARY TASK OF THIS PHASE I EFFORT IS THE DEMONSTRATION OF POTENTIAL EFFICIENT CONVERSION IN THESE GASES. SYSTEM DESIGN FOR A PHASE II PROTOTYPE SYSTEM WILL ALSO BE CONDUCTED.

ACEL INC — NAVY — $ 56,900
599 N MATHILDA AVE - #235
SUNNYVALE, CA 94086
DR WEI-HANG CHU
TITLE:
AUTOMATIC MINE FIELD DETECTOR
TOPIC: 9 OFFICE: CMC

AIRBORNE MINE FIELD DETECTION IS DIFFICULT BECAUSE IN MOST CASES, THE FEATURES WHICH INDICATE THE PRESENCE OF THE MINE FIELD ARE VAGUE AND IRREGULAR. THE COMPUTATION EFFORT TO SEARCH THROUGH THE FILMS FOR INFORMATION SUGGESTING THE PRESENCE OF A MINE FIELD IS ENORMOUS. DUE TO THE ADVANCEMENT OF MICROELECTRONICS AND ROBOT VISION TECHNOLOGY, AN INEXPENSIVE AIR-BORNE MINE FIELD DETECTOR WITH ARTIFICAL INTELLIGENCE MAY BE REALIZABLE. ACEL PROPOSES TO PERFORM AN ANALYSIS IN DETERMINING THE REALIZABILITY OF AN AUTOMATIC MINE FIELD DETECTOR WHICH WILL BE DESIGNED TO DETECT MOBILE MINE FIELDS WITH SURFACE OR SHALLOWLY BURIED MINES. THE AUTOMATIC MINE FIELD DETECTOR IS DROPPED FROM AN AIRPLANE TO AN AREA OF BATTLE FIELD THAT IS OF INTEREST. THE MINE DETECTOR SURVEYS THE SURROUNDING GROUND WITH ITS MULTITUDE OF SENSORS. IT WILL THEN GO THROUGH A SEQUENCE OF RECOGNITION DECISIONS USING ARTIFICIAL INTELLIGENCE TECHNIQUES, AND WILL DECISE ON THE PRESENCE AND LOCATION OF MINES.

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ADAPTIVE MACHINE TECHNOLOGIES INC — DARPA — $ 27,164
5170 DAHLTRY LN
COLUMBUS, OH 43220
VINCENT J VOHNOUT
TITLE:
HIGH PERFORMANCE LIGHTWEIGHT MANIPULATOR FEASIBILITY STUDY
TOPIC: 4 OFFICE: DARPA

A MANIPULATOR DESIGN IS PROPOSED WHICH USES ADVANCED MATERIALS AND CONTROL TECHNIQUES TO ACHIEVE PERFORMANCE FAR SUPERIOR TO THAT OF CONVENTIONAL MANIPULATORS. PRELIMINARY STUDIES INDICATE THAT A MANIPULATOR CAN BE DESIGNED WITH A USEFUL LOAD CAPACITY OF 100 KILOGRAMS, A USEFUL REACH OF 2.5 METERS, AND END-EFFECTOR SPEED OF AT LEAST 5 METERS/SEC, AND A WEIGHT OF LESS THAN 500 KILOGRAMS. THE DESIGN MAKES USE OF END-EFFECTOR FEEDBACK CONTROL OF A COMPLIANT STRUCTURE TO REDUCE WEIGHT. HYBRID HYDRAULIC/HYDROSTATIC ACTUATION PROVIDES AMPLE POWER AND SPEED WITH GOOD ENERGY EFFICIENCY. COMPOSITE MATERIALS ARE USED IN AREAS WHERE HIGH STIFFNESS IS ESSENTIAL. THE OBJECTIVE OF THE PHASE I EFFORT IS TO ESTABLISH THE FEASIBILITY OF ALL THE TECHNOLOGIES REQUIRED TO ACHIEVE THE STATED PERFORMANCE. DESIGN STUDIES WILL BE PERFORMED IN THE AREAS OF CONTROL, COMPUTER SYSTEMS, HYDRAULIC SYSTEMS, KINEMATICS, AND MECHANICAL STRUCTURES. A PRELIMINARY DESIGN FOR A HIGH PERFORMANCE MANIPULATOR WILL BE COMPLETED.

ADAPTIVE SENSORS INC — SDIO — $ 47,836
216 PICO BLVD - STE 8
SANTA MONICA, CA 90405
HAROLD M FINN
TITLE:
INDUCED COHERENCE BREAK-UP DECOY BACKSCATTERING EFFECT EXOATMOSHERIC DISCRIMINATION DECOYS/RV'S SPACE BASED LASER RADAR SYSTEM
TOPIC: 1 OFFICE: IST

BY DEPLOYING A VERY LOW DENSITY CLOUD OF PARTICLES (AVERAGE SPACING OF 1/2 METER) AND EACH OF VERY SMALL MASS AND THE SIZE OF A FOG DROPLET, IT IS POSSIBLE BY EXPLOITING THE EXTRAORDINARILY FINE DOPPLER RESOLUTION OBTAINABLE WITH A SPACE-BORNE COHERENT LASER PULSE DOPPLER RADAR SYSTEM TO DISCERN, OVER THE COHERENT PROCESSING TIME INTERVAL, THE INDUCED IMPULSIVE CHANGE IN VELOCITY SUFFERED BY A DECOY IN ITS COLLISIONS WITH THE PARTICLES OF THE CLOUD COMPARED TO THAT OF AN RV

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WHICH HAS A RELATIVELY LARGER MASS. THE RANGE-GATED DOPPLER FILTER BANK PROCESSOR OF THE RADAR WILL REVEAL THE BREAK-UP OF COHERENCE AND DISSIPATION OF THE 'SKIN-LINE' RETURN ENERGY, UNIFORMLY DISTRIBUTED OVER MANY RESOLUTION CELLS, AND THE COHERENCY OF THE RV SKIN-LINE RETURN ENERGY ESSENTIALLY PRESERVED, AND THE RETURN SIGNAL PRIMARILY IN A SINGLE DOPPLER FILTER. A KEY FEATURE OF THE CONCEPT IS THAT ONLY SHORT TERM STABILITY IS REQUIRED OF THE LASER RADAR TO EFFECT THE DECOY/RV DISCRIMINATION DECISION. A METHODICAL FIRST PHASE PROGRAM AIMED AT ESTABLISHING THE POTENTIAL FEASIBILITY OF THE CONCEPT INCLUDES THE DEVELOPMENT OF BASELINE DESIGNS FOR THE LASER RADAR AND PARTICULATE CLOUD, AND A MODELING OF THE TARGET/RV CHARACTERISTICS; AN IDENTIFICATION OF CRITICAL COMPONENTS OF THE SYSTEM, AND A QUANTITATIVE PREDICTION OF PERFORMANCE.

ADLER CORP — NAVY — $ 49,970
4801 MASSACHUSETTS AVE NW - STE 360
WASHINGTON, DC 20016
W K ALDERMAN
TITLE:
SATELLITE SURVEILLANCE AND COUNTERMEASURES
TOPIC: 30 OFFICE: NESC

COUNTERMEASURES DESIGNED AGAINST SATELLITES MUST KEEP PACE WITH RAPID STRIDES PRESENTLY BEING MADE IN SOPHISTICATED USE OF OCEAN SURVEILLANCE-TYPE SATELLITES. THESE ADVANCES IN SURVEILLANCE INCLUDE HIGH TECHNOLOGY ELECTRONIC HARDWARE AND SIGNAL PROCESSING. THE PROPOSED EFFORT WILL FOCUS ON DEVELOPMENT OF AN INNOVATIVE SYSTEM CONCEPT FOR COUNTERMEASURES AGAINST PRESENT AND FUTURE SATELLITE SURVEILLANCE AND TARGETING CAPABILITIES. THIS SBIR PROJECT'S TECHNICAL APPROACH INCLUDES THE ASSESSMENT OF FEASIBILITY OF A SYSTEMS CONCEPT UTILIZING DISPERSED, SMALL, REMOTE COUNTERMEASURE VEHICLES CAPABLE OF COUNTERING RADIO FREQUENCY SURVEILLANCE AND TARGETING SYSTEMS. PHASE I EFFORT WILL DEFINE A BASELINE SYSTEM CONCEPT INCLUDING VEHICLES, ELECTRONIC PAYLOADS AND SIGNAL PROCESSING. ADDITIONALLY, INVESTIGATION WILL BE MADE FOR INTEGRATION OF INTRA-VEHICLE SYSTEM AND EXTRA-VEHICLE SYSTEM INTER-CONNECTING MULTIPLE VEHICLES.

ADVANCED COMPOSITE PRODUCTS INC — ARMY — $ 83,783
37 WASHINGTON AVE
E HAVEN, CT 06512
DAVID MAASS
TITLE:
TOUGH THERMOPLASTIC COMPOSITE BRIDGE DECK DEVELOPMENT
TOPIC: 53 OFFICE: BRDC

THE OBJECTIVE OF THIS EFFORT IS TO DEVELOP A MANUFACTURING PROCESS

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AND SAMPLE HARDWARE FOR A LIGHTWEIGHT, TOUGH COMPOSITE CLASS 70 TRI-ARCH BRIDGE DECK. CONTINUOUS FIBER REINFORCED THERMOPLASTIC COMPOSITES (TPC) ARE WELL SUITED TO THIS APPLICATION BECAUSE THEY OFFER REDUCED WEIGHT, IMPROVED IMPACT DAMAGE TOLERANCE, LOW CORROSION POTENTIAL, AND ARE SUITED FOR HIGH VOLUME MANUFACTURING METHODS. AFTER A THOROUGH REVIEW OF BRIDGE REQUIREMENTS AND MATERIAL AND MATERIAL FORMS AVAILABLE, A SUBSCALE SECTION OF TPC BRIDGE DECK IS TOOLED, FABRICATED AND FURNISHED TO THE GOVERNMENT FOR EVALUATION. ANTICIPATED, PHASE II FOLLOW-ON FUNDING WOULD INCLUDE DETAIL DESIGN, TOOL DESIGN, FULL SCALE PROTOTYPE FABRICATION, AND QUALIFICATION TESTING.

ADVANCED COMPOSITE PRODUCTS INC — AF — $ 74,600
37 WASHINGTON AVE
E HAVEN, CT 06512
DAVID MAASS
TITLE:
CONTINUOUS HEATED ROLL FORMING OF THERMOPLASTIC COMPOSITE MATERIALS DEVELOPMENT
TOPIC: 7 OFFICE: ASD/TA

THE OBJECTIVE OF THIS PROGRAM IS TO DEVELOP A CONTINUOUS PRODUCTION METHOD BASED ON THE USE OF CONTINUOUS FIBER REINFORCED THERMOPLASTIC COMPOSITE MATERIAL. HEATED ROLL FORMING (HRF), AN ADAPTATION OF THE METAL ROLL FORMING PROCESS, IS TO BE USED BECAUSE OF ITS ABILITY TO PRODUCE A VERY BROAD RANGE OF SHAPES, SIZES, AND MATERIALS IN HIGH VOLUME AND THEREFORE LOW UNIT COST. THE APPROACH TO HRF PROCESS DEVELOPMENT IS TO SELECT AND DESIGN A REPRESENTATIVE COMPONENT, SELECT A SUITABLE THERMOPLASTIC MATERIAL AND MATERIAL FORM AND THEN DEVELOP HRF PROCESS PARAMETERS TO PRODUCE THE CHOSEN COMPONENT. AFTER FABRICATION TRIALS, A TEST COMPONENT IS LOADED TO VERIFY THE PROCESS, MATERIAL AND DESIGN. ANTICIPATED PHASE II FOLLOW-ON FUNDING COULD BE USED TO BUILD DEDICATED HRF MACHINERY, EXPAND THE RANGE OF APPLICATIONS, EXTEND THE CURRENT WORK TO OTHER MATRIX MATERIALS, AND EXPERIMENT WITH SECONDARY FORMING OPERATIONS.

ADVANCED INFORMATION & DECISION SYS — ARMY — $ 50,000
201 SAN ANTONIO CIRCLE - STE 286
MOUNTAIN VIEW, CA 94040
DANIEL G SHAPIRO
TITLE:
OPERATIONS MONITORING ASSISTANT
TOPIC: 27 OFFICE: CECOM

THIS PROPOSAL CONCERNS THE BASIC RESEARCH AND DEVELOPMENT REQUIRED TO

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DEFINE AN OPERATIONS MONITORING ASSISTANT (OMA) WHICH IS INTENDED AS A TOOL FOR ASSESSING THE IMPACT OF CURRENT EVENTS ON A CORPS, OR DIVISION LEVEL OPERATIONS PLAN. THE SYSTEM IS PRINCIPALLY CONCERNED WITH FULFILLING AN INDICATIONS AND WARNING FUNCTION, THAT IS, WITH PREDICTING THE CONSEQUENCES OF IMPORTANT BATTLEFIELD EVENTS IN TERMS OF THE FUTURE OPERATIONAL GOALS THAT MAY OR MAY NOT BE ACHIEVED. IN ADDITION TO PREDICTING PROBLEMS, THE OPERATIONS MONITORING SYSTEM SHOULD PROVIDE EARLY INDICATION OF OPPORTUNITIES WHICH IT MAY BE POSSIBLE TO EXPLOIT. THE SYSTEM OPERATES BY PERFORMING INFERENCE ON TWO SOURCES OF DATA; A REPRESENTATION OF THE CURRENT SITUATION WHICH INCLUDES A TACTICAL ANALYSIS OF THE BATTLEFIELD, AND A REPRESENTATION FOR THE OPERATIONS PLAN WHICH CAPTURES THE GOALS BEHIND THE ACTION INVOLVED. THIS APPROACH RELIES ON THE USE OF ARTIFICAL INTELLIGENCE TECHNIQUES.

ADVANCED MARINE ENTERPRISES INC — NAVY — $ 49,727
1725 JEFFERSON DAVIS HWY - STE 1300
ARLINGTON, VA 22202
KARL FARBER
TITLE:
SPARE PART SERIAL TRACKING
TOPIC: 23 OFFICE: NESC

IT IS PROPOSED THAT A PLAN TO EVALUATE, SELECT, AND TEST (FOR ECONOMIC FEASIBILITY) AN ELECTRONIC SERIAL TRACKING SYSTEM BE DEVELOPED. MORE SPECIFICALLY, A MARKET SURVEY WILL BE CONDUCTED TO DETERMINE THE AVAILABLE ELECTRONIC TRACKING SYSTEMS. NEXT, THE CHARACTERISTICS AND PERFORMANCE OF EACH TRACKING SYSTEM WILL BE DOCUMENTED. THE LIKELY OPERATING ENVIRONMENTS OF THE TRACKING SYSTEM WILL THEN BE IDENTIFIED FROM WHICH CHARACTERISTICS AND MINIMUM PERFORMANCE REQUIREMENTS OF THE TRACKING SYSTEM MAY BE OBTAINED. THOSE TRACKING SYSTEMS FAILING TO MEET THE PERFORMANCE REQUIREMENTS IDENTIFIED THROUGH CONSIDERATION OF OPERATING ENVIRONMENTS WILL BE REMOVED FROM FURTHER CONSIDERATION. OF THE REMAINING SYSTEMS, ONE WILL BE CHOSEN BASED ON PERFORMANCE AND CAPABILITY, EASE OF OPERATION AND INTERFACING, AND COST. FROM THE SURVEY OF OPERATING ENVIRONMENTS, ONE OPERATING ENVIRONMENT MUST BE CHOSEN AS A REPRESENTATIVE TEST SYSTEM. A TEST PLAN WILL THEN BE DEVELOPED AND EVALUATION CRITERIA SPECIFIED. THE "PAPERLESS" INVENTORY SYSTEM RESULTING FROM ELECTRONIC TRACKING WILL PROVIDE FOR THE RAPID AND ACCURATE IDENTIFICATION, LOCATION, AND

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CHARACTERIZATION OF MILITARY HARDWARE. IN TIME, A DATA BASE SUFFICIENT TO SOLVE PROBLEMS CONCERNING RELIABILITY AND MAINTAINABILITY CAN BE CONSTRUCTED.

ADVANCED RESEARCH & APPLICATIONS CORP — AF — $ 46,230
1223 E ARQUES AVE
SUNNYVALE, CA 94086
DR JAMES H STANLEY
TITLE:
INSTRUMENT FOR ADVANCED MATERIAL MICROSTRUCTURE ANALYSIS
TOPIC: 43 OFFICE: AFWAL/ML

THE KEY TO THE DEVELOPMENT OF NEW HIGH-TEMPERATURE, HIGHER-PERFORMANCE, LIGHTER-WEIGHT MATERIALS IS AN UNDERSTANDING OF THE PROPERTIES AND BEHAVIOR OF THESE ADVANCED MATERIALS AS A FUNCTION OF THEIR MICROSTRUCTURE. AN X-RAY TOMOSCOPE, BASED ON COMPUTER TOMOGRAPHY (CT) PRINCIPLES, IS CAPABLE OF SPATIALLY LOCATING AND SIZING MATERIAL FEATURES TO A RESOLUTION OF 25 MICRONS OR BETTER, WHILE PROVIDING QUANTITATIVE INFORMATION ABOUT MATERIAL COMPOSITION. DEVELOPMENT OF A PRACTICAL INSTRUMENT DEPENDS UPON RESOLVING TECHNICAL UNCERTAINTIES IN HIGH-INTENSITY MICROFOCUS X-RAY SOURCES AND HIGH RESOLUTION DETECTOR TECHNOLOGY. PHASE I WILL DEVELOP A HIGH RESOLUTION SOLID-STATE DETECTOR ARRAY AND EVALUATE ITS PERFORMANCE ON A CERAMIC PHANTOM TEST PIECE.

ADVANCED SYSTEM TECHNOLOGIES INC — NAVY — $ 49,757
3801 E FLORIDA AVE - STE 400
DENVER, CO 80210
DR ROBERT T GOETTGE
TITLE:
EXPERT ASSISTANT FOR PERFORMANCE ENGINEERING OF LARGE EMBEDDED REAL-TIME SOFTWARE
TOPIC: 82 OFFICE: NSWC

LARGE, EMBEDDED REAL-TIME SOFTWARE DEVELOPMENTS OFTEN LACK PERFORMANCE ENGINEERING EXPERTISE DUE TO A SHORTAGE OF PERFORMANCE EXPERTS. EXPERT SYSTEM TECHNOLOGY OFFERS A SOLUTION TO THE SHORTAGE OF PERFORMANCE ENGINEERING EXPERTS. TWO TECHNICAL OBJECTIVES MUST BE RESEARCHED BEFORE AN EXPERT SYSTEM BASED ASSISTANT FOR PERFORMANCE

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ENGINEERING CAN BE DEVELOPED: (1) DEFINITION OF A BODY OF UNDERLYING EXPERTISE IN PERFORMANCE ENGINEERING OF LARGE, EMBEDDED REAL-TIME SOFTWARE, AND (2) DEMONSTRATION THAT THIS EXPERTISE IS AMENABLE TO EXISTING EXPERT SYSTEM TECHNOLOGY. THE PROPOSED PHASE I RESEARCH OF THIS SBIR PROJECT WILL ADDRESS THESE TECHNICAL OBJECTIVES BY DEVELOPING A KNOWLEDGE BASE FOR AN EXPERT SYSTEM FOR DESIGN EVALUATION, A CRITICAL COMPONENT OF PERFORMANCE ENGINEERING. BY DEVELOPING A KNOWLEDGE BASE THE TECHNICAL OBJECTIVES WILL BE NATURALLY ANSWERED. IN ADDITION, THE KNOWLEDGE BASE WILL SERVE AS FOUNDATION FOR EXPLORATORY DEVELOPMENT IN PHASE II.

AERODYNE RESEARCH INC — SDIO — $ 70,525
45 MANNING RD
BILLERICA, MA
DR ROGER S PUTNAM
TITLE:
SPATIAL PHASE LOCKING OF HIGH ENERGY LASERS
TOPIC: 1 OFFICE: IST

THE NEED FOR HIGH ENERGY PULSED LASERS HAS FOCUSED ON COHERENT OPTICAL COMBINING SYSTEMS TO PROVIDE A CONTROLLED SPATIAL PHASE DISTRIBUTION ACROSS THE OUTPUT BEAM. WE PROPOSE HERE TO ANALYZE THE SPATIAL FILTER PHASE LOCKING SYSTEM DEMONSTRATED RECENTLY AT MIT AND COMPARE IT TO THE INJECTION LOCKING AND PROXIMITY LOCKING TECHNIQUES TO DETERMINE THE BEST ENERGY COMBINING SYSTEM FOR LONG RANGE OPTICAL RADAR, ENERGY DELIVERY SYSTEMS, AND COMMUNICATION. THE RESEARCH WILL BE DIRECTED AT ANALYZING THE PHASE LOCKING MECHANISMS, COMBINING THE ADVANTAGEOUS FEATURES OF THE THREE SYSTEMS, AND EXTENDING IT TO A DEMONSTRABLE HIGH ENERGY SYSTEM. THE PERTINENT ISSUES ARE THE TRADEOFF BETWEEN THE OPTICAL COLLECTION EFFICIENCY AND THE NUMBER OF CONTRIBUTING ENERGY SOURCES, THE FAULT TOLERANCE TO INDIVIDUAL COMPONENT LASER FAILURE, THE EFFICIENCY VERSUS ENERGY OUTPUT FOR A CELLULAR PHASE LOCKING SYSTEM, THE INTRINSIC PHASE LOCKING TIME CONSTANT UNDER PULSE CONDITIONS, AND THE CONTROL OF THE PHASE ACROSS THE OPTICAL OUTPUT BEAM. THE RESEARCH PLAN INVOLVES ABOUT ONE-HALF MAN YEAR OF EFFORT.

AERONAUTICAL RSCH ASSOC PRINCETON INC — NAVY — $ 49,897
PO BOX 2229 - 50 WASHINGTON RD
PRINCETON, NJ 08540
DR ROGER D THORPE
TITLE:
ONE-DIMENSIONAL ERODING ROD DAMAGE ASSESSMENT MODEL
TOPIC: 89 OFFICE: NSWC

AN EXISTING ONE-DIMENSIONAL, NON-STEADY ANALYSIS OF AN ERODING

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KINETIC ENERGY PENETRATOR WILL BE USED AS THE BASIS TO DEVELOP A DAMAGE ASSESSMENT MODEL. THE MODEL PRESENTLY ACCOUNTS FOR THE EFFECTS OF PENETRATOR FINENESS RATIO, COMPRESSIBILITY AND STANDING SHOCKS. IT WILL BE EXPANDED IN SCOPE BY REFINING THE PRESENT BACK-FACE MODEL TO PREDICT PERFORATION AND SPALL. BECAUSE THE MODEL IS BASED ON THE A.R.A.P. INTEGRAL THEORY OF IMPACT IT HAS THE CAPABILITY TO TREAT SITUATIONS NOT READILY ACCESSIBLE TO FINITE ELEMENT CODES, I.E., ADVANCED, NON-METALLIC COMPOSITE TARGETS. A RELATIVELY SIMPLE ONE-DIMENSIONAL MODEL IS USED AS IT AIDS IN THE UNDERSTANDING OF PENETRATOR/TARGET INTERACTION AND ALLOWS FOR THE ECONOMIC COMPUTATION OF A VARIETY OF CASES. IN THIS PROGRAM, THE DEVELOPMENT OF THE DAMAGE MODEL IS GUIDED BY MULTI-DIMENSIONAL NUMERICAL SIMULATION CODES AND BY LABORATORY EXPERIMENTS. THE CODE WILL BE DEMONSTRATED BY APPLICATION TO A PROBLEM OF PRACTICAL INTEREST: AN UNDERWATER SPACED ARRAY.

AGBABIAN ASSOCS — AF — $ 44,242
250 N NASH ST
EL SEGUNDO, CA 90245
HAROLD A FUTTRUP
TITLE:
DEEP BASE TUNNEL CLOSURES
TOPIC: 89 OFFICE: BMO/PMX

HARDENED, RELIABLE, QUICK OPENING/CLOSING CLOSURES FOR THE TUNNELS IN A DEEP BASE ARE ESSENTIAL TO THE SURVIVAL AND OPERATION OF THE DEEP BASE. IT IS PROPOSED TO (1) GENERATE A NUMBER OF CONCEPTS FOR SUCH CLOSURES, (2) SCREEN THOSE CONCEPTS ON THE BASIS OF THEIR OPERABILITY, SIMPLICITY, CONSTRUCTIBILITY, OBVIOUS COST IMPACTS, AND THEIR ADAPTABILITY TO BEING HARDENED, (3) TO REFINE SELECTED CONCEPT(S) TO ESTABLISH THEIR HARDNESS AND FUNCTIONAL ADEQUACY, (4) TO PREPARE A PRELIMINARY DESIGN OF A MECHANICAL OPERATING SYSTEM AND ESTABLISH ITS ADEQUACY, HARDENABILITY, COST, AND SPEED OF OPERATION, AND (5) TO ESTABLISH THE FEASIBILITY OF THE ENTIRE DESIGN.

AGBABIAN ASSOCS — AF — $ 39,558
250 N NASH ST
EL SEGUNDO, CA 90245
H A FUTTRUP
TITLE:
GROUND WATER FLOW FOR DEEP UNDERGROUND TUNNELS MANAGEMENT
TOPIC: 105 OFFICE: BMO/PMX

A DEEP BASED SYSTEM WOULD PROBABLY BE LOCATED BELOW THE WATER TABLE.

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IT WOULD THEREFORE BE SUBJECT TO SOME WATER INFLOW IN ALL PHASES OF CONSTRUCTION AND OPERATION, ALTHOUGH THE RATE OF INFLOW WOULD BE A FUNCTION OF THE GEOLOGIC FORMATION IN WHICH THE BASE IS SITED. THE MANAGEMENT, CONTROL, AND REMOVAL OF THIS WATER IS ESSENTIAL TO THE SURVIVAL AND THE COMPLETION OF THE BASE. THE DEVELOPMENT OF SYSTEMS FOR MANAGING THIS INFLOW IS THEREFORE OF UTMOST IMPORTANCE. THIS PROPOSED PHASE I STUDY WILL ADDRESS PROBABLE INFLOW RATES, ESTABLISH PARAMETERS FOR BASE CONFIGURATION TO ALLEVIATE INFLOW AND PROMOTE AUTOMATIC WATER COLLECTION AT SELECTED POINTS, WATER STORAGE RESERVOIRS AS A SOLUTION TO THE DISPOSAL PROBLEM OR AS AN ADJUNCT TO THE PUMPING PROBLEM, THE SELECTION OF PUMPED WATER DISPOSAL POINTS, THE SELECTION OF TYPES OF CONSTRUCTION FOR WATER DISPOSAL CONDUITS, THE ESTABLISHMENT OF PROBABLE PUMPING HEADS, THE SELECTION OF WATER DISPOSAL PUMPS, THE ESTABLISHMENT OF ACCEPTABLE INFLOW RATES AS A FUNCTION OF POWER SUPPLY, AND THE SEALING OF RUPTURED LINES TO SEAL OFF SUDDEN INFLOW.

AGBABIAN ASSOCS DNA $ 70,434
250 N NASH ST
EL SEGUNDO, CA 90245
JAMES A MALTHAN
TITLE:
NUMERICAL ANALYSIS OF ROCK BURSTING AS A SURFACE INSTABILITY PHENOMENON
TOPIC: 1 OFFICE: OAAM

UNDERGROUND EXCAVATIONS IN HARD ROCK SUBJECT TO DYNAMIC LOADING CAUSED BY NUCLEAR DETONATION MAY EXPERIENCE VIOLENT COLLAPSE (ROCKBURSTING) SIMILAR TO WHAT IS OBSERVED IN DEEP MINING OPERATIONS. THIS PROPOSAL AIMS AT DEVELOPING A METHODOLOGY TO DETERMINE THE CIRCUMSTANCES FOR WHICH ROCKBURST WILL OCCUR, BASED ON THE ASSUMPTION THAT COLLAPSE OF THE CAVITY IS TRIGGERED BY A SURFACE BUCKLING OF THE WALLS OF THE EXCAVATIONS. THE METHODOLOGY WILL RELY ON A FINITE ELEMENT DISCRETIZATION TO DETERMINE THE CONDITIONS OF INSTABILITY, BY SEARCHING THE CONDITIONS FOR WHICH ONE OF THE EIGENVALUES OF THE INCREMENTAL STIFFNESS MATRIX VANISHES. THE OBJECTIVES OF THIS PHASE I PROPOSAL ARE TO ASSEMBLE A FINITE ELEMENT CODE, IMPLEMENT CONSTITUTIVE EQUATIONS TO MODEL PRESSURE-SENSITIVE DILATANT ROCK, AND VALIDATE THE NUMERICAL MODEL AGAINST THEORETICAL SOLUTIONS ON THE SURFACE INSTABILITY OF A HALF-PLANE SUBJECT TO LATERAL LOADS.

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AIR TURBINE TECHNOLOGY INC 6001 PARK OF COMMERCE BLVD BOCA RATON, FL 33431 MICHAEL J DEBRECENI	NAVY	$ 49,524

TITLE:
HIGH SPEED TURBINE DEVELOPMENT
TOPIC: 114 OFFICE: NWC

A PHASE I PROGRAM WILL BE DIRECTED TOWARD THE DEVELOPMENT OF A HIGH-SPEED, POWER GENERATING TURBINE DRIVEN BY A COMPRESSED FLUID. CONCEPTS AND DETAILS WILL BE FORMULATED, DESIGNED, AND ANALYZED WITH REGARDS TO EFFICIENCY, LIGHT WEIGHT, COST EFFECTIVENESS, OPERATING CHARACTERISTICS, AND RELIABILITY. OVERALL SIZE WILL BE 2 INCHES DIAMETER OR LESS. ROTOR/NOZZLE CONFIGURATIONS WILL BE ANALYZED AND EVALUATED IN CONJUNCTION WITH OPERATING PARAMETERS (3 HP DEVELOPED, 250 KRPM, AND MINIMUM EFFICIENCY OF 40%), FLUIDS, PRESSURES, AND TEMPERATURES UP TO 2500 F. BEARINGS AND SEALS WILL BE EVALUATED AND SELECTIONS MADE. VARIOUS MATERIALS WILL BE REVIEWED AND SELECTED BASED UPON OPERATING STRESSES, FLUID COMPATIBILITY, AND TEMPERATURE LIMITS COMMENSURATE WITH LIGHT WEIGHT, REASONABLE COST, AVAILABILITY, AND MANUFACTURING EASE. DYNAMAIC STABILITY WITH REGARDS TO SHAFT, ROTOR, AND SUPPORTS WILL BE ANALYZED AS WELL AS DAMPING, BEARING PRELOAD, AND LUBRICATION TECHNIQUES. COMPUTER PROGRAMS WILL BE USED TO PREDICT TURBINE PERFORMANCE, DYNAMIC BALANCE, AND STRESS ANALYSES TO ASSIST IN ESTABLISHING THE TURBINE'S CONFIGURATION. INTERFACE REQUIREMENTS INCLUDING MOUNTING AND SHAFT COUPLING METHODS WILL BE INVESTIGATED AND SELECTED IN LIGHT OF POTENTIAL USER REQUIREMENTS AND TO INSURE VERSATILITY AND COMPATIBILITY. A TURBINE WHEEL (ROTOR) WILL ALSO BE FABRICATED.

AKM ASSOCS 30 W POINT PL SAN MATEO, CA 94402 DR ASOK K MUKHOPADHYAY	ARMY	$ 50,000

TITLE:
ARTIFICIAL INTELLIGENCE (AI) - ROBOTICS: AI-BASED FIRE CONTROL DECISION AIDS
TOPIC: 13 OFFICE: ARDC

A BASIC RESEARCH PROGRAM HAS BEEN INITIATED AT THE ARMANENT RESEARCH

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AND DEVELOPMENT CENTER (ARDC) ENCOMPASSING THE FIELDS OF AI AND ROBOTICS FOR APPLICATIONS TO WEAPON PLATFORM AUTOMATION AND FIRE CONTROL SYSTEMS. THE THRUST OF THE PROGRAM IS TO DEVELOP "SYSTEM-BUILD" TOOLS OR SOFTWARE MODULES TO SUPPORT EVOLUTIONARY DEVELOPMENT AND PROTOTYPE DEMONSTRATION OF AN AUTONOMOUS/SEMI-AUTONOMOUS PLATFORM CAPABILITY. AKM ASSOCIATES PROPOSES TO DEVELOP A DEFENSIVE/OFFENSIVE FIRE CONTROL DECISION AID A (FCDA) MODULE WHICH WOULD BE A COMPANION TO THE AUTOMATIC TARGET RECOGNITION (ATR) MODULE WE ARE CURRENTLY DEVELOPING UNDER CONTRACT TO ARDC. THESE TWO AI-BASED FIRE CONTROL DECISON AIDS WOULD BE OF GREAT SIGNIFICANCE WITHIN THE ADOPTED FINITE-STATE-MACHINE (FSM) STRUCTURE FOR THE WEAPON PLATFORM AUTOMATION: 1) AUTOMATIC TARGET RECOGNITION (ATR) IS BASED ON MULTISENSOR INTEGRATION (MSI) AND 'EXTRA-SIGNAL' INTELLIGENCE CORRELATION USING TOOLS OF PERCEPTUAL REASONING. 2) DEFENSIVE/OFFENSIVE FIRE CONTROL DECISION AID (FCDA) WOULD ACT AS A TARGETING AID TO THE COMMANDER/GUNNER. THE TWO MODULES (ATR AND FCDA) WILL BE DEVELOPED TO OPERATE AS STAND-ALONE MODULES OR BE EASILY INTEGRABLE WITHIN THE HIERARCHICAL CONTROL FRAMEWORK OF WEAPON PLATFORM AUTOMATION. FCDA MODULE WILL BE DEVELOPED ON MICROVAX II WITH MICROVMS 3 OPERATING SYSTEM AND USING THE VAXLISP LANGUAGE. SUCH AN IMPLEMENTATION WILL BE COMPLETELY PORTABLE TO ARDC VAX 11/780 COMPUTER SYSTEM.

AKM ASSOCS AF $ 50,000
30 W POINT PL
SAN MATEO, CA 94402
CARL PONDER
TITLE:
COMPUTER OPERATING SYSTEM INSTRUCTION SET PRIMITIVES FOR ADA
TOPIC: 23 OFFICE: ASD

THE ADA LANGUAGE HAS BEEN DESIGNED FOR THE DOD AS A PRIMARY LANGUAGE FOR EMBEDDED SYSTEMS. MANY FEATURES OF ADA TEND TO MAKE EXECUTION OPERATING SYSTEM (OS)-INTENSIVE. THESE ARE I/O, MULTITASKING, EXCEPTION HANDLING, TIMESLICING, AND DYNAMIC STORAGE MANAGEMENT. IN MANY SYSTEMS THESE FUNCTIONS ARE HANDLED BY THE OS COOPERATING WITH THE LANGUAGE RUNTIME SYSTEM (LRS). CALLS TO THE OS GENERALLY FORCE A SEQUENCE OF NESTED CONTEXT SWITCHES, WHICH IMPLIES A LARGE OVERHEAD ON OPERATIONS WHICH MAY BE SIMPLE IN THEMSELVES. EMBEDDED SYSTEMS FOR REALTIME CONTROL, SUCH AS AN INTELLIGENT AVIONIC SYSTEM MANAGER, REQUIRE INTENSIVE I/O OPERATIONS (SUCH AS MONITORING INSTRUMENTS) AND

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EVENT-DRIVEN MULTIPROCESSING. THERE ARE THREE OBJECTIVES FOR THE PROPOSED RESEARCH EFFORT: FIRST IS TO DEFINE COMPLEX INSTRUCTIONS FOR OS PRIMITIVES (CISC), COMPATIBLE WITH MICROCODED ARCHITECTURES, AND DESCRIBE THE NECESSARY SOFTWARE INTERFACE. THE SECOND IS TO DEFINE SIMPLE INSTRUCTIONS TO ENHANCE SOFTWARE-BASED SOLUTIONS, COMPATIBLE WITH COMPACT REDUCED INSTRUCTION SET ARCHITECTURES (RISC) WHICH IS MORE PRACTICAL IN SOME EMBEDDED SYSTEMS AND DESCRIBE THE NECESSARY SOFTWARE INTERFACE. THE THIRD IS TO IDENTIFY CASES WHERE THE OPERATING SYSTEM MUST INTERVENE IN EXECUTION, TO DEFINE THE LIMITS OF OUR REORGANIZATION. OUR ULTIMATE GOAL IS TO REMOVE AS MANY FEATURES AS POSSIBLE FROM THE OS DOMAIN. WE CANNOT HOWEVER REMOVE THEM ALL AND IT IS NECESSARY TO IDENTIFY THOSE WE CAN FOR SYSTEM OPTIMIZATION.

AKM ASSOCS — AF — $ 50,000
30 W POINT PL
SAN MATEO, CA 94402
CARL PONDER
TITLE:
EXPERT SYSTEM USE OF THE ADA INTERFACE TO OTHER COMPUTER LANGUAGES
TOPIC: 14 OFFICE: ASD

ALTHOUGH ADA WAS DESIGNED TO PROVIDE A MULTITASKING ENVIRONMENT ON EMBEDDED COMPUTERS, IT CURRENTLY LACKS THE FEATURES NECESSARY FOR EXPERT SYSTEMS APPLICATIONS AND FOR SYMBOLIC PROCESSING IN GENERAL. HOWEVER, BECAUSE THE ADA LANGUAGE SPECIFICATION DEFINES A CALLING MECHANISM FOR INTERFACING WITH OTHER LANGUAGES, IT IS POSSIBLE TO ADHERE TO THE ADA STANDARD WHILE MAKING USE OF SUCH SPECIALIZED LANGUAGES. AKM ASSOCIATES PROPOSES TO PROVIDE AN EXPOSITORY REPORT ON THE ADA INTERFACE FEATURE AS IT RELATES TO LISP, PROLOG, SMALLTALK AND FORTH. THIS REPORT WILL ALSO INCLUDE A QUALITATIVE EVALUATION OF THE UTILITY AND LIMITATION OF THE ADA INTERFACE TO OTHER LANGUAGES. FOR THOSE IMPLEMENTATIONS OF ADA LACKING A CALLING MECHANISM, AKM ASSOCIATES WILL ALSO INVESTIGATE THE FEASIBILITY OF DEVELOPING SUCH AN INTERFACE. FINALLY, THE REPORT WILL PROPOSE A METHOD FOR THE QUANTITATIVE DEMONSTRATION OF THE UTILITY OF THE INTERFACING FEATURES.

ALBANY TITANIUM INC — AF — $ 48,633
PO BOX 887 - 840 30TH ST SW
ALBANY, OR 97321
DR JOSEPH A MEGY
TITLE:
LOW DENSITY TITANIUM ALLOY DEVELOPMENT
TOPIC: 9 OFFICE: ASD/TA

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THIS PHASE I PROPOSAL CONCERNS AN EVALUATION OF THE POTENTIAL OF

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THE AlTi-OXY PROCESS TO PRODUCE Ti-Li-Al ALLOYS IN POWDER FORM. THE FOLLOW ON PHASE II PROGRAM WOULD INVOLVE PRODUCTION OF SUFFICIENT MATERIAL TO PRODUCE PARTS FOR TESTING.

ALPHATECH INC — AF — $ 71,211
111 MIDDLESEX TURNPIKE
BURLINGTON, MA 01803
DR JONATHAN KORN
TITLE:
DISPLAY FOR LOW LEVEL TERRAIN FOLLOWING FLIGHT
TOPIC: 206 OFFICE: AMD/RDO

THE PROPOSED RESEARCH CONSTITUTES A FIRST STEP IN THE UTILIZATION OF ALPHATECH'S DISPLAY DESIGN METHODOLOGY TO DEVELOP IMPROVED DISPLAY-SYSTEMS FOR AIR CREWS IN TERRAIN FOLLOWING FLIGHT. IT INVOLVES AN ANALYTICAL EFFORT AT ALPHATECH, AND AN EXPERIMENTAL VALIDATION AT THE UNIVERSITY OF CONNECTICUT. PILOT MODELING TECHNIQUES ARE CENTRAL TO OUR APPROACH FOR DISPLAY SYSTEM EVALUATION. A PILOT MODELING IS NEEDED TO GIVE PREDICTION OF CLOSED-LOOP PILOT/VEHICLE PERFORMANCE FOR A GIVEN WORKLOAD, AN TO RANK-ORDER THE USEFULNESS OF THE DISPLAYED INFORMATION. OUR APPROACH, IN THE EVALUATION PROBLEM, IS TO EMPLOY THE OPTIMAL CONTROL MODEL (OCM) OF HUMAN RESPONSE. THE OCM COMPUTER-BASED DISPLAY DESIGN PROCEDURE IS COMPRISED OF THREE LEVELS FOLLOWED BY MAN-IN-THE-LOOP EXPERIMENTATION. THESE LEVELS ARE: (1) INFORMATION LEVEL WHICH DETERMINES THE RELATIVE IMPORTANCE OF THE SYSTEM VARIABLES IN THE PILOT VEHICLE-CONTROL TASK, (2) ELEMENT LEVEL IN WHICH THE INFORMATION REQUIREMENTS ARE INTEGRATED IN A FEASIBLE DISPLAY SYSTEM, AND (3) FORMAT LEVEL IN WHICH ACTUAL DISPLAY LAYOUT IS CONSTRUCTED.

ALPHATECH INC — NAVY — $ 49,978
111 MIDDLESEX TURNPIKE
BURLINGTON, MA 01803
THOMAS KURIEN
TITLE:
UNIFIED SYMBOLIC AND NUMERICAL PROCESSING FOR AIRBORNE SURVEILLANCE
TOPIC: 64 OFFICE: NASC

THE OBJECTIVE OF THIS RESEARCH IS TO PROVE THE FEASIBILITY OF USING

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A NOVEL APPROACH OF COMBINED SYMBOLIC AND NUMERICAL INFORMATION PROCESSING TO AID E-2C OPERATORS TO CARRY OUT THEIR SURVEILLANCE MISSION. DUE TO THE VAST AMOUNT OF SURVEILLANCE DATA THAT NEEDS TO BE PROCESSED, E-C2 OPERATORS FACE A DIFFICULT TASK IN CARRYING OUT THEIR MISSIONS. COMPLEX NUMERICAL ALGORITHMS FOR PROCESSING TARGET TRACKS ALREADY EXIST. HOWEVER, THE SUBSEQUENT PROBLEM OF EVALUATING THE THREAT WILL REQUIRE ALGORITHMS WHICH USE BOTH NUMERICAL AND SYMBOLIC PROCESSING. ALPHATECH PROPOSES TO FIRST DECOMPOSE THE THREAT EVALUATION PROBLEM INTO INDEPENDENT STEPS AND IDENTIFY INPUTS, OUTPUTS AND FUNCTION OF EACH STEP. ALPHATECH WILL THEN DESIGN AND IMPLEMENT A COMBINED NUMERICAL AND SYMBOLIC ALGORITHM IN DETAIL FOR ONE STEP AND DEMONSTRATE A PROTOTYPE SYSTEM FOR THREAT EVAUATION. NUMERICAL PROCESSING WILL BE BASED ON THE MATHEMATICS OF ESTIMATION, STATISTICAL DECISION AND OPTIMIZATION THEORY. SYMBOLIC PROCESSING WILL BE BASED ON KNOWLEDGE ACQUIRED FROM E-2C OPERATORS AND IMPLEMENTED AS A SIMPLE EXPERT SYSTEM. THE NUMERICAL AND SYMBOLIC PROCESSING WILL BE COMBINED BY MEANS OF A COMMON DATA BASE. BASED ON THIS ALGORITHMS, A PROTOTYPE COMPUTER PROGRAM WILL BE DEVELOPED TO DEMONSTRATE THE FEASIBILITY OF CONSTRUCTING AN OPERATIONAL DECISION AID FOR E-2C OPERATORS.

AMALGAMATED TECHNOLOGIES INC — NAVY — $ 49,600
13901 N 73RD ST - STE 208
SCOTTSDALE, AZ 85260
ROY E BEAL
TITLE:
SURFACE ATTACK ON METALS IN THE PRESENCE OF LIQUID METALS
TOPIC: 1 OFFICE: ONR

MATERIAL COMPATABILITY BETWEEN LIQUID METAL CURRENT COLLECTOR ALLOYS AND SOLID METALS ON MATERIAL COLLECTOR SURFACES WILL BE INVESTIGATED. LOW MELTING FUSIBLE TYPE ALLOYS WITH CAPABILITY OF OPERATING AT 200 DEG F OR BELOW WILL BE FEATURED WITH SOME CONSIDERATION OF SUITABLE MATERIALS IN THE 0-500 DEG F RANGE. A THOROUGH LITERATURE SEARCH FOR PERTINENT PHYSICAL, MECHANICAL, AND SURFACE INTERACTIVE INFORMATION BETWEEN LIQUID AND SOLID METALS WILL BE CONDUCTED. AN EXPERIMENTAL PROGRAM WILL VERIFY LITERATURE DATA AND PROCEED TO ADVANCE THE STATE OF KNOWLEDGE BY TESTING NEW ALLOY MODIFICATIONS THAT APPEAR TO SHOW PROMISE FROM A THEORETICAL STANDPOINT. CHEMICAL ANALYSIS, GRAVIMETRIC MEASUREMENTS, METALLOGRAPHY AND VISUAL ASSESSMENTS OF CANDI-

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DATE LIQUID METAL/SOLID METAL COMBINATIONS WILL PROVIDE AN UNDERSTANDING TO ALLOW SURFACE INTERACTION PROCESS MODELING TO BE DEVELOPED AND REFINED BY INTERACTIVE EXPERIMENTS. THE MAIN OBJECTIVE OF PHASE I IS TO IDENTIFY LIQUID METALS WITH A HIGH SUCCESS PROBABILITY AS COLLECTOR MATERIALS WITH MINIMUM SURFACE DETERIORATION AND INTERACTION. PHASE II WILL CONCENTRATE ON DEVELOPING PRACTICAL APPLICATION OF THE NEW ALLOYS.

AMERASIA TECHNOLOGY INC — AF — $ 49,000
2239 TOWNSGATE RD - STE 208
WESTLAKE VILLAGE, CA 91361
DR TEONG C LIM
TITLE:
DIGITAL RF MEMORY (DRFM) AS ACTIVE CHAFF FEASIBILITY STUDIES
TOPIC: 82 OFFICE: AFBMO/PMX

THERE ARE TWO TYPES OF ELECTRONIC COUNTERMEASURE SYSTEMS -- ACTIVE AND PASSIVE (ECM). THE PASSIVE ECM USES CHAFF, DECOYS, AND RADAR CROSS-SECTION REDUCTION, AND FOR THE ACTIVE NOISE JAMMERS, AND REPEATER JAMMER. IN THIS PROPOSAL, AN ACTIVE ECM IS PROPOSED WHICH USES A MINIATURE DIGITAL RF MEMORY (DRFM) AS ACTIVE CHAFF IN THE BALLISTIC MISSILE ENVIRONMENT. THIS MINIATURE DRFM UTILIZES STATE-OF-THE-ART TECHNOLOGIES SUCH AS RADIATION HARDENED GaAs ICs AND SURFACE-ACOUSTIC-WAVE FREQUENCY SYNTHESIZERS.

AMERASIA TECHNOLOGY INC — AF — $ 49,945
2239 TOWNSGATE RD - STE 208
WESTLAKE VILLAGE, CA 91361
DR TEONG C LIM
TITLE:
SURFACE ACOUSTIC WAVE CHIRP TRANSFORM CORRELATOR FOR SCORING RECEIVER DEVELOPMENT
TOPIC: 181 OFFICE: AD/PMR

THREAT SIMULATORS CAN MAKE BENEFICIAL USE OF SURFACE-ACOUSTIC-WAVE (SAW) DISPERSIVE DELAY LINE (DDL) DEVICE TO SIMULATE ENEMY RADAR CHARACTERISTICS. HOWEVER, A MORE IMPORTANT APPLICATION FOR SAW DDL DEVICE IS IN "SCORING RECEIVER". THE RECEIVER WOULD SERVE TO ANALYZE AND EVALUATE THE ECM GENERATED IN RESPONSE TO THE THREAT. THIS NOT

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ONLY PERMITS EVALUATION OF ECM EFFECTIVENESS, BUT ALSO BE USED TO TRIGGER A REALISTIC THREAT SYSTEM RESPONSE TO THE ECM. THIS IS AN IMPORTANT PART OF THE TRAINING MISSION. THE QUALITY OF THE SCORING RECEIVER DEPENDS ON THE CHIRP TRANSFORM CORRELATOR. HENCE, PHASE I OBJECTIVE IS TO PERFORM A FEASIBILITY STUDY ON SUCH CORRELATOR USING THE STATE-OF-THE-ART SAW DISPERSIVE FILTERS AND PHASE II EFFORT IS TO IMPLEMENT A HARDWARE FOR DEMONSTRATION.

AMERASIA TECHNOLOGY INC ARMY $ 49,945
2239 TOWNSGATE RD - STE 208
WESTLAKE VILLAGE, CA 91361
DR EDWARD J STAPLES
TITLE:
DIGITAL ACCELERATION SENSORS FOR INERTIAL GUIDANCE OF SMART MUNITIONS
TOPIC: 2 OFFICE: ARDC

AN INERTIAL GUIDANCE SYSTEM FOR SMART MUNITIONS USING SAW RESONATOR BASED ACCELERATION SENSORS IS PROPOSED. THE ADVANTAGES ARE LARGE DYNAMIC RANGE, TEMPERATURE COMPENSATION, 12 BIT ACCURACY, AND A DIGITAL OUTPUT WITHOUT ANALOG-TO-DIGITAL CONVERSION, SMALL SIZE, AND LOW COST. STUDIES HAVE SHOWN INTEGRATED ERROR RATES LESS THAN 1 NAUTICAL MILE/HOUR CAN BE ACHIEVED. THESE ADVANTAGES ENABLE THE SAW SENSOR TO MEET ALL OF THE REQUIREMENTS OF INERTIAL ACCELERATION SENSORS FOR SMART MUNITIONS. THE PROPOSED PHASE I STUDY WILL PROVIDE A DETAILED DESIGN STUDY OF SAW SENSORS AND A BASELINE INERTIAL SYSTEM WILL BE SIMULATED TO VERIFY THE SYSTEM PERFORMANCE IN TERMS OF SMART MUNITIONS INERTIAL REQUIREMENTS. HARDWARE IMPLEMENTATION AND TESTING WILL BE PERFORMED IN PHASE II OF THE PROJECT.

AMERASIA TECHNOLOGY INC NAVY $ 49,945
2239 TOWNSGATE RD - STE 208
WESTLAKE VILLAGE, CA 91361
DR EDWARD J STAPLES
TITLE:
SURFACE ACOUSTIC WAVE (SAW) MINE SENSORS DEVELOPMENT
TOPIC: 106 OFFICE: NSWC

A DIGITAL UNDERWATER SOUND DETECTION SYSTEM FOR SMART MINES USING SAW

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SUBMITTED BY	DEPT	AWARDED AMOUNT

RESONATOR BASED SENSORS IS PROPOSED. THE ADVANTAGES ARE LARGE DYNAMIC RANGE, SENSITIVITY MINUS 180 dB RE 1 V/mPa, 16 PLUS BIT ACCURACY, SMALL SIZE AND LOW COST, AND A DIGITAL OUTPUT WITHOUT ANALOG-TO-DIGITAL CONVERTERS. THESE ADVANTAGES ENABLE THE SAW SENSOR TO MEET ALL OF THE REQUIREMENTS OF SMART MINE SENSORS. THE PROPOSED STUDY (PHASE I) WILL PROVIDE A DETAILED DESIGN OF SAW SENSOR FOR UNDERWATER SOUND DETECTION. A DIGITAL CMOS SPECTRUM ANALYZER WILL BE DESIGNED TO PROVIDE SIGNATURE ANALYSIS AND TARGET CHARACTERIZATION. A BASELINE SENSOR ARRAY SYSTEM WILL BE SIMULATED TO VERIFY SYSTEM PERFORMANCE AND ANALYZE OPERATIONAL CHARACTERISTICS IN TERMS OF SMART MINE REQUIREMENTS. HARDWARE IMPLEMENTATION AND TESTING WILL BE PERFORMED IN PHASE II OF THE PROJECT.

AMERASIA TECHNOLOGY INC — NAVY — $ 49,924
2239 TOWNSGATE RD - STE 208
WESTLAKE VILLAGE, CA 91361
DR EDWARD J STAPLES
TITLE:
SURFACE ACOUSTIC WAVE (SAW) RATE-OF-DESCENT/ALTITUDE TRANSDUCER DEVELOPMENT
TOPIC: 115 OFFICE: NWC

THE PROPOSED PROGRAM IS TO PERFORM STUDIES LEADING TO THE DEVELOPMENT OF A SURFACE ACOUSTIC WAVE (SAW) TRANSDUCER FOR ON BOARD AIR-DATA SYSTEM. THE OBJECTIVE OF THE PROPOSED PROGRAM IS TO DEVELOP A HIGH PERFORMANCE DIGITAL RATE-OF-DESCENT/ALTIMETER TRANSDUCER WHICH WILL UTILIZE STATE-OF-THE-ART SAW TECHNOLOGY. PRELIMINARY ANALYSIS SHOWS THAT SAW TRANSDUCER HAS: (1) A DYNAMIC RANGE OF 10 TO THE 6TH POWER, THUS GIVING AN ACCURACY OF LESS THAN 0.01 FT. IN 1000 FEET, (2) THE ALTITUDE QUANTIZATION RATE OF 0.5 FT/Hz, AND (3) AN EQUIVALENT SAMPLING RATE OF 60 KHz (APPROXIMATELY 2/16 BITS/SEC.).

AMERICAN RESEARCH CORP OF VIRGINIA — NAVY — $ 61,422
642 FIRST ST
RADFORD, VA 24141
R C STIFFLER
TITLE:
CHARACTERIZATION OF DAMAGE IN COMPOSITE ROCKET MOTOR CANISTERS
TOPIC: 113 OFFICE: NWC

THE INHERENT ANISOTROPY AND INHOMOGENEITY OF COMPOSITE MATERIALS MAKE

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DAMAGE DETECTION AND CHARACTERIZATION DIFFERENT THAN THAT OF HOMOGENEOUS ISOTROPIC MATERIALS. BOTH IN QUALITY ASSURANCE AND MAINTAINABILITY, TESTS BASED ON STRONG AND WELL UNDERSTOOD PRINCIPLES MUST BE ESTABLISHED IN ORDER TO DETECT AND QUANTIFY DAMAGE. THE DATA FROM THESE TESTS COULD SERVE AS A BASIS FOR ACCEPT-REJECT CRITERIAL FOR DAMAGE ROCKET MOTOR CANISTERS. TWO TECHNIQUES THAT APPEAR BEST SUITED FOR CHARACTERIZING DAMAGE ARE ULTRASONIC AND HIGH-FREQUENCY EDDY CURRENT METHODS. EDDY CURRENT TECHNIQUES ARE SENSITIVE TO DAMAGE NEAR THE SURFACE WHILE ULTRASONICS CAN PENETRATE THE THICKNESS OF THE ROCKET MOTOR CANISTER. THE OBJECT OF THIS RESEARCH PROGRAM INVOLVES THE DEVELOPMENT OF THE NECESSARY PRINCIPLES, TECHNIQUES, HARDWARE AND SOFTWARE TO CHARACTERIZE DAMAGE IN ROCKET MOTOR CASINGS.

AMERICAN RESEARCH CORP OF VIRGINIA SDIO $ 0
642 FIRST ST
RADFORD, VA 24141
DR R J CHURCHILL
TITLE:
LASER DENSIDICATION OF PLASMA DEPOSITED CARBON-CARBON COMPOSITES
TOPIC: 5 OFFICE: IST

SPACE POWER SYSTEMS NECESSARY FOR THE STRATEGIC DEFENSE MISSIONS WILL REQUIRE STIFF, LIGHTWEIGHT, IMPACT RESISTANT MATERIALS CAPABLE OF WITHSTANDING 1000-2000 DEG C TEMPERATURES IN A HIGHLY REACTIVE ENVIRONMENT FOR SEVERAL YEARS. DEMANDS OF THIS NATURE DICTATE THE DEVELOPMENT OF NEW MATERIALS AND IMPROVEMENTS IN THE PROPERTIES OF EXISTING MATERIALS. TO RESPOND TO THIS NEED, THE PRESENT PROPOSAL SUGGESTS THE PLASMA DEPOSITION AND LASER DENSIFICATION OF CARBON-CARBON COMPOSITES. THE TARGET OF OPPORTUNITY IS THE COMBINATION OF PLASMA DEPOSITED CARBON MATRICES ON CARBON FIBERS WITH LASER DENSIFICATION OF THE CARBON MATRIX AND OF THE SURFACE OF THE COMPOSITE TO ENHANCE STRUCTURAL PROPERTIES AND WEAR RESISTANCE. SUCCESSFUL COMPLETION OF THE PROGRAM OBJECTIVES, INCLUDING ESTABLISHMENT OF A LOW PRESSURE PLASMA DESPOSITION TECHNIQUE, DEVELOPMENT OF A SUITABLE LASER DENSIFICATION PROCESS, SELECTION OF COMPATIBLE FIBER PLACEMENT METHODS AND CONDUCT OF A PARAMETRIC STUDY, SHOULD LEAD TO AN OPTIMAL CARBON-CARBON COMPOSITE PRODUCTION TECHNIQUE FOR FURTHER DEVELOPMENT AND TEST IN PHASE II OF THE PROGRAM.

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AMERICAN TECHNICAL SERVICES — AF — $ 45,000
245 LOMA CORTA DR
SOLANA BEACH, CA 92075
DR BARRY MONS
TITLE:
OPTIMUM NAVIGATION STUDY
TOPIC: 84 OFFICE: AFBMO/PMX

CURRENT AND FUTURE DEFENSIVE MISSILE SYSTEMS HAVE TO COUNTER THREATS THAT OPERATE AT GREAT SPEEDS AT HIGH ALTITUDES AND THAT EMPLOY INCREASINGLY MORE SOPHISTICATED SELF-SCREENING COUNTER MEASURES. TO COUNTER SUCH A THREAT IT IS ESSENTIAL THAT THE UNITED STATES EXPLOIT BOTH CURRENT AND FUTURE MISSILE SYSTEMS TO THEIR MAXIMUM POTENTIAL, BY DEVELOPING OPTIMUM MIDCOURSE AND TERMINAL GUIDANCE LAWS THAT WILL MINIMIZE TERMINAL MISS DISTANCE AND REQUIRE A MINIMUM AMOUNT OF ENERGY. THE OPTIMUM NAVIGATION STUDY PRESENTED IN THIS PROPOSAL WILL DEVELOP THE OPTIMUM NAVIGATION LAWS FOR RV's EQUIPPED WITH A TERMINAL HOMING CAPABILITY AND WILL DEMONSTRATE THE PERFORMANCE OF SUCH AN RV IN TERMS OF ACTUAL MISS DISTANCE.

AMHERST SYSTEMS INC — AF — $ 46,822
1 AMERICAN DR
BUFFALO, NY 14225
DR HOLLIS F RYAN
TITLE:
TACTICS AND EQUIPMENT EVALUATION (TEEVAL)
TOPIC: 10 OFFICE: ASD/XR

THE PROJECT WILL DEFINE THE CAPABILITIES AND DETERMINE THE COST TO DEVELOP A TRANSPORTABLE, REALTIME DYNAMIC SIMULATOR SYSTEM WITH THE FOLLOWING FEATURES: a) DENSE, PULSE-BY-PULSE ENVIRONMENT; b) C3 SYSTEM MODELS FOR BOTH ATTACKER AND DEFENDER FORCES; c) INTERACTIVE PARTICIPATION OF UP TO E.G., 6 PILOTS TO CONTROL THEIR AIRCRAFT, ASSOCIATED AVIONICS AND MISSILE SYSTEMS; d) INTERACTIVE PARTICIPATION OF ONE OR MORE MANNED SIMULATED GROUND SITES; AND, e) ECONOMICAL TO MAINTAIN AND EASY TO USE. THE DESIGN OF THE SIMULATOR SYSTEM WILL BE BASED ON THE COMBAT ELECTROMAGNETIC ENVIRONMENT SIMULATOR (CEESIM) CURRENTLY UNDER DEVELOPMENT FOR THE AIR FORCE BY AMHERST SYSTEMS. THE CEESIM WILL SIMULATE UP TO 1000 EMITTERS AND 500 PLATFORMS/SITES

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AT ANY INSTANT IN TIME, AND UP TO 1 MPPS OUTPUT, EITHER AT RF OR OPTIONALLY, IN THE FORM OF DIGITAL PULSEWORDS. TASK EFFORTS WILL CONSIST OF a) FUNCTIONAL REQUIREMENTS DEFINITION FOR EACH MODEL ELEMENT, b) IMPLEMENTATION ANALYSIS FOR EACH MODEL ELEMENT, c) IDENTIFICATION OF CURRENT COMPUTER MODELS APPLICABLE TO EACH MODEL ELEMENT, AND d) GENERATION OF A TEEVAL DEVELOPMENT PLAN.

AMPARO CORP — AF — $ 37,318
PO BOX 36780
ALBUQUERQUE, NM 87176
J J WALKER
TITLE:
H E DRIVEN LINAC FOR RADAR SUPPRESSION
TOPIC: 83 OFFICE: AFBMO/MYSC

THIS PHASE I EFFORT PROPOSES TO EVALUATE THE CONCEPT OF USING AN EXPLOSIVE DRIVEN ELECTRON LINAC TO SUPPRESS AND ADVERSARY'S ACQUISITION AND TRACKING RADARS. IT TAKE ADVANTAGE OF THE "SEARCH-LIGHTING" EFFECT ASSOCIATED WITH THE RADIATION PRODUCED BY HIGH VELOCITY ELECTRONS BREMSSTRAHLUNG IN AIR.

ANALYSIS & MEASUREMENT SERVICES CORP — AF — $ 50,371
4706 PAPERMILL RD
KNOXVILLE, TN 37919
H M HASHEMIAN
TITLE:
DETERMINATION OF INSTALLED THERMOCOUPLE RESPONSE
TOPIC: 213 OFFICE: AEDC/DOT

THE PROJECT WILL INVOLVE ADPTATION OF THE LOOP CURRENT STEP RESPONSE METHOD INVENTED AND DEVELOPED BY THE PROJECT PARTICIPANTS FOR DETERMINING INSTALLED THERMOCOUPLE RESPONSE FOR TYPE J, K AND E THERMOCOUPLES USED IN TURBINE ENGINE TEST FACILITIES. THE METHOD INVOLVES PROCESSING DATA FROM A COOLING TRANSIENT FOLLOWING CESSATION OF JOULE AND/OR PELTIER HEATING OF THE THERMOCOUPLE. THE PROJECT WILL FOCUS ON ESTABLISHING TEST ACCURACIES FOR ALL THREE THERMOCOUPLE TYPES, DETERMINING OPTIMUM TEST METHODS, AND DEVELOPING EASY TO USE, SAFE AND RELIABLE EQUIPMENT. THE PROGRAM WILL PROVIDE THE TECHNOLOGY NOW

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NEEDED FOR TEMPERATURE MEASUREMENT IN TURBINE ENGINES AND ITS TEST FACILITIES, AND WILL ALSO PROVIDE A PRODUCT WHICH WILL FIND A NEED FOR RESPONSE TIME TESTING IN SCIENCE AND INDUSTRY.

ANALYTICS INC — NAVY — $ 48,339
2500 MARYLAND RD
WILLOW GROVE, PA 19034
KEITH JOHNSON
TITLE:
COST PRODUCTION TECHNIQUE FOR SOFTWARE
TOPIC: 35 OFFICE: NESC

BY IDENTIFYING THE HEURISTICS USED BY EXPERT ESTIMATORS TO DRAW ANALOGIES AND MAKE INFERENCES FROM HISTORICAL DATA AND KNOWLEDGE OF THE DEVELOPMENT PROCESS, AND BY IDENTIFYING AND, TO THE EXTENT POSSIBLE, QUANTIFYING THOSE CRITICAL PARAMETERS THAT DRIVE SOFTWARE, AN "EXPERT SOFTWARE COST ESTIMATING ASSISTANT" WILL BE PRODUCED. IT WILL BE BASED ON INNOVATIVE ARTIFICIAL INTELLIGENCE (AI) AND KNOWLEDGE ENGINEERING TECHNIQUES AND WILL ENABLE AN ESTIMATOR TO DRAW ON STORED EXPERIENCE AND ARRIVE AT A REASONABLE COST ESTIMATE WITH ALL ASSUMPTIONS INCLUDED.

ANALYTICS INC — AF — $ 48,473
2500 MARYLAND RD
WILLOW GROVE, PA 19034
KEITH JOHNSON
TITLE:
TAILORED EXPERT SYSTEM GENERATOR
TOPIC: 26 OFFICE: AFWAL/AA

THE PURPOSE OF THIS RESEARCH EFFORT IS TO EXPLORE THE FEASIBILITY OF DEVELOPING AN GENERIC EXPERT SYSTEM WHICH WOULD BE USED TO DEVELOP EXPERT SYSTEMS TAILORED FOR SPECIFIC APPLICATION. ANALYTICS HAS DEVELOPED AN ADVANCED, PRODUCT-ORIENTED CONCEPT FOR BUILDING, TESTINGS, AND EXECUTING AI APPLICATION SYSTEMS CALLED NINA. THE NINA CONCEPT SUPPORTS THE DESIGN, IMPLEMENTATION, AND EXECUTION OF A WIDE CLASS OF KNOWLEDGE BASED AI SYSTEMS. NINA-BUILT SYSTEMS CAN FULLY REFLECT THE REALITIES OF THE APPLICATION WORLD INCLUDING LACK OF

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CERTAINTY, LACK OF CONSISTENCY, AND PARTIAL KNOWLEDGE AND INFORMATION. IN EXECUTING THIS EFFORT WE WILL UTILIZE OUR NINA CONCEPT AS THE BASIS FOR BEGINNING TO EXAMINE THE FEASIBILITY OF DEVELOPING A TAILORED EXPERT SYSTEM GENERATOR.

ANATECH INTERNATIONAL CORP — NAVY — $ 47,979
3344 N TORREY PINES CT - STE 320
LA JOLLA, CA 92037
DR ROBERT S DUNHAM
TITLE:
DEDICATED 3-D ACOUSTIC MULTILAYER RESPONSE MODEL
TOPIC: 90 OFFICE: NSWC

THE SAFETY OF SUBMARINES REQUIRES THAT THEY BE DESIGNED ACOUSTICALLY QUIET TO AVOID DETECTION. ONE METHOD TO REDUCE ACOUSTIC EMISSION IS TO SURROUND THE HULL WITH A VISCOELASTIC LAYER. IN ORDER TO ACCESS THE EFFECTIVENESS OF THESE VISCOELASTIC LAYERS, IT IS NECESSARY TO DETERMINE THE THREE-DIMENSIONAL (3-D) SURFACE COMPLEX IMPEDANCE AND ACOUSTIC LOSS AS A FUNCTION OF FREQUENCY FOR A STEADY STATE HARMONIC INPUT. THIS PROJECT WILL PROVIDE FOR THE ACCURATE ASSESSMENT OF THE EFFECTIVENESS OF THESE VISCOELASTIC LAYERS BY DEVELOPING AN EFFICIENT, MODULAR, USER-FRIENDLY, DEDICATED 3-D FINITE ELEMENT CODE THAT IS CAPABLE OF DETERMINING THE COMPLEX SURFACE IMPEDENCE AS A FUNCTION OF THE STEADY STATE DRIVING FREQUENCY AND ACCURATE MODELING TECHNIQUES FOR THESE UNIQUE GEOMETRIES.

ANATECH INTERNATIONAL CORP — AF — $ 49,712
3344 N TORREY PINES CT - STE 320
LA JOLLA, CA 92037
DR Y R RASHID
TITLE:
REINFORCED CONCRETE STRUCTURES IN THE POST CRITICAL RANGE MODELING AND ANALYSIS
TOPIC: 217 OFFICE: AFESC

ALTHOUGH FINITE ELEMENT CODES UTILIZING ELASTIC-PLASTIC-FRACTURING MODELS FOR CONCRETE STRUCTURAL ANALYSIS HAVE BEEN IN USE FOR NEARLY TWO DECADES, SEVERE STRUCTURAL DAMAGE INVOLVING SPALLING AND BREAKUP HAS REMAINED COMPUTATIONALLY INTRACTABLE. THIS PROPOSAL IS AIMED AT

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THE DEVELOPMENT OF A COMPUTATIONAL CAPABILITY FOR THE ANALYSIS OF REINFORCED CONCRETE STRUCTURES SUBJECTED TO SEVERE STRUCTURAL DAMAGE RESULTING FROM HIGH DYNAMIC LOADS AND DEFORMATION RATES. THIS INVOLVES THE MODELING OF REINFORCED CONCRETE IN THE POST CRITICAL RANGE WHICH INCLUDES CRACKING, SPALLING, CRUSHING AND STRUCTURAL SEPARATION AND THE DEVELOPMENT OF A COMPUTATIONAL PROCEDURE THAT COMBINES THE DEFORMATION-BASED FINITE ELEMENT METHOD AND THE RIGID-BODY KINEMATICS OF THE DISCRETE ELEMENT METHOD. IN THIS MANNER, ALL THREE INTERDEPENDENT RESPONSE REGIMES ARE TREATED, NAMELY, ELASTIC-PLASTIC DEFORMATIONS, SEVERE DAMAGE AND FINAL COLLAPSE. THE OBJECTIVES OF PHASE I EFFORT IS TO DEVELOP THE MODEL TO A LEVEL WHERE THE FEASIBILITY OF THE METHOD CAN BE ESTABLISHED. THE ULTIMATE OBJECTIVE OF THE PROPOSED RESEARCH IS TO DEVELOP A GENERAL ANALYSIS TOOL FOR REINFORCED CONCRETE STRUCTURES SUBJECTED TO CONVENTIONAL WEAPONS EFFECTS.

ANCO ENGINEERS INC — NAVY — $ 65,529
9937 JEFFERSON BLVD
CULVER CITY, CA 90032
DR PAUL IBANEX
TITLE:
RADIOGRAPHIC DETERMINATION OF MASS AND INERTIAL TENSOR OF ANATOMICAL SEGMENTS
TOPIC: 57 OFFICE: NMC

THE NAVAL MEDICAL RESEARCH AND DEVELOPMENT COMMAND DESIRES TO NONDESTRUCTIVELY MEASURE THE INERTIAL PROPERTIES OF NON-HUMAN PRIMATE BODIES AND LIMBS. THESE RESULTS CAN BE USED IN BUILDING ACCURATE BODY DYNAMICS MODELS FOR CRASH AND SEAT EJECTION STUDIES AND FOR ASSESSING CERTAIN SHORT TERM EFFECTS IMMEDIATELY FOLLOWING SUCH TESTS. ANCO PROPOSES THE USE OF THREE AXIS RADIOGRAPHY (X-RAY PHOTOGRAPHYS) OF ANATOMICAL SEGMENTS WITH HIGH ENERGY PHOTONS (EXCESS OF 120 KeV) WHICH ALLOWS THE DETERMINATION OF TOTAL MASS, CENTER OF GRAVITY, AND THE SIX INDEPENDENT COMPONENTS OF THE INERTIA TENSOR. THIS TECHNIQUE DOES NOT REQUIRE ANY KNOWLEDGE OF THE NATURE OF THE TISSUES STUDIED (OR THEIR ABSORPTION COEFFICIENT) AND DOES NOT REQUIRE EXPENSIVE ON-SITE CT SCAN EQUIPMENT.

ANTICIPATORY SCIENCES INC — AF — $ 44,105
123 E GRANT ST - WESLEY BLDG/STE 600
MINNAPOLIS, MN 55403
EARL C JOSEPH
TITLE:
FUTURISTS WORKSHOPS - EXTENDED MAN POSSIBILITIES
TOPIC: 10 OFFICE: ASD/XR

ASI PROPOSES A RESEARCH METHODOLOGY FOR THE PURPOSE OF MAXIMIZING

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THE SEARCH FOR AND THE EXTRACTION OF NEW CONCEPTS AND INNOVATIONS IN THE AREA OF EXTENDING THE CAPABILITIES OF THE HUMAN IN AERONAUTICAL/ SPACE SYSTEMS THROUGH DESIGNING, CONDUCTING, RUNNING, AND MONITORING OF A FUTURISTS/RESEARCH WORKSHOP. THE PROPOSED METHODOLOGY INCLUDES: 1) THE USE OF ASI DESIGNED OR REFINED FUTURIST TOOLS AND METHODS TO STIMULATE THINKING ABOUT FUTURE POSSIBILITIES AND TO EXTRACT NEW INFORMATION RELATIVE TO FUTURE POSSIBILITIES; 2) INVITE PARTICIPANTS ENCOMPASSING PROFESSIONAL FUTURISTS, SCIENCE FICTION WRITERS, INDUSTRIAL MANAGERS/SCIENTISTS/ENGINEERS, AND AIR FORCE EXPERTS; 3) A FREE-WHEELING STRUCTURED WORKSHOP FORMAT ORGANIZED TO MAXIMIZE THE GENERATION, EXTRACTION, AND EXCHANGE OF NEW IDEAS, AND 4) TO FOCUS ON "EXTENDED MAN" FUTURES -- FOR EXAMPLE, TO CONSIDER THE HUMAN AS A "BLACK BOX" IN A WEAPON SYSTEM EXTENDED AND ENHANCED VIA AI ENHANCED, BIO-BODY ARMOR SYSTEMS, "VIRTUAL COCKPIT" ENVIRONMENTS, BIO-MUX SYSTEMS, BIO-GENETIC ENGINEERING, NEW MONOCLONAL ANTIBODY IMMUNIZED/CONDITIONED/PROTECTED SYSTEMS, ETHNOTRONIC SYSTEMS, ETHNOBIOGENETIC SYSTEMS, AND BIO-MOLECULAR "COMPUTER" SYSTEMS. AT THE CONCLUSION OF THE WORKSHOP, ASI PROPOSES TO PRODUCE A REPORT WHICH INCLUDES THE IDEAS GENERATED AND AN ANALYSIS OF THE FINDINGS.

APOLLO SYSTEMS TECHNOLOGY INC — AF — $ 50,000
27141 HIDAWAY AVE - STE 205
CANYON COUNTRY, CA 91351
ROBERT T UDA
TITLE:
PHYSICAL SECURITY THREATS TO SMALL ICBM BASING SYSTEMS DEFINITION AND ASSESSMENT
TOPIC: 120 OFFICE: BMO/PMX

A REQUIREMENT EXISTS (1) TO DEFINE/ASSESS PHYSICAL SECURITY THREATS TO THE SMALL ICBM HARD MOBILE LAUNCHER (HML) AS POSED BY TERRORIST AND PARAMILITARY GROUPS ADN (2) TO COUNTER AGAINST THESE THREATS. THREAT DEFINITION CHARACTERIZES POTENTIAL THREATS BASED ON A REVIEW OF EXISTING DOCUMENTS WHICH SUMMARIZE PAST TERRORIST ACTIVITY. THREAT CONSIDERATIONS RANGE FROM THEFT TO DESTRUCTION. CHARACTERISTICS INCLUDE LIKELY NUMBER OF PEOPLE PER GROUP, TYPES/CAPABILITIES OF WEAPONS, TYPES OF TOOLS/DEMOLITION EQUIPMENT, KINDS OF TRANSPORTATION, METHODS/TACTICS OF OPERATION, AND DAY/NIGHT OPERATIONS. BASED ON OUR RESULTS, METHODS WILL BE RECOMMENDED TO ASSURE HIGH LEVEL OF PROTECTION AGAINST THESE THREATS AT A REASONABLE COST.

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EMPHASIS WILL BE ON DEVELOPING NEW, COST-EFFECTIVE PHYSICAL SECURITY CONCEPTS INCLUDING SHIELDS, INTRUSTION SENSORS, ELECTRONIC/LASER FENCES, OPERATIONAL PROCEDURES, ETC. THE OUTCOME OF THIS STUDY WILL BE THE RECOMMENDATION OF SEVERAL ORIGINAL, INNOVATIVE CONCEPTS, IN DESCENDING ORDER OF PRIORITY, FOR DEVELOPING DURING PHASE II OF THIS PROGRAM.

APPLICATIONS RESEARCH CORP — AF — $ 47,700
428 LOUISIANA SE - STE A5
ALBUQUERQUE, NM 87108
KATHLEEN JOYCE
TITLE:
IMPLICATION OF OPEN DATA RELEASE IN STRATEGIC ICBM SYSTEMS
TOPIC: 75 OFFICE: BMO/PMX

PHASE I OF THIS PROPOSAL IS CONCERNED WITH THE DEVELOPMENT OF A DESIGN FOR A GENERIC INTELLIGENCE VALUE MODEL WHICH CAN BE USED FOR MANY DIFFERENT INTELLIGENCE AND WEAPON APPLICATIONS. THIS MODEL WILL ALLOW (FOR EACH PIECE AND LEVEL OF DATA) AN ASSOCIATED ESTIMATE OF THE INTELLIGENCE VALUE OF THIS DATA TO AN OPPOSING INTELLIGENCE SERVICE. THE DESIGN INVOLVES ASSOCIATIONAL RELATIONSHIPS BETWEEN DIFFERENT PIECES OF DATA. PREDICTIVE AND REACTIVE CAPABILITIES ARE INCORPORATED BY THE USE OF AN ELECTRONIC SPREADSHEET WITH INTERRELATIONSHIP FORMULAS DEFINING THE DATA STRUCTURE. A HIGH-LEVEL DESIGN FOR A STRATEGIC ICBM SYSTEMS INTELLIGENCE VALUE DATA BASE (TO BE USED WITH THE MODEL) IS ALSO TO BE DEVELOPED DURING THE PHASE I EFFORT. THE PHASE II TASK INVOLVES CODING AND DEBUGGING THE MODEL AND CODING THE STRATEGIC ICBM SYSTEMS INTELLIGENCE VALUE DATA BASE. THE MODEL PROGRAM IS TO BE EXERCISED WITH THIS DATA BASE AND A PRIORITIZED LIST OF SPECIFIC DATA ELEMENTS WHICH SHOULD BE HELD CLOSELY WILL BE OUTPUT.

APPLICATIONS RESEARCH CORP — ARMY — $ 55,935
330 S LUDLOW ST
DAYTON, OH 45402
RALPH J MCLEAN
TITLE:
COST-EFFECTIVE ANALYSIS OF A/C MULTI-SPECTRAL CM
TOPIC: 36 OFFICE: CECOM/EWL

CM SYSTEMS WHICH ARE MULTI-SPECTRAL IN NATURE ARE GOING TO BE RE-

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QUIRED TO PROTECT ARMY AIRCRAFT IN ADVANCED SCENARIOS DUE TO THE INCREASED SOPHISTICATION AND UTILIZATION OF THE TOTAL SPECTRUM BY ENEMY AIR DEFENSE NETWORKS. IN ORDER TO OPTIMIZE THE ARMY'S POSITION IN THIS MATTER A VITAL NEED EXISTS TO PERFORM A COMPREHENSIVE ENGINEERING LEVEL ANALYSIS OF ELECTRONIC BATTLEFIELD. IN ORDER TO DETERMINE HOW BEST TO COUNTER THREAT WEAPON SYSTEMS THAT USE INTEGRATED RF/EO/IR ASSETS. THIS PROPOSAL DESCRIBES AN ANALYSIS METHODOLOGY WHICH IS OPERATIONAL, WHICH HAS BEEN VALIDATED AND CORRELATED WITH FLIGHT TESTS AND DIRECTLY APPLICABLE TO SATISFY THIS REQUIREMENT. PHASE I PROGRAM PURPOSES TO DEMONSTRATE THE FEASIBILITY OF THIS ANALYSIS METHODOLOGY TO SATISFY THIS REQUIREMENT.

APPLICATIONS RESEARCH CORP — AF — $ 50,000
330 S LUDLOW ST
DAYTON, OH 45402
FREELAND D CRUMLY
TITLE:
SOFTWARE SATURATION ECM TECHNIQUES
TOPIC: 10 OFFICE: ASD/XR

THE RESEARCH WILL PROVIDE AN INVESTIGATIVE STUDY AND DEVELOPMENT OF VARIOUS ELECTRONIC COUNTERMEASURE (ECM) TECHNIQUES TO DEGRADE THE PERFORMANCE OF DIGITALLY CONTROLLED THREAT WEAPON SYSTEMS THROUGH THE DEVELOPMENT OF SOFTWARE ALGORITHMS DESIGNED TO SATURATE OR OVERLOAD THE THREAT. THE THREATS OF PRIMARY CONCERN ARE PASSIVE DETECTION/GUIDANCE SYSTEMS WHICH WILL RECEIVE SIGNALS EMITTED BY THE DETECTED TARGET, UNCONTAMINATED BY ANY REFLECTED SIGNAL. A SECONDARY APPLICATION OF THE RESULTS OF THE STUDY IS EXPECTED TO PROVIDE ECM TECHNIQUES WHICH ARE EFFECTIVE AGAINST ACTIVE SYSTEMS UNDER DIGITAL LOGIC CONTROL.

APPLICATIONS RESEARCH CORP — SDIO — $ 0
428 LOUISIANA SE - STE A5
ALBUQUERQUE, NM 87108
KATHLEEN JOYCE
TITLE:
AN EXCEPTION-ORIENTED AI SYSTEM TO SUPPORT C3 FOR THE SDI MISSION
TOPIC: 4 OFFICE: IST

PHASE I OF THIS PROPOSAL IS CONCERNED WITH THE DEVELOPMENT OF A DESIGN

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FOR AN ARTIFICIAL INTELLIGENCE SYSTEM TO SUPPORT C3 FOR THE SDI TRACKING MISSION. THE DESIGN WILL UTILIZE EXCEPTION REPORTING TO HELP REDUCE THE DATA OVERLOAD. IT WILL INCORPORATE EXPERT RULES OF TRACKING ANALYSIS. ONE OF THE QUESTIONS IT WILL ADDRESS IS "WHY WAS SUCH AN ORBIT CHOSEN?". IT WILL ALSO BE DESIGNED TO LOOK FOR PATTERNS TO RECOGNIZE CURRENTLY BENIGN "SLEEPER" SPACE OBJECTS WHICH MAY SUDDENLY "COME TO LIFE" AND DISPLAY A LETHAL CAPABILITY. THE PHASE II TASK INVOLVES THE ACTUAL CODING AND IMPLEMENTATION OF THE ARTIFICIAL INTELLIGENCE SYSTEM.

APPLIED & THEORETICAL MECHANICS INC — DNA — $ 48,758
4501 SEQUOYAH RD
OAKLAND, CA 94605
JOELLE CHAMPNEY
TITLE:
DUST LOFTING IN PRECURSOR FLOWFIELDS
TOPIC: 2 OFFICE: OAAM

THE OBJECTIVE OF THIS EFFORT IS TO ASSESS THE ACCURACY OF A RECENTLY DEVELOPED CODE, TURF2, TO PREDICT TRANSIENT EFFECTS CAUSED BY A SHOCK WAVE MOVING OVER A SAND BED, AND DIFFRACTING OVER AN OBSTACLE ON THE SURFACE AND IN A HOT LAYER OF GAS. DURING 1984, TURF2 TWO-PHASE FLOW BOUNDARY CONDITIONS AND TWO-PHASE FLOW TURBULENCE MODELING WERE IMPLEMENTED AND TESTED FOR STEADY FLOWS. RESULTS COMPARED WELL WITH EXPERIMENTS FOR FLOWS RESULTING FROM A WIND ABOVE A SAND BED AND FROM A SHOCK WAVE SWEEPING A SAND BED. IN THE PROPOSED EFFORT, A SERIES OF UNSTEADY TURBULENT TWO-PHASE FLOWS WILL BE SIMULATED AND COMPARED WITH EXPERIMENTAL DATA: (1) FOR A SHOCK WAVE SWEEPING A SAND BED, (2) FOR A SHOCK WAVE SWEEPING A SAND BED AND DIFFRACTING OVER AN OBSTACLE, (3) FOR A SHOCK WAVE SWEEPING A SAND BED INCLUDING A HOT LAYER OF GAS AND DIFFRACTING OVER AN OBSTACLE.

APPLIED ENGINEERING RESOURCES INC — AF — $ 49,990
PO BOX 345
SANTA BARBARA, CA 93102
EDWARD CONCHA
TITLE:
EXPLOSIVE EXCAVATION METHODS
TOPIC: 106 OFFICE: BMO/PMX

THE EXCAVATION OF ROCK AND DEEP BASED FACILITIES PRESENTS MAJOR COST

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SUBMITTED BY	DEPT	AWARDED AMOUNT

AND TECHNICAL CHALLENGES. PROPOSALS FOR TUNNELING ARE MOSTLY BASED ON USING TUNNEL BORING MACHINES. EXCAVATION BY DRILL AND BLAST METHODS, WITH MANY ADVANTAGES, ARE ALSO POSSIBLE. DRILL AND BLAST METHODS ARE LESS SENSITIVE TO ROCK QULITY AND TO CHANGES IN TUNNELING DIRECTION. MANY ATTEMPTS, OVER TIME AND BY DIFFERENT PEOPLE, HAVE BEEN MADE TO REDUCE THE CYCLIC INEFFFICIENCIES OF THE DRILL AND BLAST METHOD IN CONFINED HEADINGS. THERE HAS BEEN LITTLE EFFORT TO INTEGRATE TECHNOLOGIES AND TECHNIQUES DEVELOPED FROM ONE PROJECT TO ANOTHER. A PREVIOUS STUDY BY AER, RELATIVE TO MINING APPLICATIONS, INDICATED THAT THE MAJORITY OF SUBSYSTEMS HAVE BEEN DEVELOPED BUT NOT INTEGRATED INTO AN EFFECTIVE MECHANISM. THIS STUDY WILL REVIEW EXPLOSIVE EXCAVATION TECHNOLOGY, RELATIVE TO THE TYPE OF TUNNELS AND CONSTRUCTION SCHEDULES ENVISIONED IN A DEEP BASING, TO DETERMINE THE FEASIBILITY OF DEVELOPING AN EFFECTIVE AUTOMATED, CONTINUOUS, EXPLOSIVE EXCAVATION SYSTEM FOR POSSIBLE USE IN BOTH THE CONSTRUCTION PHASE AND IN THE POST ATTACK DIGOUT PHASE.

APPLIED FUSION TECHNOLOGIES INC — NAVY — $ 59,950
PO BOX 9652
FORT COLLINS, CO 80525
CHARLES CONNELLY
TITLE:
RELIABLE WELDING OF HSLA STEELS BY SQUARE WAVE PULSING USING AN ADVANCED SENSING (EDAP) TECHNIQUE
TOPIC: 5 OFFICE: ONR

PULSE WELDING TECHNIQUES FOR HSLA STEELS HAVE THE ADVANTAGES OF IMPROVING MICROSTRUCTURE, REDUCING DISTORTION AND INCREASING MECHANICAL PROPERTIES. THE PRIMARY OBJECTIVE IS TO IMPROVE RELIABILITY AND PREDICTABILITY OF WELDING HSLA STEELS. A NEW ADVANCED SENSING SYSTEM "EDAP" WILL PROVIDE REAL TIME PUDDLE SIZE AND QUALITY INFORMATION. THIS WILL IMPROVE THE CAPABILITIES OF AUTOMATED WELDING SYSTEMS. THE USE OF HIGH RESOLUTION, HIGH SPEED VIDEO WILL BE SHOWN AS A VIABLE AND ECONOMIC RESEARCH TOOL AND A METHOD OF MAINTAINING VISUAL RECORDS FOR ANALYTICAL STUDY. FOUR AREAS OF REASEARCH WILL BE DERIVED FROM ONE STUDY, PULSE WELDING OF HSLA STEELS, DATA BASE DEVELOPMENT FOR A710 STEELS, EVALUATING THE EDAP CONTROL SYSTEM, AND DEMONSTRATING THE VALUE OF HIGH SPEED VIDEO FOR CONDUCTING RESEARCH.

APPLIED PHYSICS INC — DARPA — $134,847
5345 WYOMING BLVD NE - STE 206
ALBUQUERQUE, NM 87109
RICHARD HOLLAND
TITLE:
EM SCATTERING AND RCS CALCULATION FOR GENERALIZED INFINITE CYLINDERS
TOPIC: 14 OFFICE: DARPA

CONTRACTOR WILL DEVELOP A NUMERICAL TECHNIQUE FOR COMPUTING THE TWO-

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DIMENSIONAL RCS OF AN ARBITRARY INFINITE CYLINDER. CYLINDER MAY BE INHOMOGENEOUS, ANISOTROPIC, ABRUPTLY DISCONTINUOUS, LOSSY, HYSTERETIC OR OTHERWISE NONLINEAR, AND TIME-VARYING. THE NUMERICAL TECHNIQUE WILL BE BASED ON A TIME-DOMAIN FINITE-DIFFERENCE ALGORITHM USING GENERALIZED NONORTHOGONAL COORDINATES. IT WILL BE ORGANIZED IN SUCH A WAY THAT EXTENSION TO THREE DIMENSIONS IS OBVIOUS AND STRAIGHT FORWARD. FREQUENCY-DOMAIN RCS RESULTS WILL BE OBTAINED FROM TIME-DOMAIN OUTPUT EITHER BY USING AN FFT OR BY DRIVING THE PROBLEM WITH CW ILLUMINATION PAST THE TIME WHEN START-UP TRANSIENTS DIE OUT.

APPLIED POLYMER TECHNOLOGY INC ARMY $ 76,853
6078 B CORTE DEL CEDRO
CARLSBAD, CA 92008
DR RICHARD J HINRICHS
TITLE:
ULTRASONIC DETERMINATION OF STORAGE AND LOSS MODULI OF SOLID PROPELLANTS
TOPIC: 64 OFFICE: MICOM

WE ULTRASONICALLY CHARACTERIZE THE VISCOELASTIC PROPERTIES OF GRADED AND DEGRADED SOLID PROPELLANT SAMPLES. THE RESULTS WILL BE EXAMINED IN ORDER TO DETERMINE WHETHER THIS METHOD CAN BE USED AS A DIAGNOSTIC TOOL FOR INDICATING THE DEGREE OF DEGRADATION.

APPLIED RESEARCH & DEVELOPMENT CO ARMY $ 45,781
PO BOX 245
MORRISVILLE, PA 19067
J A COSTANTINO-LAVELLE
TITLE:
MICRO-MINIATURE ELECTRO-OPTICAL ROLL SENSOR FOR IMPROVED SMART MUNITIONS PERFORMANCE
TOPIC: 1 OFFICE: ARDC

ONE F THE MORE DIFFICULT CHALLENGES IN THE DEVELOPMENT OF SMART MUNITIONS IS THE DESIGN OF SIMPLE, RELIABLE ROLL (OR ROLL RATE) SENSORS. ROLL SENSORS NOW IN USE ARE USUALLY COMPLEX, EXPENSIVE, LARGE AND/OR HEAVY. THE ELECTRO-OPTICAL ROLL SENSOR PROPOSED IN THIS SBIR PROJECT ATTEMPTS TO OVERCOME THESE SHORTCOMINGS BY UTILIZING THE INHERENT SIZE, POWER, PERFORMANCE AND WEIGHT ADVANTAGES OFFERED BY THE TECHNOLOGIES OF ELECTRONICS AND OPTICS. THE DESIGN DESCRIBED IN THE

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PROPOSAL IS SMALL, COMPACT, RUGGED AND LIGHTWEIGHT; IT OPERATES WITHOUT MOVING PARTS AND HAS MINIMAL POWER REQUIREMENTS. THE ROLL INFORMATION IT PROVIDES IS UNAMBIGUOUS AND INSTANTLY AVAILABLE IN DIGITAL FORM. THE ROLL SENSOR IS COMPATIBLE WITH BOTH HIGH AND LOW SPIN RATE PROJECTILES.

APPLIED RESEARCH ASSOCS INC — AF — $ 49,285
4300 SAN MATEO BLVD NE - STE A220
ALBUQUERQUE, NM 87110
DWAYNE D PIEPENBURG
TITLE:
AUTOMATIC TUNNEL CLOSURE
TOPIC: 89 OFFICE: BMO/PMX

THE PROJECT WILL ADOPT EXISTING SENSOR AND ELECTRICAL CONTROL TECHNOLOGY AND EQUIPMENT TO SENSE CHANGES IN ENVIRONMENTAL FACTORS THAT MIGHT BE DETRIMENTAL TO PERSONNEL AND EQUIPMENT IN DEEP UNDERGROUND TUNNEL COMPLEXES. BASED UPON LIMITING CONDITIONS SET INTO CONTROL SYSTEM COMPUTER PROGRAM, THE SENSOR SIGNALS WILL AUTOMATICALLY CLOSE OFF THE TUNNEL COMPLEX FROM ABOVE GROUND ENVIRONMENTS OR ISOLATE SEGMENTS OF THE TUNNEL COMPLEX TO PRECLUDE THE UNDESIRABLE SPREADING OF ADVERSE EFFECTS. THE CONTROL SYSTEM WILL BE MANUALLY REVERSIBLE AND WILL PERMIT MULTIPLE OPENINGS AND CLOSINGS OF THE CLOSURE MECHANISM. THE CLOSURES WILL CONSIST OF TWO DOOR PANELS, THAT OPERATE LIKE A GUILLOTINE, EACH CAPABLE OF CLOSING OFF THE TUNNEL INDEPENDENTLY.

APPLIED RESEARCH ASSOCS INC — DNA — $ 75,861
4917 PROFESSIONAL CT
RALEIGH, NC 27609
WILLIAM L DUNN
TITLE:
SHAPE AND COMPOSITION FACTORS IN GAMMA-RAY SHIELDING INVESTIGATION
TOPIC: 5 OFFICE: OAAM

STANDARD RADIATION TRANSPORT ANALYSIS TECHNIQUES WILL BE USED TO STUDY THE EFFECT OF SHIELD CONFIGURATION (SHAPE FACTORS, MATERIAL GRADIENTS) ON TARGET DOSE. SUCH A STUDY WILL ASSIST IN DETERMINING

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OPTIMAL SHIELD CONFIGURATIONS FOR PROTECTION OF MILITARY VEHICLES SUCH AS THE SMALL ICBM HARD MOBILE LAUNCHER AGAINST GAMMA RADIATION FROM NUCLEAR WEAPONS. PARTICULAR ATTENTION WILL BE PAID TO THE INCORPORATION OF STREAMING PATHS IN THE SHIELD, IN ORDER TO DIVERT GAMMA RAYS AWAY FROM CRITICAL AREAS. THE POTENTIAL SAVINGS (REDUCED DOSE FOR GIVEN SHIELD MASS OR REDUCE MASS FOR A SPECIFIED TARGET DOSE) ARE SIGNIFICANT. THE GOOD-GEOMETRY AND LAYERED-SHIELD PRINCIPLES PREVIOUSLY DEVELOPED BY THE APPLICANT WILL BE REFINED BY EVALUATING ABSORPTION AND SCATTERING INDICES, BY CONSIDERING RADIAL AND AXIAL GRADIENTS (ATOMIC NUMBER AND/OR DENSITY) IN INDIVIDUAL SHIELD MEMBERS AND BY INCORPORATING PLEATING OR RIBBING IN CONCENTRIC MULTILAYER SHIELDS TO GIVE PROTECTION OVER A SOLID ANGLE APPROACHING A HALF-SPACE. IN PHASE II, SHIELDING AGAINST NEUTRONS WILL BE CONSIDERED AND A SHIELDING OPTIMIZATION STRATEGY FOR EARLY INTEGRATION INTO THE OVERALL DESIGN PROCESS WILL BE DEVELOPED.

APPLIED RESEARCH ASSOCS INC — DNA — $ 69,320
4917 PROFESSIONAL CT
RALEIGH, NC 27609
ROBERT A FRANK
TITLE:
BIAXIAL INTERFACE STRESS TRANSDUCER FOR HIGH OVERPRESSURES - DEVELOPMENT
TOPIC: 3 OFFICE: OAAM

DEFINITION OF THE STRUCTURE-MEDIA INTERACTION (SMI) LOADS ON A BURIED STRUCTURE IS ONE OF THE LARGEST SOURCES OF UNCERTAINTY IN ANALYZING THE SURVIVABILITY OF STRATEGIC STRUCTURES. ADVANCEMENT OF THE STATE-OF-THE-ART IN THE MODELING OF SMI BEHAVIOR IS HAMPERED BY A LIMITED DATA BASE WHICH IS CONFINED TO OVERPRESSURES MUCH SMALLER THAN THOSE CURRENTLY OF INTEREST. THIS EFFORT PROPOSES TO DEVELOP AND TEST A BIAXIAL INTERFACE STRESS TRANSDUCER (BIST) CAPABLE OF MEASURING INTERFACE NORMAL AND SHEAR STRESSES AT VERY HIGH PRESSURES. THE PROPOSED GAGE WOULD BE A MODIFICATION OF THE TRIAXIAL INTERFACE STRESS GAGE (TIST) THAT IS CURRENTLY USED FOR LOW OVERPRESSURE ENVIRONMENTS. AS PART OF THE PROPOSED EFFORT, TECHNICAL ISSUES THAT HAVE ARISEN FROM APPLICATION OF THE TIST WILL BE INVESTIGATED. THESE ISSUES INCLUDE: (1) CROSS-AXIS ACCELERATION, (2) SUSCEPTIBILITY TO MOISTURE PENETRATION, (3) GAGE CALIBRATION, (4) GAGE OFFSETS, (5) DOWNSIZING THE GAGE, AND (6) DATA ANALYSIS AND INTERPRETATION. THE EFFORT WILL ALSO INVESTIGATE THE FEASIBILITY OF DEVELOPING A TEST FIXTURE TO MEASURE

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INTERFACE SHEAR IN SIMULATION DEVELOPMENT AND MATERIAL PROPERTY TESTS.

APPLIED SCIENCE GROUP INC — NAVY — $ 49,979
335 BEAR HILL RD
WALTHAM, MA 02254
DR DAVID SHEENA
TITLE:
EYE ATTITUDE SENSOR
TOPIC: 134 OFFICE: NTEC

AN ACCURATE, HIGH SPEED, LOW COST, HELMET MOUNTED EYE POSITION MEASUREMENT INSTRUMENT IS REQUIRED. APPLIED SCIENCE LABORATORIES (ASL) PROPOSES TO LEMONSTRATE THE FEASIBILITY OF A DUAL PATH, SOLID STATE LIGHT POSITION DETECTOR SCHEME BY BUILDING A LABORATORY BENCH TOP MODEL. TWO COORDINATES ON THE EYE THAT MOVE DIFFERENTIALLY WITH ROTATION WILL BE MEASURED. THIS WILL COMPENSATE FOR RELATIVE MOTION BETWEEN THE HELMET AND THE EYE, AND WILL MEASURE EYE LINE-OF-GAZE. EXISTING ASL HARDWARE WILL BE USED TO PROCESS THE RAW SIGNALS AND TO PROVIDE CALIBRATED EYE ATTITUDE DATA. A SUCCESSFUL FEASIBILITY DEMONSTRATION OF THE SCHEME WILL LEAD TO LOW COST, LIGHT WEIGHT, HIGH RESOLUTION, HELMET MOUNTED DEVICES WITH THE POTENTIAL FOR RESPONSE TIMES OF UNDER 5 MSEC. A WORKING HELMET MOUNTED SYSTEM SUITABLE FOR USE OR TEST WILL BE BUILT UNDER A PHASE II PROGRAM.

APPLIED SCIENCE TECHNOLOGY INC — DARPA — $ 49,738
1311A DOLLY MADISON BLVD
McLEAN, VA 22101
DR G DANIEL HICKMAN
TITLE:
APPLYING THE LASER-ACOUSTIC TECHNIQUE TO REMOTE SENSING ICE THICKNESS FEASIBILITY
TOPIC: 9 OFFICE: DARPA

A NEW HYBRID CONCEPT, REFERRED TO AS "LASER-ACOUSTICS," IS INTRODUCED AS A TECHNIQUE FOR DIRECTLY MEASURING ICE THICKNESS. IN THIS CONCEPT A PULSED CO2 LASER OPERATING FROM A REMOTE PLATFORM IN AIR IS FOCUSED ON ICE TO GENERATE AN ACOUSTIC FIELD HAVING A RELATIVELY FLAT FREQUENCY SPECTRUM OUT TO 100 kHz. A MICROPHONE ALSO LOCATED IN AIR DETECTS THE SOUND REFLECTED FROM THE ICE/WATER INTERFACE. PRECISE

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TIMING OF THESE SIGNALS MAKES IT POSSIBLE TO ACCURATELY MEASURE THE ICE THICKNESS. INITIAL ICE FIELD MEASUREMENTS PROVED THE FEASIBILITY OF THIS CONCEPT FOR MEASURING 1 METER THICK ICE. THE EMPHASIS OF THE PROPOSED PROGRAM IS TO INVESTIGATE THE BASIC AND SYSTEM PARAMETERS THAT ARE NECESSARY TO DEVELOP THIS CONCEPT INTO AN AIRBORNE REMOTE SYSTEM FOR MEASURING ICE THICKNESS OF SEVERAL METERS TO A RESOLUTION OF 0.25 - 0.5 METERS. IT IS POSSIBLE THAT SUCH A SYSTEM COULD BE USED IN A STAND-ALONE MODE, OR IN CONJUNCTION WITH OTHER "ICE SENSORS" TO ACCOMPLISH THE DESIRED DEPTH RESOLUTION AND WIDE AREA COVERGE FOR ROUTINE SURVEILLANCE OF ICE THICKNESS.

APPLIED TECHNOLOGIES INC — ARMY — $ 49,998
6395 GUNPARK DR - UNITE E
BOULDER, CO 80301
W R DAGLE
TITLE:
HIGH RELATIVE HUMIDITY MEASUREMENT
TOPIC: 30 OFFICE: LABCOM

A SONIC WIND SYSTEM THAT IS CAPABLE OF MEASURING WIND SPEEDS IN THE RANGE OF 0.1 METERS/SEC TO 30 METERS/SEC CAN BE USED TO COMPUTE THE RELATIVE HUMIDITY IN THE 95-100% RANGE. THE SPEED OF SOUND OF AIR IS A FUNCTION OF THE MOISTURE CONTENT OF THE AIR AND THE TEMPERATURE. BY MEASURING THE TEMPERATURE OF THE AMBIENT AIR, THE RELATIVE HUMIDITY CAN BE CALCULATED. A SINGLE SENSOR THAT COULD PROVIDE RELATIVE HUMIDITY MEASUREMENT, IN ADDITION TO WIND SPEED, WIND DIRECTION, AND TEMPERATURE WOULD GREATLY ENHANCE ATMOSPHERIC MODELS.

APPLIED TECHNOLOGY ASSOCS — AF — $ 49,662
PO BOX 19434
ORLANDO, FL 32814
ROBERT CAVALLERI
TITLE:
ACTIVE COOLING CONCEPTS FOR REENTRY VEHICLES REVIEW
TOPIC: 104 OFFICE: BMO/PMX

EXISTING EXPERIMENTAL DATA FOR ACTIVE COOLING CONCEPTS WILL BE REVIEWED. IN PARTICULAR THREE CONCEPTS WILL BE CONSIDERED, SLOT

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COOLING, GAS JET NOSE TIP COOLING AND TRANSPIRATION COOLING. THE DATA REVIEWED WILL BE SCREENED FOR USE AS INPUT AND ANALYSIS BY A TIME DEPENDENT NAVIER STOKES COMPUTER CODE. THE COMPUTER CODE WILL BE USED TO ANALIZE THE DATA AND ESTABLISH A CONFIDENCE LEVEL FOR THE COMPUTER CODE. CALCULATIONS FOR ACTUAL FLIGHT CONDITIONS AND INJECTANT WILL BE PERFORMED. RESULTS OF THE ANALYSIS AND REVIEW OF THE EXPERIMENTAL DATA WILL THEN BE USED TO DEFINE CRITICAL EXPERIMENTS FOR EACH OF THE COOLING CONCEPTS.

APTEK INC — AF — $ 67,744
2860 S CIRCLE DR - STE 346
COLORADO SPRINGS, CO 80906
BRETT A LEWIS
TITLE:
LOW IMPULSE LIGHTWEIGHT AFT COVER DESIGN
TOPIC: 112 OFFICE: BMO/PMX

THE GOAL OF THIS STUDY WILL BE TO PROVE THE FEASIBILITY OF DEVELOPING A HARDENED, LIGHTWEIGHT AFT COVER FOR FUTURE REENTRY VEHICLES. THE INDIVIDUAL TASKS INCLUDE, DETERMINING MATERIAL AND DESIGN REQUIREMENTS FOR FUTURE VEHICLES, IDENTIFYING WHAT MATERIAL AND DESIGN CONCEPTS WILL MEET THESE REQUIREMENTS, AND SELECTION OF THE BEST DESIGNS FOR FURTHER DEVELOPMENT. METHODS OF INTEGRATING THE USES OF MULTIPLE LAYERS INTO A SINGLE LAYER WILL BE INVESTIGATED. HARDNESS, WEIGHT, FABRICATION COSTS, AND RISK WILL BE USED TO RANK THE DIFFERENT CONCEPTS THAT MEET THE MATERIAL AND DESIGN GOALS. OVERLAYS, COMPOSITES, FOAMS, AND "NEW" METALS WILL BE SOME OF THE POSSIBLE MATERIALS TO BE EXAMINED. THIS STUDY WILL LEAD TOWARD AN AFT COVER THAT WILL WITHSTAND HIGHER LEVELS OF EXPOSURE ON FUTURE REENTRY VEHICLES AND AT THE SAME TIME BE LIGHTER IN WEIGHT.

APTEK INC — DNA — $ 69,964
2860 S CIRCLE - S BLDG/STE 346
COLORADO SPRINGS, CO 80906
JEFFREY A HOAG
TITLE:
DECOY OVERLAY MATERIALS STUDY
TOPIC: 5 OFFICE: OAAM

APTEK, AS PRIME CONTRACTOR, IN CONJUNCTION WITh GENERAL ELECTRIC

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COMPANY AND SRI INTERNATIONAL, AS SUBCONTRACTORS, WILL CONDUCT A STUDY TO IDENTIFY AND INVESTIGATE CANDIDATE OVERLAY MATERIALS VERSUS SYSTEM REQUIREMENTS FOR BOTH ACTIVE AND PASSIVE DECOYS. OVERLAY MATERIALS DEVELOPED BY THE NH&S COMMUNITY WILL BE CONSIDERED AS WELL AS PREVIOUSLY UNEVALUATED CANDIDATES SUCH AS RARE EARTH BORIDES. THE STUDY WILL ELIMINATE UNSUITABLE CANDIDATES FOR REASONS WHICH WILL BE DOCUMENTED, IDENTIFY PROMISING OVERLAY MATERIALS, AND IDENTIFY ANY TECHNOLOGY OR DATA GAPS WHICH PREVENT AN ADEQUATE EVALUATION. POTENTIAL PHASE II ACTIVITIES WILL INVOLVE PERFORMING A MORE DETAILED EVALUATION OF PROMISING CANDIDATES PRIMARILY THROUGH AN EXTENSIVE TEST PROGRAM TO ACQUIRE ENGINEERING DATA TO FURTHER CHARCTERIZE THE MATERIALS.

APTEK/TEKCON J V — ARMY — $ 0
2860 S CIRCLE DR - S BLDG/STE 346
COLORADO SPRINGS, CO 80906
WARREN P ROACH
TITLE:
PROTECTION OF MEDICAL EQUIPMENT AGAINST ELECTROMAGNETIC PULSE
TOPIC: 93 OFFICE: MED FT. DET

AS ARMY MEDICAL FIELD AND HOSPITAL EQUIPMENT, THROUGH TECHNOLOGICAL ADVANCES IN INTEGRATED HARDWARE, BECOMES MORE COMPLEX AND SOPHISTICATED, IT LIKEWISE BECOMES MORE SUSCEPTIBLE TO DAMAGE FROM POTENTIAL NUCLEAR EMP COUPLED CURRENT AND VOLTAGE TRANSIENTS. THIS PROPOSAL DEFINES A PLAN WHEREBY THE DESIGNATED MISSION ESSENTIAL MEDICAL EQUIPMENT MAY BE ANALYZED AND EVALUATED FOR TECHNIQUES TO ACHIEVE HARDNESS OF THE EQUIPMENT AGAINST EMP. THE GOAL OF THE RESEARCH TO BE PERFORMED UNDER THIS PHASE I PROPOSAL, IS TO DEFINE A UNIFORM HARDENING PLAN FOR THE SPECIFIC CLASSES OF EQUIPMENT WHICH CAN BE IMPLEMENTED IN A COST EFFECTIVE AND SYSTEMATIC MANNER.

ARACOR(ADVANCED RSCH & APPLICATION CORP) — SDIO — $ 49,100
1223 E ARQUES AVE
SUNNYVALE, CA 94086
LOUIS N KOPPEL
TITLE:
X-RAY SOURCE ENHANCEMENT FOR X-RAY LASER (XRL) MATERIAL RESPONSE EXPERIMENTATION
TOPIC: 3 OFFICE: IST

AN IMPORTANT ASPECT OF SDI DEVELOPMENT OF X-RAY LASER (XRL) WEAPONS

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SYSTEMS AND THE COUNTERMEASURES IS THE EXPERIMENTAL VALIDATION OF EFFECTS OF SIMULATION FIDELITY AND THE CREATION OF MATERIALS RESPONSE DATABASES. THIS EXPERIMENTAL PROGRAM USES AS A SOURCE OF INTENSE SOFT X-RAYS THE PLASMA RADIATING SOURCE (PRS) OPERATED BY THE DEFENSE NUCLEAR AGENCY. THE PRS AS CURRENTLY USED FAILS TO PROVIDE SUFFICIENT X-RAY FLUENCE, SPECTRAL QUALITY AND DEBRIS-FREE MEASUREMENT ENVIRONMENT REQUIRED BY THIS NEW XRL EFFECTS TESTING ROLE. A CALCULATIONAL/ EXPERIMENTAL PHASE I PROJECT IS PROPOSED TO DEVELOP A SPECTRALLY DISCRIMINATING X-RAY CONCENTRATOR OPTIC COMPONENT THAT WILL IMPROVE PRS PERFORMANCE IN THE XRL TESTING ROLE. THE BASIS FOR THIS COM PONENT IS THE ADVANCED LAYERED SYNTHETIC MICROSTRUCTURE (LSM) X-RAY INTERFERENCE MIRROR. PHASE I CALCULATIONAL EFFORT WILL ESTABLISH THE FEASIBILITY OF CONSTRUCTING FIGURED LSM X-RAY CONCENTRATOR OPTICS OFR PRS ENHANCEMENT. EXPERIMENTS WILL BE CONDUCTED AT A PRS FACILITY TO DEMONSTRATE DEBRIS MITIGATION AND TO INVESTIGATE LSM SURVIVABILITY IN THE PRS ENVIRONMENT.

ARD CORP NAVY $ 49,996
5457 TWIN KNOLLS RD - STE 400
COLUMBIA, MD 21045
DR EUGENE B SILVERMAN
TITLE:
AURAL PROCESSED SIGNALS FOR MINE DETECTION AND CLASSIFICATION
TOPIC: 65 OFFICE: NASC

THE DETECTION AND CLASSIFICATION OF UNDERWATER OBJECTS, SUCH AS MINES, BY MEANS OF ACOUSTIC SENSORS IS OF CONSIDERABLE PRACTICAL SIGNIFICANCE. UNFORTUNATELY, MANY RECENT ATTEMPS TO DEVELP SIGNAL PROCESSING TECHNIQUES TO ACCOMPLISH THIS AUTOMATICALLY HAVE ENJOYED ONLY LIMITED SUCCESS. RECENTLY, A NUMBER OF INVESTIGATORS SUGGESTED THAT THE CAPABILITY OF HUMAN LISTENERS CAN BE EXPLOITED TO FACILITATE THE DEVELOPMENT OF AUTOMATIC CLASSIFICATION ALGORITHMS. ONE OF THE MORE SUCCESSFUL TECHNIQUES WHICH EXAMINES HOW LISTENERS IDENTIFY PARTICULAR SETS OF SOUNDS INVOLVES OBTAINING AN ORTHORGONAL DECOM- POSITION OF A SET OF AUDITORY COMPARISONS USING MULTIDIMENSIONAL SCALING. THE PRIMARY OBJECTIVE OF THE PRESENT PROPOSAL IS TO EXPLORE THE POTENTIAL UTILITY OF HUMAN LISTENING CAPABILITIES FOR IDENTIFYING ACOUSTIC FEATURES USEFUL FOR MINE DETECTION AND CLASSIFICATION. MUL- TIDIMENSIONAL SCALING TECHNIQUES WILL BE APPLIED TO THE COMPARATIVE JUDGEMENT OF HUMAN LISTENERS. THE PROPOSED WORK WILL EXTEND EXISTING

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RESEARCH BY (1) INVESTIGATING SONAR RETURNS FROM SINGLE AND MULTIPLE TARGET OBJECTS OF DIFFERENT COMPOSITIONS AT DIFFERENT RANGES, (2) IDENTIFYING THE ACOUSTIC PARAMETERS BY WHICH HUMAN LISTENERS EVALUATE THESE SIGNLS, AND (3) EXPLORING THE FEASIBILITY OF DEVELOPING AN AUTOMATIC OR INTERACTIVE, SEMI-AUTOMATIC ALGORITHM TO ACCOMPLISH MINE DETECTION AND CLASSIFICATION.

ARIZONA CARBON FOIL CO INC — ARMY — $ 48,327
4152 E 6TH ST
TUCSON, AZ 85711
JOHN O STONER JR
TITLE:
DIAMOND-LIKE HARD CARBON COATINGS FOR PROTECTION OF OPTICAL COMPONENTS AND SYSTEMS
TOPIC: 77 OFFICE: AMMRC

WE WISH TO EXPLORE A NEW METHOD FOR PRODUCING VERY HARD DIAMOND-LIKE COATINGS ON OPTICAL COMPONENTS. TO DO THIS, WE WILL USE AN APPARATUS THAT ACCELERATES CARBON IONS FROM A CARBON ARCH OPERATING IN VACUUM. THIS METHOD HAS SEVERAL ADVANTAGES: LARGE QUANTITIES OF IONS CAN BE PRODUCED, SO COATINGS CAN BE MADE RAPIDLY. THE IONS' QUANTITY AND ENERGY, AND THUS THE PROPERTIES OF THE COATINGS RESULTING FROM THEM, CAN BE ADJUSTED EASILY BY EXTERNAL VOLTAGE CONTROLS. WE WILL PRODUCE SUCH COATINGS ON GLASS, SILICON, AND GERMANIUM SURFACES; WE WILL FURTHER INVESTIGATE THE DEPOSITION CONDITIONS THAT YIELD ABRASION-RESISTANT COATINGS, TEST THE OPTICAL PROPERTIES OF SUCH COATINGS IN THE ULTRAVIOLET, VISIBLE, AND INFRARED REGIONS, AND TEST THEIR CORROSION RESISTANCE TO COMMON ENVIRONMENTAL CHEMICALS.

ARNOX CORP — NAVY — $ 42,000
TWO SOUND VIEW DR
GREENWICH, CT 06830
JAMES E ROCK
TITLE:
FIRE RETARDANT TREATMENT OF PAPERBOARD MATERIALS
TOPIC: 48 OFFICE: NSSC

PROJECT OBJECTIVES: COMPLETE TESTING OF FIRE-RESISTANCE AND STRENGTH CHARACTERISTICS OF PAPER AND PAPERBOARD TREATED WITH ARNOX FIRE RE-

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TARDANT, DEVELOP PRODUCTION SCALE APPLICATION METHODS. ARNOX IS A PATENTED CONDENSED PHASE SYSTEM, LOW SMOKE FIRE RETARDANT RENDERS PAPER AND PAPERBOARD ESSENTIALLY NON-COMBUSTIBLE. DECOMPOSITION AND OUTGASSING IS MATERIALLY SLOWED. ASTM TESTS DEMONSTRATE TREATED PAPERBOARD WITH ZERO FLAMESPREAD AND SMOKE. ARNOX IS ph7, NON-TOXIC, NON-ALLERGENIC, COLORLESS, ODORLESS. PAPERBOARDS MAY BE IN-LINE OR RETRO-TREATED. IN THE LABORATORY, ARNOX TREATED PAPERBOARDS DEMONSTRABLY SUFFER LESS STRUCTURAL DEGRADATION THAN PRESENTLY AVAILABLE PAPERBOARDS AND MAY BE MADE WATER AS WELL AS FIRE RESISTANT. ARNOX TREATED BOARD MEASURES 60 ON LOI TESTS (VS. LOI 17 ON UNTREATED BOARD). ACHIEVEMENT OF VOLUME AVAILABILITY OF MATERIALS WITH THE DEMONSTRATED PROPERTIES REQUIRES BOTH CHEMICAL AND APPLICATIONAL DEVELOPMENT WORK, WHICH IS THE OBJECTIVE OF THIS GRANT.

ARROWHEAD PLASTIC ENGINEERING INC — NAVY — $ 48,469
1201 HOYT AVE
MUNCIE, IN 47302
DR ROBERT DEARBORN
TITLE:
MODIFICATION OF PHENOLIC FOAMS
TOPIC: 39 OFFICE: NSSC

RIGID, LOW DENSITY POLYURETHANE FOAM IS WIDELY USED IN CUSHIONING AND FLOTATION APPLICATIONS. IT DOES POSSESS CERTAIN DISADVANTAGES, INCLUDING COMBUSTABILITY, TOXIC GAS EVOLUTION IN A FIRE AND POOR DIMENSIONAL STABILITY. PHENOLIC FOAMS ARE MORE STABLE, DO NOT SUPPORT COMBUSTION AND LACK THE FUNCTIONAL GROUPS RESPONSIBLE FOR THE GASES, BUT THEY LACK STRENGTH AND RESISTANCE TO ABRASION. WE PROPOSE TO DEVELOP PHENOLIC FOAMS WITH IMPROVED PHYSICAL PROPERTIES AND SUITABLE FOR FOAM-IN-PLACE APPLICATIONS. THESE FOAMS ARE TO CONSIST OF TWO COMPONENTS, BOTH BEING PHENOL-ALDEHYDE BASED, WITH ONE COMPONENT BEING AN ALKALI-CATALYZED AND THE OTHER AN ACID-CATALYZED PRECONDENSATE. SURFACTANT AND BLOWING AGENT WILL BE ADDED TO THE SYSTEM TO PROVIDE THE CELLULAR STRUCTURE. THE PHYSICAL PROPERTIES TO BE IMPROVED INCLUDE FLEXIBILITY, FRIABILITY AND MECHANICAL STRENGTH. TO ACHIEVE THIS THE BASIC RESINS WILL BE MODIFIED TO REDUCE FUNCTIONALITY AND CONTROL CROSS-LINKING DURING THE CURE.

ARTECH CORP — ARMY — $ 49,901
2901 TELESTAR CT
FALLS CHURCH, VA 22042
DR FRED ORDWAY
TITLE:
HARD COATINGS FOR OPTICAL SURFACES DEVELOPMENT
TOPIC: 77 OFFICE: AMMRC

SURFACES OF BOTH TRANSMISSIVE AND REFLECTIVE OPTICAL COMPONENTS ARE

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MADE OF COMPARATIVELY SOFT MATERIALS (PLASTICS, OPTICAL GLASSES, HALIDE CRYSTALS, INFRARED-TRANSMITTING MATERIALS, ALUMINUM, SILVER) AND VULNERABLE TO SCRATCHING AND CHEMICAL DETERIORATION THROUGH ENVIRONMENTAL ATTACK AND ABRASION IN USE AND ROUTINE CLEANING. A COATING OF CUBIC BORON NITRIDE (cBN), HAVING A HARDNESS COMPARABLE TO DIAMOND AND HIGH CHEMICAL STABILITY, CAN GREATLY EXTEND THE USEFUL LIVES OF SUCH COMPONENTS. A PROGRAM OF RESEARCH, BASED ON THE EXPERIENCE AND CAPABILITIES OF ARTECH IN THIN FILM DEPOSITION AND INSTRUMENTATION AND THE ACCOMPLISHMENTS OF DR. CHARLES FELDMAN IN PRODUCTION OF PURE BOBON FILMS AT JOHNS HOPKINS APPLIED PHYSICS LABORATORY, IS PROPOSED TO IDENTIFY THE MOST SUITABLE PROCESS FOR APPLYING cBN COATINGS TO A WIDE RANGE OF OPTICAL SURFACES. THE PROGRAM, WITH DR. FELDMAN AS CONSULTANT, WILL EXPLORE THE USE OF VACUUM EVAPORATION IN CONJUNCTION WITH ION BEAM TECHNOLOGY AS WELL AS RADIO-FREQUENCY SPUTTERING TO DEPOSITE ADHERENT cBN FILMS ON UNHEATED SUBSTRATES. CONSULTATION ON ION BEAM TECHNIQUES AND EQUIPMENT WILL BE PROVIDED BY GEORGE J. LUTZ, WHO HAS HAD CONTINUOUS EXPERIENCE IN THAT FIELD BEGINNING IN 1969 WITH THE FIRST COMMERICAL ION MILLING APPARATUS. EQUIPMENT FOR PRACTICAL APPLICATIONS WILL BE DEVELOPED IN PHASE II.

ASTRON CORP — NAVY — $ 49,740
929 W BROAD ST
FALLS CHURCH, VA 22046
ED RATHBUN
TITLE:
VLF TRANSMIT ANTENNA DESIGN
TOPIC: 33 OFFICE: NESC

A TRANSPORT VHF (25-30 KHz) TRANSMIT SYSTEM ANTENNA WAS STUDIED. SEVERAL INNOVATIVE CONCEPTS WERE ANALYZED AND EVALUATED BOTH IN THE LABORATORY AND THE ANTENNA RANGE. ALL MEASUREMENTS ARE MODELED AT 2.5 TO 3 MHz. THE TECHNIQUES INCLUDE: LOOP, MONOPOLE (INCLUDE SLOW WAVE VERSIONS), CENTER-FED VERTICAL MONOPOLE, AND GROUND/AIR INTERFACE DIPOLE. THE PROGRAM STRESSED ANTENNAS WHICH COULD OPERATE IN AREAS WHERE THE GROUND CONDUCTIVITY IS POOR.

ASTRON CORP — NAVY — $ 49,812
PO BOX 1810
SPRINGFIELD, VA 22046
JOSEPH R JAHODA
TITLE:
HF BROADBAND AIRCRAFT ANTENNA STUDY
TOPIC: 60 OFFICE: NASC

A BROADBAND HIGH-FREQUENCY ANTENNA STRUCTURE FOR THE TACAMO AIRFRAME

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WAS STUDIED. THE STRUCTURES STUDIED WOULD NOT DEGRADE AERODYNAMIC PERFORMANCE AND WOULD ALLOW MULTIPLE TRANSMITTER OPERATION OVER THE FULL 2 TO 30 MHz BAND. EVALUATION FACTORS WERE EFFICIENCY, BAND-WIDTH, MINIMUM LOSSES, LOW RESISTANCE, AND MINIMUM CHANGES TO THE AIRCRAFT. INCLUDED IN THE STUDY WERE LONG WIRE, EMBEDDED, DIE-ELECTRIC LOADING AND ACTIVE TRANSMITTER TECHNIQUES.

ASTRON RESEARCH & ENGINEERING AF $ 70,000
2028 OLD MIDDLEFIELD WAY
MOUNTAIN VIEW, CA 94043
THOMAS J DAHM
TITLE:
ABLATIVE MATERIAL SURFACE ROUGHNESS EFFECTS TECHNOLOGY EXTENSION
TOPIC: 103 OFFICE: AFBMO/PMX

ABLATION BEHAVIOR AND THERMAL PROTECTION REQUIREMENTS FOR REENTRY VEHICLES ARE SIGNIFICANTLY INFLUENCED BY ROUGH WALL CONVECTION EF-FECTS. TO ACCURATELY CHARACTERIZE THE EFFECTS FOR SYSTEM DESIGN, IT IS ESSENTIAL TO UNDERSTAND THE PHYSICS OF THE TURBULENT BOUNDARY LAYER SUBJECT TO ARBITRARY ROUGHNESSES, AND THE ABLATION INDUCED DEVELOPMENT OF THE MORPHOLOGY. PHASE I OF THIS PROGRAM WILL ADDRESS THE BOUNDARY LAYER PHYSICS ASPECTS OF THE TECHNOLOGY. RECENT WIND TUNNEL SIMULATION DATA WILL BE REVIEWED AND ANALYZED FOR THE PURPOSES OF BRINGING THE RESULTS INTO THE EXISTING DATA BASE ENCOMPASSED BY THE CORRELATIONS EXISTING IN THE ABRES SHAPE CHANGE CODE (ASCC). TO FACILITATE DATA CORRELATIONS, FUNDAMENTAL BOUNDARY LAYER MODELING STUDIES WILL BE CARRIED OUT TO EXAMINE THE EFFECTS OF SURFACE MOR-PHOLOGY ON THE THERMAL AND MASS BOUNDAY LAYERS. WHEREAS THE IDEA OF AN EQUIVALENT SAND GRAIN ROUGHNESS HAS BEEN SHOWN TO CHARACTERIZE THE BEHAVIOR OF THE MOMENTUM BOUNDARY UNDER MOST CONDITIONS, THE PROPOSED RESEARCH HAS AS AN OBJECTIVE THE DERIVATION OF A THERMAL OR MASS BOUNDARY LENGTH SCALE OR RELATED FIGURE OF MERIT THAT CAN BE USED IN CONJUNCTION WITH THE EQUIVALENT SAND GRAIN ROUGHNESS TO CHARACTERIZE THE COUPLED MOMENTUM AND THERMAL OR MASS BOUNDAY LAYERS THAT DICTATE CONVECTIVE TRANSFER.

ASTRON RESEARCH & ENGINEERING AF $ 72,705
2028 OLD MIDDLEFIELD WAY
MOUNTAIN VIEW, CA 94043
CHARLES POWARS
TITLE:
MATERIALS FOR EML CONDUCTING RAILS WITH EMPHASIS ON TUNGSTEN COATED COPPER
TOPIC: 188 OFFICE: AD/PRM

THE INTEGRITY OF EML CONDUCTING RAILS IS A CRITICAL ISSUE; MELTING

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OR ABLATION DEGRADE BALLISTIC PERFORMANCE AND GUN DURABILITY. THE SEVERE RAIL ENVIRONMENT IS DUE TO PLASMA ARMATURE RADIATION, OHMIC HEATING, CONVECTION, MAGNETIC AND PRESSURE FORCES, AND FRICTION. THIS RESEARCH WILL DEVELOP, TEST, AND DEMONSTRATE AN OPTIMUM DUAL-MATERIAL CONDUCTING RAIL SYSTEM: A HIGH MELT TEMPERATURE COATING (TENTATIVELY TUNGSTEN) ON A HIGH HEAT SINK CAPABILITY SUBSTRATE MATERIAL (TENTATIVELY COPPER ALLOY). EMPHASIS WILL BE ON IDENTIFICATION OF THE BEST COATING MATERIALS AND APPLICATION PROCESS, AND THIS WILL BENEFIT FROM SUCCESSFUL TUNGSTEN COATED HYPERVELOCITY GAS GUN BARREL EXPERIENCE. BOTH CHEMICAL VAPOR AND PLASMAS SPRAY DEPOSITION PROCESSES WILL BE EVALUATED. PHASE I WILL INCLUDE ENVIRONMENT QUANTIFICATION, MATERIAL AND PROCESS CANDIDATE SELECTION, SPECIMEN FABRICATION AND CHARACTERIZATION, AND SCREENING TEST DESIGN. PHASE II WILL INCLUDE RAIL SPECIMEN SCREENING TESTS (TENTATIVELY IN A SHORT RAIL GUN TEST APPARATUS POWERED BY AN AVAILABLE 1.25 MJ CAPACITOR POWER SUPPLY), RESULTS ANALYSIS, AND RAIL DESIGN AND FABRICATION FOR REPRETITIVE-FIRE APPLICATION.

ASTRON RESEARCH & ENGINEERING — AF — $ 53,869
2028 OLD MIDDLEFIELD WY
MOUNTAIN VIEW, CA 94043
JOHN D SULLIVAN
TITLE:
GAS TURBINE EXIT TEMPERATURE MEASUREMENT
TOPIC: 214 OFFICE: AEDC/DOT

THE AIR FORCE NEEDS RELIABLE AND ACCURATE GAS TEMPERATURE MEASURING CAPABILITY AT HIGH TEMPERATURES. A SPECIFIC APPLICATION IS IN MEASURING GAS TURBINE COMBUSTOR EXIT TEMPERATURES, WHERE CURRENT NEEDS EXCEED THE CAPABILITY OF EXISTING TEMPERATURE MEASUREMENT SYSTEMS. THIS PROGRAM WILL DETERMINE THE FEASIBILITY OF A THERMAL PROBE SYSTEM CAPABLE OF 15 DEG F ACCURACY AT 2000 TO 3000 F FOR THE GAS TURBINE APPLICATION. THE PROPOSED METHOD CAN BE EXTENDED TO OTHER TEMPERATURE RANGES AND ENVIRONMENTS, GREATLY INCREASING ACCURACY AND TIME RESPONSE WITHOUT SACRIFICING PROBE DURABILITY. THE TECHNIQUE DESCRIBED USES COMMERCIALLY AVAILABLE PROBE MATERIALS AND SIGNAL CONDITIONING HARDWARE TO ACHIEVE THIS PERFORMANCE IN A SYSTEM THAT IS SIMPLER AND MORE RELIABLE THAN RADIATION PRYOMETRY OR LASER-BASED THERMOMETRY.

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ASTRON RESEARCH & ENGINEERING — NAVY — $ 50,000
2028 OLD MIDDLEFIELD WAY
MOUNTAIN VIEW, CA 94043
JOHN D SULLIVAN
TITLE:
HIGH SPEED GAS TEMPERATURE MEASUREMENT EQUIPMENT
TOPIC: 126 OFFICE: NWSC

THE NAVY NEEDS RUGGED, FAST-RESPONSE GAS TEMPERATURE MEASURING CAPABILITY; A SPECIFIC APPLICATION IS IN MEASURING MISSILE LAUNCHER EJECT CHAMBER TEMPERATURE TRANSIENTS. THIS PROPOSAL DESCRIBES A THERMAL PROBE SYSTEM CAPABLE OF MEASURING GAS TEMPERATURE CHANGES OF HUNDRED OF DEGREES FAHRENHEIT IN TIMES OF LESS THAN TEN MILLISECONDS. THIS METHOD CAN BE EXTENDED TO ANY TEMPERATURE ENVIRONMENT OF GREATLY IMPROVE TIME RESPONSE WITHOUT SACRIFICING PROBE DURABILITY. THE TECHNIQUE DESCRIBED USES COMMERCIALLY AVAILABLE PROBE MATERIALS AND SIGNAL CONDITIONING HARDWARE TO ACHIEVE THIS PERFORMANCE IN A SYSTEM THAT IS SIMPLER AND MORE RELIABLE THAN RADIATION PYROMETRY OR LASER-BASED THERMOMETRY.

ASTRON RESEARCH & ENGINEERING — SDIO — $ 0
2028 OLD MIDDLEFIELD WY
MOUNTAIN VIEW, CA 94043
CHARLES POWARS
TITLE:
ELECTROMAGNETIC LAUNCHER RAIL MATERIAL DEVELOPMENT
TOPIC: 18 OFFICE: IST

ELECTROMAGNETIC RAIL GUNS ARE KINETIC ENERGY WEAPON CANDIDATES FOR BALLISTIC MISSILE DEFENSE. HOWEVER, THE INTEGRITY OF THE CONDUCTING RAILS IS A CRITICAL ISSUE; MELTING OR ABLATION DEGRADE BALLISTIC PERFORMANCE AND GUN DURABILITY. THE SEVERE RAIL ENVIRONMENT IS DUE TO PLASMA ARMATURE RADIATION, OHMIC HEATING, CONVECTION, MAGNETIC AND PRESSURE FORCES, AND FRICTION. THIS RESEARCH WILL DEVELOP, TEST, AND DEMONSTRATE AN OPTIMUM DUAL-MATERIAL CONDUCTING RAIL SYSTEM: A HIGH MELT TEMPERATURE COATING (TENTATIVELY TUNGSTEN) ON A HIGH HEAT SINK CAPABILITY SUBSTRATE MATERIAL (TENTATIVELY COPPER ALLOY). EMPHASIS WILL BE ON IDENTIFICATION OF THE BEST COATING MATERIAL AND APPLICATION PROCESS, AND THIS WILL BENEFIT FROM SUCCESSFUL TUNGSTEN

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COATED HYPERVELOCITY GAS GUN BARREL EXPERIENCE. BOTH CHEMICAL VAPOR AND PLASMA SPRAY DEPOSITION PROCESSES WILL BE EVALUATED. PHASE I WILL INCLUDE ENVIRONMENT QUALIFICATION, MATERIAL AND PROCESS CANDIDATE SELECTION, SPECIMEN FABRICATION AND CHARACTERIZATION, AND SCREENING TEST DESIGN. PHASE II WILL INCLUDE RAIL SPECIMEN SCREENING TESTS, RESULTS ANALYSIS, AND RAIL DESIGN AND FABRICATION FOR REPRETITIVE-FIRE APPLICATION.

ATEAM CORP AF $ 47,520
7920 CHAMBERSBURG RD
DAYTON, OH 45424
KENNETH D WILKINSON
TITLE:
TEST EQUIPMENT FOR AVIONICS BEYOND 18 GHZ
TOPIC: 6 OFFICE: ASD/RW

USE OF THE FINAL REPORT WILL PERMIT A COST EFFECTIVE SELECTION OF TEST EQUIPMENT TO IMPROVE THE OPERATIONAL AVAILABILITY OF CURRENT PRIME SYSTEMS AT AN AFFORDABLE COST. THE PROGRAMS WILL NOT BE FACED WITH THE EXPENSE AND TIME OF DEVELOPING, TESTING, AND SUPPORTING NEW TEST AND CALIBRATION EQUIPMENT TO MEET MANY OF THEIR REQUIREMENTS. THIS RESEARCH PROJECT WILL BE STRUCTURED AND COMPLETED IN A WAY WHICH BUILDS ON PAST AND CURRENT EFFORTS FOR TESTING ABOVE 18 GHZ THUS SAVING MONEY AS WELL AS SCHEDULE TIME AND REDUCING PROGRAM RISKS. THE PHASE I REPORT WILL PROVIDE A COMPREHENSIVE LISTING OF COMMERCIAL AND DOD TEST AND CALIBRATION EQUIPMENT CURRENTLY AVAILABLE FOR RF TESTING ABOVE GHZ. THE FINAL REPORT WILL ALSO IDENTIFY ANY AIR FORCE, ARMY OR NAVY PRIME PROGRAMS CURRENTLY DEVELOPING RF TESTERS THAT WILL BE AVAILABLE WITHIN THE NEXT THREE YEARS. ALSO, THE REPORT WILL ITEMIZE IDENTIFIED INDEPENDENT RESEARCH AND DEVELOPMENT EFFORTS FOR TEST AND CALIBRATION EQUIPMENT, TECHNIQUES AND FACILITIES FOR USE ABOVE 18 GHZ. THE ANALYSIS, CONTAINED IN THE REPORT, WILL ALSO POINT OUT AREAS IN WHICH TESTING TECHNOLOGY RESEARCH AND FULL SCALE DEVELOPMENT SHOULD BE CONDUCTED TO IMPROVE FUTURE SUPPORT POSTURES.

ATMOSPHERIC & ENVIRONMENTAL RESEARCH INC AF $ 63,371
840 MEMORIAL DR
CAMBRIDGE, MA 02139
RONALD G ISAACS
TITLE:
INTERSATELLITE IMAGE COMPARISONS
TOPIC: 159 OFFICE: AFGL/XOP

A SIX-MONTH RESEARCH PROGRAM IS DESCRIBED TO DEVELOP WAYS TO COMPARE

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CONCURRENT DATA SAMPLES FROM A VARIETY OF IMAGING SENSOR SYSTEMS (BOTH VISIBLE AND THERMAL INFRARED SPECTRAL BANDS) IN ORDER TO ABET CLOUD ANALYSIS AND INTERPRETATION. SENSORS OF INTEREST INCLUDE THE DMSP OLS, NOAA AVHRR, GOES VISSR, AND LANDSAT TM/MSS. SALIENT SENSOR CHARACTERISTICS WILL BE IDENTIFIED, SAMPLE DATA SETS SELECTED AND ACQUIRED, IMAGES INTERCOMPARED, AND TECHNIQUES DEVELOPED TO TRANSFORM FROM ONE DATA SOURCE TO ANOTHER. BASED ON THE RESULTS OF THE ABOVE PHASE I EFFORT, GUIDELINES WILL BE SPECIFIED FOR IMAGING INTERCOMPARISONS. THESE MAY BE IMPLEMENTED AS ALGORITHMS FOR MACHINE PROCESSING, AS APPROPRIATE.

AUL INTSTRUMENTS INC — ARMY — $ 50,000
1055 STEWART AVE
GARDEN CITY, NY 11530
BERNARD SAUL
TITLE:
VEHICLE WASTE DISPOSAL SYSTEM
TOPIC: 72 OFFICE: TACOM

FEASIBILITY STUDY AND PRELIMINARY DESIGN OF A APPARATUS FOR DISPOSING OF LIQUID AND OTHER ORGANIC WASTE AND OTHER NON-METALLIC WASTES IN MILITARY VEHICLES WHEREIN THE WASTE IS PERIODICALLY MOVED FROM A HOLDING AREA TO A HEATING CHAMBER WHICH THEN UTILIZES HEAT (VEHICLE'S EXHAUST SYSTEM OR INDEPENDENT HEAT SOURCE) TO INCINERATE THE WASTE MATERIAL. BACTERIA IN THE WASTE ARE VAPORIZED AND DESTROYED BY THE HEAT THAT CONVERTS THE WASTE TO A PRODUCT THAT IS PRINCIPALLY STEAM AND A LITTLE FINE ASH. THIS RESIDUE IS PASSED THROUGH THE REMAINDER OF THE EXHAUST SYSTEM ALONG WITH THE EXHAUST GASSES. SPECIAL EMPHASIS WILL BE MADE TO MAKE SYSTEM COMPATIBLE WITH SPACE LIMITATIONS, OPERATIONAL REQUIREMENTS AND ENVIRONMENTAL STRESS REQUIRED OF A MILITARY VEHICLE. THE WASTE DISPOSAL SYSTEM DESIGN WILL ALLOW OPERATION WHILE THE VEHICLE IS OPERATING IN A CONTAMINATED ENVIRONMENT.

AUTOMATION RESEARCH OF CINCINNATI — NAVY — $ 44,882
3152 LINWOOD AVE - OFFICE C
CINCINNATI, OH 45208
DR WILLIAM G WEE
TITLE:
APPLICATION OF 3-D COMPUTER VISION METHODOLOGY TO REAL-TIME VIDEO IMAGES
TOPIC: 83 OFFICE: NSWC

THE FEASIBILITY STUDY INCLUDES R&D TASKS TO INVESTIGATE THE FOL-

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LOWING: A) WORKPIECE CLASSIFICATION; B) WORKPIECE LOCATION AND ORIENTATION, AND C) WORKPIECE SURFACE CONDITION. THESE TASKS INCLUDES PREPROCESSING OF REAL-TIME VIDEO DATA FROM A SPECIAL 3-D VISION SYSTEM, AND APPLICATIONS OF ADVANCED COMPUTER VISION METHODOLOGIES TO CARRY OUT THE INVESTIGATION OF A), B), AND C).

AUTOMATION TECHNOLOGY CORP — ARMY — $ 49,992
5457 TWIN KNOLLS RD
COLUMBIA, MD 21045
RICHARD K SIMMONS
TITLE:
3-D VIEWING SYSTEM ENHANCEMENTS FOR THE CONTROL OF ROBOTIC VEHICLES
TOPIC: 67 OFFICE: TACOM

THREE-DIMENSIONAL (3-D) VIEWING SUBSYSTEMS HAVE BEEN SHOWN TO FACILITATE TELEOPERATIONS IN A VARIETY OF SETTINGS BY PRESENTING BINOCULAR DISPARITY CUES TO DEPTH IN THE REMOTE SCENE. IN ORDER TO ENHANCE THE ADAPTABILITY OF 3-D VIEWING SUBSYSTEMS TO DIFFERENT SITUATIONS AND OPERATORS, IT IS PROPOSED TO DEVELOP AN ENGINEERING MODEL OF AN ELECTROMECHANICAL DEVICE FOR VARYING THE ORIENTATION, SEPARATION, CONVERGENCE, AND FOCUS OF THE CAMERAS. FOLLOWING A MISSION ANALYSIS AND DESIGN SPECIFICATION, THIS ELECTROMECHANICAL DEVICE, AND ASSOCIATED CONTROLS FOR THE TELEOPERATOR, WILL BE DESIGNED AND FABRICATED. EMPIRICAL TESTS OF TELEOPERATION PERFORMANCE WILL BE CONDUCTED WITH THE DEVICE MOUNTED ON A MOBILE VEHICLE, IN ORDER TO DEMONSTRATE THE FEASIBILITY OF THIS ADAPTABLE 3-D SUBSYSTEM IN COMPARISON TO PERFORMANCE WITH FIXED CAMERA 3-D AND 2-D VIEWING SUBSYSTEMS.

AZTEC ENGINEERING INC — ARMY — $ 0
1079 YALE CIRCLE
BOULDER, CO 80303
DR J MARK ELDER
TITLE:
AUTOMATED PHYSIOLOGIC MONITORING FOR FIELD STABILIZATION OF TRAUMA CASES
TOPIC: 88 OFFICE: MED FT. DET

IN FUTURE CONFLICTS, THE RAPID EVACUATION TO DEFINITIVE CARE OF THE

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VIETNAM ERA MAY NOT BE POSSIBLE. THE FIELD MEDICAL SPECIALIST MAY BE REQUIRED TO STABILIZE AND TRIAGE MANY CASUALTIES OF VARYING COMPLEXITY. IN THIS PROPOSAL, THE USE OF SOPHISTICATED MEDICAL INSTRUMENTATION AND COMPUTER TECHNOLOGY TO ASSIST FIELD PERSONNEL IS DISCUSSED. A MINIATURIZED COMPUTER-BASED PHYSIOLOGIC MONITORING SYSTEM MAY BE POSSIBLE WHICH WOULD HELP IDENTIFY TRENDS, SUGGEST INTERVENTION, PRIORITIZE TRANSPORT, DOCUMENT THE PATIENT'S COURSE, AND ORGANIZE THE APPROACH TO MULTISYSTEM TRAUMA. SUCH A SYSTEM HAS THE POTENTIAL TO OPTIMIZE THE UTILIZATION OF FIELD PERSONNEL AND EVACUATION FACILITIES AND, THUS, IMPACT EARLY MORTALITY. IN ADDITION, THIS SYSTEM COULD CONTINUE PROVIDING HIGH QUALITY MONITORING THROUGH TRANSPORT AND DEFINITIVE CARE.

BAKER W ENGINEERING — NAVY — $ 48,809
PO BOX 6477 - 218 E EDGEWOOD PL
SAN ANTONIO, TX 78209
DR WILFRED E BAKER
TITLE:
ENHANCED CONVENTIONAL EXPLOSIVES
TOPIC: 10 OFFICE: CMC

TWO CONCEPTS ARE ADVANCED FOR ACHIEVING HIGH BLAST OVERPRESSURES OVER LARGE SURFACE AREAS, USING MODEST AMOUNTS OF CONVENTIONAL HIGH EXPLOSIVES. PRELIMINARY CALCULATIONS OF PERFORMANCE IN THE PROPOSAL SHOW GOOD PROMISE. WE PROPOSE TO DETERMINE THE FEASIBILITY OF BOTH CONCEPTS BY LIMITED TESTING, AND TO PLAN MORE EXTENSIVE R&D IF TEST RESULTS SHOW ONE OR BOTH CONCEPTS DO INDEED SHOW GOOD PROMISE OF MEETING PROGRAM OBJECTIVES. DELIVERY METHODOLOGY AND EQUIPMENT WOULD BE A SEPARATE DEVELOPMENT.

BD SYSTEMS INC — AF — $ 58,486
20675 S WESTERN - STE 204
TORRANCE, CA 90501
DON R HOWARD
TITLE:
SURVEILLANCE INFORMATION ON CYCLE TIME ON SMALL MOBILE SYSTEMS ASSESSMENT
TOPIC: 124 OFFICE: AFBMO/PMX

SMALL MOBILE MISSILE SYSTEM CONCEPT VIABILITY IS DEPENDENT ON DENIAL

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OF ACCURATE TARGETING INFORMATION TO THE AGRESSOR. RELOCATION TIMES MUST BE LESS THAN THE AGRESSOR'S SURVEILLANCE/TARGETING CYCLE TIME. THIS STUDY PROJECTS SOVIET SURVEILLANCE CAPABILITIES AND INFORMATION PROCESSING AND RETARGETING CAPABILITIES FOR THE 1995 TO 2000 TIME PERIOD. BASED ON THIS PROJECTION, THE SMALL MOBILE MISSILE SYSTEM DESIGN AND OPERATIONS CONCEPT, AND THE OPTIONS THERETO ASSESSMENT IS MADE OF THE SOVIET TIMELINES FOR RETARGETING WHICH COULD BE ACHIEVED. PHASE I EFFORTS ARE FOCUSED ON DEVELOPING TIMELINES FOR SPACE-BASED SURVEILLANCE OPTIONS. (CONUS-BASED OPERATIVE TEAM COLLECTION TIME-LINE OPTIONS ARE TO BE DEVELOPED; THEIR ASSESSMENT WILL BE IN PHASE II.

BD SYSTEMS INC — AF — $ 66,724
20675 S WESTERN AVE - STE 204
TORRANCE, CA 90501
ROBERT H MCDOUGLE
TITLE:
PHYSICAL SECURITY THREATS TO SMALL ICBM BASING SYSTEMS DEFINITION AND ASSESSMENT
TOPIC: 120 OFFICE: AFBMO/PMX

TERRORIST/PARAMILITARY ACTIVITIES ARE ON THE RISE THROUGHOUT THE WORLD. THE IMPLICATION OF THIS ENVIRONMENT FOR THE SMALL ICBM HARD MOBILE LAUNCHER PHYSICAL SECURITY SYSTEM MUST BE CAREFULLY ANALYZED. THIS STUDY WILL DEFINE AND ASSESS POTENTIAL PHYSICAL SECURITY THREATS TO THE SICBM/HML AND WILL DEFINE AND ASSESS COUNTERMEASURE OPTIONS FOR THREAT NEGATION. MASSIVE PROTECTIVE MEASURE, MILITARY ESCORTS, AND ELABORATE DEFENSIVE SYSTEMS ARE INCOMPATABLE WITH THE BASIC CONCEPT OF A SMALL MOBILE MISSILE TO BE OPERATED AT REASONABLE COST. NEW COUNTERMEASURE CONCEPTS ARE URGENTLY NEEDED. INNOVATIVE NEW IDEAS ARE TO BE ASSESSED FOR THREAT DETECTION, THREAT ANALYSIS/EVALUATION, AND THREAT NEGATION. FOR EXAMPLE, ONE AREA SURVEILLANCE IDEA FOR THREAT VEHICLE DETECTION IS TO SENSE EXISTING COMMUNICATIONS SATELLITE ENERGY REFLECTING OFF THE THREAT. THIS AND OTHER DEMONSTRATED TECHNOLOGY IS SUGGESTED AS POSSIBLE TECHNOLOGY TRANSFER FROM OTHER APPLICATIONS. THE FEASIBILITY OF THIS AND OTHER NEW CONCEPTS IS TO BE DETERMINED IN PHASE I. A METHODOLOGY FOR THREAT ASSESSMENT LEADING TO SELECTION OF A CREDIBLE AND VIABLE PHYSICAL SECURITY PLAN IS ALSO DEVELOPED.

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BELTRAN INC
1133 E 35TH ST
BROOKLYN, NY 11210
MICHAEL R BELTRAN
TITLE:
PASSIVE VULNERABILITY REDUCTION TO HOSTILE THREATS
TOPIC: 39 OFFICE: AFWAL/FI

AF $ 50,000

FUEL FIRES AND EXPLOSIONS FROM HITS TO THE AIRCRAFT FUEL SYSTEM BY INCENDIARY AND HIGH ENERGY BALLISTIC PROJECTILES AND WARHEAD FRAGMENTS HAVE BEEN THE GREATEST SINGLE CAUSE OF AIRCRAFT LOSS IN PAST AIRWARS. THE PHASE I TECHNICAL OBJECTIVES WILL BE TO SELECT INNOVATIVE CONCEPTS OR TECHNIQUES WHICH COULD PROVE EFFECTIVE IN REDUCING THE COMBAT FUEL FIRE AND EXPLOSIVE THREAT IN FUEL TANK VOID SPACES OR DRY BAYS ADJACENT TO TANKS WITHOUT THE PERFORMANCE OR COST PENALTIES OF CURRENT STATE OF THE ART METHODS. PHYSICAL OR CHEMICAL MECHANISMS BY WHICH LIQUID FUEL IN THE FUEL TANK OR DRY BAY CAN BE NEUTRALIZED OR PREVENTED FROM PARTICIPATING IN THE COMBUSTION WILL BE SELECTED. THE WORK OF PHASE I WILL BE TO SCREEN THE CANDIDATE MECHANISMS BASED ON ANALYTICAL COMBUSTION AND EXPERIMENTAL DATA. BASED ON THE FINAL SELECTED MECHANISM(S), SEVERAL AGENTS, PROCESSES, OR TECHNIQUES WILL BE DEVELOPED FOR DETAILED EVALUATION AND SUBSCALE TESTING TO BE CONDUCTED IN PHASE II. THE TEAM OF INVESTIGATORS DRAW FROM NEARLY 80 YEARS OF EXPERIENCE IN COMBUSTION PROCESSES AND MODELING WITH OVER 10 DIRECTLY USEFUL REFERENCES IN THE AIRCRAFT FIRE SAFETY LITERATURE. FURTHER, THIS CONTRACT WILL QUALIFY FOR THE NEW YORK STATE SBIR FUND MATCHING PROGRAM WHICH CAN DOUBLE THE R & D ON THIS TOPIC WITHOUT THE AIR FORCE EXPENDING FUNDS ABOVE THE ORIGINAL SBIR CONTRACT.

BENEL ASSOCS
8603 BUCKBOARD DR
ALEXANDRIA, VA 22308
DENISE C R BENEL
TITLE:
ENHANCES VISUAL SELECTION TECHNIQUES
TOPIC: 73 OFFICE: AMD/RDO

AF $ 37,788

A FOUR STAGE PHASE I EFFORT WILL BE CONDUCTED TO DEVELOP A RAPID

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SCREENING TECHNIQUE FOR THE DARK FOCUS, COMPARE THE DARK FOCUS WITH VISUAL CONTRAST SENSITIVITY, INVESTIGATE THE UNDERLYING RELATIONSHIP BETWEEN THE DARK FOCUS AND MEASURED VISUAL CONTRAST SENSITIVITY, AND DEVELOP A PLAN TO DEVELOP OPTIMAL PILOT SELECTION ALGORITHMS FOR VISUAL CHARACTERISTICS. THE DARK FOCUS WILL BE MEASURED BY AN OPTOMETER TO BE CONSTRUCTED ACCORDING TO A DESIGN SELECTED DURING STAGE 1. CURRENT CANDIDATES ARE THE LASER OPTOMETER AND THE VERNIER OPTOMETER. DATA WILL BE COLLECTED DURING STAGE 2 FOR BOTH THE DARK FOCUS AND VISUAL CONTRAST SENSITIVITY. THE ANALYSES WILL BE DIRECTED AT ELUCIDATION OF POTENTIAL VARIATIONS IN CONTRAST SENSITIVITY AS A RESULT OF PREFERRED FOCAL DISTANCE-TARGET DISTANCE MISMATCHES.

BERKELEY RESEARCH ASSOCS INC — ARMY — $ 49,774
PO BOX 241
BERKELEY, CA 94701
NINO R PEREIRA
TITLE:
SOFT X-RAY MODIFICATION FOR AURORA
TOPIC: 41 OFFICE: LABCOM

ACHIEVEMENT OF AN INTERN FLASH X-RAY TEST FACILITY BASED AS COMPTON BACKSCATTER OF FLASH GAMMA-RAYS DEMANDS THAT THE PRIMARY RADIATION SOURCE BE SMALL COMPARED TO THE DESIRED TEST AREA. THIS PROPOSAL IS TO EVALUATE ELECTRON BEAM DIODE CONCEPTS WITH PROMISE FOR A SMALL GAMMA RAY SOURCE, AND TO ASCERTAIN THE LOWER LIMITS ON THE TEST AREA SPRINGING FROM DIODE LIMITATIONS.

BIHRLE APPLIED RESEARCH INC — AF — $ 48,801
400 JERICHO TURNPIKE
JERICHO, NY 11753
BILLY P BARNHART
TITLE:
COMPUTATIONAL TECHNIQUE AND DESIGN GUIDE DEFINING DEPARTURE/SPIN RESISTANT FOREBODY CONFIGURATIONS DEVELOPMENT
TOPIC: 30 OFFICE: AFWAL/FI

AIRPLANE FOREBODY DESIGN HAS CONSISTENTLY DEMONSTRATED SIGNIFICANT INFLUENCES ON BOTH STATIC AND ROTATIONAL AERODYNAMICS AND, CONSEQUENTLY, ON HIGH ANGLE-OF-ATTACK FLIGHT CHARACTERISTICS AND SPIN

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SUBMITTED BY	DEPT	AWARDED AMOUNT

BEHAVIOR. AN EXTENSIVE HIGH ANGLE-OF-ATTACK DATA BASE FOR MILITARY CONFIGURATIONS HAS BEEN GENERATED USING THE ROTARY BALANCE AT THE NASA LANGLEY 20-FOOT SPIN TUNNEL. THIS DATA BASE WILL BE UTILIZED TO CORRELATE STATIC AND ROTATIONAL AERODYNAMIC CHARACTERISTICS WITH FOREBODY DESIGN PARAMETERS. THE RESULTS OF THIS ANALYSIS WILL BE FORMULATED INTO A PRELIMINARY DESIGN GUIDE, WHICH WILL DEMONSTRATE THE RELATIONSHIP OF HIGH ANGLE-OF-ATTACK AERODYNAMIC CHARACTERISTICS WITH FOREBODY DESIGN. THIS TYPE OF INFORMATION IS REQUIRED AS A PRE-REQUISITE FOR THE FORMULATION OF COMPUTATIONAL TECHNIQUES.

BIO-METRIC SYSTEMS INC ARMY $ 80,683
9932 W 74TH ST
EDEN PRAIRIE, MN 55344
DR MELVIN J SWANSON
TITLE:
STABILIZATION OF PROTEINS BY CROSSLINKING
TOPIC: 18 OFFICE: CRDC

A PROJECT IS PROPOSED TO DEVELOP TECHNIQUES FOR STABILIZATION OF PROTEINS BY COVALENT CROSSLINKING. WE PLAN TO USE MONOCLONAL ANTIBODY SPECIFIC FOR T-2 TOXIN AS THE PRIMARY PROTEIN TO USE FOR DEVELOPING STABILIZATION TECHNOLOGY. USING LIGAND STABILIZATION TO DECREASE INACTIVATION DURING THE CROSSLINKING, WE PROPOSE TO EVALUATE THE EFFECTIVENESS OF INTRAMOLECULAR CROSSLINKING BETWEEN BOTH HYDROPHILIC AND HYDROPHOBIC GROUPS IN THE PROTEIN MOLECULES AS WELL AS INTERMOLECULAR CROSSLINKING WITH HIGHLY STRESS RESISTANT PROTEIN.

BIO-METRIC SYSTEMS INC ARMY $ 0
9932 W 74TH ST
EDEN PRAIRIE, MN 55344
DR PETER H DUQUETTE
TITLE:
ENZYME IMMUNOASSAY FOR T-2 TETRAOL
TOPIC: 100 OFFICE: MED FT. DET

MUCH ATTENTION HAS BEEN FOCUSED UPON THE POSSIBLE USE OF TOXIC BIOLOGICAL AGENTS IN BOTH SOUTHEAST ASIA AND AFGANISTAN. SUCH INCIDENTS INDICATE A NEED FOR IMPROVING THE UNITED STATES CAPABILITY TO ACCUR-

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ATELY DETECT THESE TOXINS AT LEVELS WELL BELOW THOSE LETHAL TO HUMANS. ONE OF THE MOST COMMON GROUPS OF NATURALLY OCCURING TOXINS IS THE TRICHOTHECENE (E.G., T-2 TOXIN) WHICH ARE HIGHLY TOXIC SECONDARY METABOLITES OF MOLDS THAT HAVE BEEN IDENTIFIED AS THE CAUSE OF TOXICOSES IN HUMANS AND ANIMALS. THE U.S. ARMY HAS SPECULATED THAT T-2 TOXIN HAS BEEN USED AND THUS HAS SOUGHT ASSISTANCE IN DEVELOPING ANALYTICAL METHODS FOR DETECTION OF T-2 TOXIN AND ITS CHIEF URINARY METABOLITE T-2 TETRAOL. A VARIETY OF METHODS ARE AVAILABLE FOR DETERMINING POSSIBLE MYCOTOXIN CONTAMINATION IN BIOLOGICAL FLUIDS OR THE ENVIRONMENT. MOST OF THE AVAILABLE ASSAYS (E.G., HPLC, GC-MS) REQUIRE EXPENSIVE EQUIPMENT, TRAINED PERSONNEL, AND ARE SLOW IN DETERMINING IF CONTAMINATION IS PRESENT. WE PROPOSE TO DEVELOP AN ENZYME IMMUNOASSAY (EIA) WHICH WILL BE USEFUL FOR THE DETECTION OF LOW CONCENTRATIONS OF T-2 TETRAOL IN URINE WHICH IS ALSO ADAPTABLE FOR DETECTION OF OTHER BIOLOGICAL TOXINS. THE ASSAY IS SIMPLE, FAST (LESS THAN 5 MINUTES), NONINSTRUMENTAL AND THUS EASILY PORTABLE FOR FIELD USE BY MILITARY PERSONNEL.

BIOMATRIX INC ARMY $ 0
PO BOX 536 - 56 RAILROAD AVE
RIDGEFIELD, NJ 07657
DR NANCY E LARSEN
TITLE:
WOUND DRESSING WITH AN ANTI-ADHESIVE ANTIBIOTIC HYALURONIC ACID COATING
TOPIC: 88 OFFICE: MED FT. DET

WE HAVE DESIGNED A NOVEL WOUND DRESSING MATERIAL WHICH IS NONADHESIVE, BACTERICIDAL, BIOLOGICALLY COMPATIBLE (NONIMMUNOGENIC, NONINFLAMMATORY, NONTHROMBOGENIC) AND IMPERMEABLE TO BACTERIA. WOUND DRESSING MATERIALS IN USE TODAY (EXAMPLE: GAUZE) CAN BE TREATED WITH AN INSOLUBLE, ANTIBIOTIC-CONTAINING, HYALURONIC ACID (HA) COATING TO PROVIDE A PERMEABLE, NONADHESIVE (CLOTTED BLOOD-WET OR DRY- WILL NOT BIND TO THIS SURFACE) BARRIER TO THE ENVIRONMENT. THIS HYDROPHILIC COATING WOULD DECREASE DEHYDRATION OF THE WOUND WHILE ALLOWING DIFFUSION OF LOW MOLECULAR WEIGHT METABOLITES OUT OF THE WOUND, THEREBY REDUCING PAIN, SWELLING, AND THE NUMBER OF TIMES THE DRESSING MUST BE CHANGED. THIS HA COATING WOULD ALSO RESTRICT THE TRAFFIC OF BATERIA INTO THE WOUND WHILE THE ANTIBIOTIC PRESENT WOULD DIMINISH THE POSSIBILITY OF INFECTION DUE TO GROWTH OF BACTERIA ALREADY INHABITING THE WOUND SITE. A DRESSING OF THIS TYPE WOULD BE EXPECTED TO PROMOTE

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HEALING OF THE WOUND BY PROVIDING A FAVORABLE ENVIRONMENT (MOIST, WARM, NON-INFECTED, ABSENCE OF TISSUE REACTION) FOR CELLS TO GROW IN AND TO MIGRATE OVER THE WOUND SURFACE. PROCEDURES FOR ASSESSING THE EFFICACY OF THIS TYPE OF WOUND DRESSING ARE DESCRIBED IN THIS PROPOSAL.

BURTON R TECHNOLOGIES INC — NAVY — $ 47,220
PO BOX 5676
RALEIGH, NC 27650
RALPH A BURTON
TITLE:
CONTROL OF SURFACE ATTACK BY GALLIUM ALLOYS IN ELECTRICAL CONTACTS
TOPIC: 1 OFFICE: ONR

AN EXPERIMENTAL APPARATUS WILL BE FABRICATED FOR INSTRUMENTED OPERATION OF CURRENT COLLECTORS IN CONTROLLED ATMOSPHERES. TERNARY ALLOYS OF GALLIUM, INDIUM AND TIN WILL BE MADE AND APPLIED TO SURFACES OF THE CURRENT COLLECTORS AND SUBJECTED TO OPERATION, ACCOMPANIED BY OBSERVATION OF FRICTION, WEAR, CONTACT RESISTANCE, AND CHEMICAL COMPOSITION OF THE FILM AND WEAR DEBRIS. INFORMATION OBTAINED WILL BE USED IN THE FORMULATION OF ADJACENT MATERIALS CHOICES FOR EXTENDED INVESTIGATIONS, AND ULTIMATELY FOR COLLECTOR DEVELOPMENT.

CAMBRIDGE ISOTOPE LABS — AF — $ 41,085
20 COMMERCE WAY
WOBURN, MA 01801
DR L ANANTHASUBRAMANIAN
TITLE:
SYNTHESIS OF NEW HIGH STABILITY POLYMERS
TOPIC: 50 OFFICE: AFWAL/ML

THE PROPOSED PROGRAM INVOLVES DEVELOPMENT OF METHODS TO INCORPORATE DEUTERIUM INTO SEVERAL OF THE NEWER GENERATION COMPOSITE HIGH TEMPERATURE SYNTHETIC POLYMERS. IN RECENT YEARS A NUMBER OF HETEROCYCLIC AROMATIC POLYMERS HAVE BEEN DEVELOPED BASED ON VARIOUS BENZOTHIAZOLE, BENZIMIDAZOLE, AND OXOBENZIMIDAZOISOQUINOLINE MONOMERS. THESE MATERIALS SHOW PROMISE AS COMPOSITE MATRIX RESINS FOR NUMEROUS HIGH TEMPERATURE APPLICATIONS SUCH AS MATERIALS FOR NEW GENERATION EN-

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GINES. THE OBJECTIVE OF THIS PROGRAM IS TO SYNTHESIZE THE DEUTERATED ANALOGS OF A NUMBER OF THE MOST PROMISING NEW MATERIALS - INCLUDING PBT, PBO, AND BBB POLYMERS. THE ADVANTAGE OF INCORPORATING DEUTERIUM INTO THESE POLYMERS IS TO GREATLY INCREASE THE THERMAL OXIDATIVE STABILITY OF THE MATERIALS WITHOUT CHANGING ANY OF THE BENEFICIAL PHYSICAL CHARACTERISTICS OF THE POLYMERS THEMSELVES. THE APPROACH WILL BE TO MAKE THE DEUTERATED PRODUCTS BY FIRST PREPARING THE ISOTOPE LABELED STARTING MATERIALS OR INTERMEDIATE MONOMERS, AND THEN REACTING THESE TO FORM THE DESIRED POLYMERS. ATTEMPTS WILL ALSO BE MADE TO EXCHANGE THE POLYMERS DIRECTLY TO INVESTIGATE POSSIBLE DIRECT, LOW COST METHODS OF PREPARATION. SYNTHESIZED MATERIALS WILL BE SUPPLIED TO APPROPRIATE DOD UNITS FOR COMPARATIVE TESTING AND EVALUATION. THERMAL STABILITIES OF UP TO 800 DEG F AND BEYOND ARE EXPECTED FROM THESE MATERIALS.

CAPE COD RESEARCH — ARMY — $ 77,853
PO BOX 600
BUZZARDS BAY, MA 02532
MYLES WALSH
TITLE:
REVERSE OSMOSIS MEMBRANE ELEMENT CLEANING
TOPIC: 57 OFFICE: BRDC

THIS RESEARCH RELATES TO IMPROVING THE FIELD PERFORMANCE OF REVERSE OSMOSIS WATER PURIFICATION UNITS THROUGH IMPROVING THE PROCEDURES USED FOR MEMBRANE ELEMENT CLEANING. THE PROPOSED RESEARCH INVOLVES OBTAINING A BETTER UNDERSTANDING OF WHY MEMBRANE PERFORMANCE DEGRADES AFTER CLEANING BY CURRENT PROCEDURES, AS WELL AS EXPLORING THE FEASIBILITY OF REPLACING THESE CHEMICAL METHODS WITH AN ESSENTIALLY MECHANICAL TECHNIQUE. THE APPROACH INVOLVES USING THE PERM-SELECTIVITY OF SUGARS AND SECONDARY ELECTRON IMAGING TO STUDY CHANGES IN THE MORPHOLOGY OF MEMBRANE FILMS THAT RESULT FROM FOULING AND SUBSEQUENT CLEANING. A LARGE PORTION OF THE PROPOSED EXPERIMENTS INVOLVES DEVELOPING TECHNIQUES FOR CLEANING MEMBRANES IN SITU ULTRASONICALLY.

CASDE CORP — DNA — $ 49,781
1150 S WASHINGTON ST
ALEXANDRIA, VA 22314
L PAPER
TITLE:
POTENTIAL APPLICATION OF 2.4 mv QUARTER SCALE PULSER AS AN EMP SIMULATOR
TOPIC: 2 OFFICE: OAAM

A 2.5 MV PULSER WAS BUILT AND TESTED AS A "PROOF-OF-PRINCIPLE" FOR

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THE EMPRESS II THREAT LEVEL NAVY EMP TEST FACILITY. NO DISPOSITION OF THIS QUARTER SCALE PULSER HAS BEEN MADE. CASDE CORPORATION BELIEVES THAT THIS PULSER OFFERS DNA AND THE SERVICES A UNIQUE DEVICE THAT COULD BE UTILIZED FOR EMP TESTING OF NUMEROUS DOD EQUIPMENTS. CASDE PROPOSES TO: (1) IDENTIFY THE PRESENT CAPABILITIES AND PARAMETERS OF THE QUARTER SCALE PULSER. (2) DEVELOP THE POTENTIAL APPLICATION OF THE PULSER TO THE SERVICES IN THE EMP TESTING OF MILITARY EQUIPMENT. (3) IDENTIFY THE GENERAL AREAS OF MODIFICATION TO THE PULSER TO PERMIT VARIOUS APPLICATIONS FOR FUTURE INVESTIGATION.

CASDE CORP — DNA — $ 49,494
1150 S WASHINGTON ST - 1ST FL
ALEXANDRIA, VA 22314
DR R T CASTLE
TITLE:
COMPARISON OF THE THREAT TO NAVY SURFACE COMBATANTS FROM THE BASE SURGE EFFECT AS COMPARED TO OTHER NUCLEAR WEAPON BURST EFFECTS
TOPIC: 1 OFFICE: OAAM

IF U.S. NAVY SURFACE COMBATANTS SURVIVE THE EARLY EFFECTS OF NUCLEAR WEAPON BURSTS SUCH AS AIRBLAST, THERMAL, ABIS, AND UNDEX, THERE IS STILL A REMAINING THREAT FROM THE BASE SURGE. THIS THREAT IS COUNTERED BY AN ON BOARD WASHDOWN SYSTEM. THIS STUDY WILL DETERMINE THE REGIONS OF THE BATTLE ZONE WHICH ARE (OR ARE NOT) DOMINATED BY THE BASE SURGE AND ASSESS THE BENEFIT DERIVED FROM SUCH WASHDOWN SYSTEMS.

CASTLE TECHNOLOGY CORP — NAVY — $ 50,000
52 DRAGON COURT
WOBURN, MA 01801
DR J PAUL PEMSLER
TITLE:
PREPARATION AND PROPERTIES OF PURE SYNTHETIC IRON PYRITES FeS2
TOPIC: 97 OFFICE: NSWC

THERMALLY ACTIVATED LITHIUM ALLOY - IRON PYRITE BATTERIES ARE USED IN A VARIETY OF MILITARY APPLICATIONS. THESE BATTERIES EXHIBIT ABNORMALLY HIGH VOLTAGES DURING THE FIRST SEVERAL MINUTES OF DISCHARGE. THE VOLTAGE TRANSIENT HAS BEEN ASSOCIATED WITH THE PHYSICAL AND

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CHEMICAL PROPERTIES OF THE NATURALLY OCCURRING PYRITE USED IN THE CATHODE. THIS PROGRAM SEEKS TO DEMONSTRATE THAT HIGH PURITY SYNTHETIC PYRITE OF CONTROLLED PARTICLE SIZE CAN BE PREPARED FROM COMMERCIALLY AVAILABLE, LOW COST STARTING MATERIALS. THE PROPERTIES OF THE SYNTHETIC PYRITE AS A CATHODE IN LiAl-FeS2 SINGLE CELLS WILL BE MEASURED WITH PARTICULAR ATTENTION PAID TO THE INITIAL VOLTAGE TRANSIENT. CATHODE PERFORMANCE WILL BE CORRELATED WITH SYNTHESES VARIABLES.

CEMCOM RESEARCH ASSOCS INC — ARMY — $ 47,386
9901-K GEORGE PALMER HWY
LANHAM, MD 20706
DR DAVID DOUBLE
TITLE:
LIGHTWEIGHT CEMENTITIOUS ARMAMENT SYSTEMS
TOPIC: 12 OFFICE: ARDC

THE OBJECT OF THE PROPOSED RESEARCH IS TO IDENTIFY THE POTENTIAL USES OF CASTABLE CEMENTITIOUS COMPOSITE MATERIAL IN ROLES SUCH AS FRAGMENT ARMOR, BUNKER PROTECTION OR HELICOPOTER ARMOR. THE MATERIAL SCIENCES EFFOPT WILL BE CARRIED OUT AT CEMCOM; THE TEST EFFORT WILL BE CARRIED OUT AT THE UNIVERSITY OF DAYTON UNDER THE DIRECTION OF DR. STEPHAN J. BLESS. THE PRINCIPAL INVESTIGATOR HAS BEEN INVOLVED IN CEMENTITIOUS COMPOSITE RESEARCH FOR OVER A DECADE AND WAS A PIONEER IN THE ORIGINAL CREATION OF A CLASS OF MATERIALS GENERICALLY KNOWN AS MACRO DEFECT FREE (MDF) CEMENTS. HIS EXTENSION OF THIS RESEARCH TO CEMENT-MATRIX COMPOSITES CONTAINING GRADED CERAMIC AGGREGATES AS WELL AS METALLIC AND NON-METALLIC FIBER REINFORCEMENT STRONGLY SUGGESTS THE APPLICABILITY OF THESE MATERIALS AS LIGHTWEIGHT/INEXPENSIVE ARMOR OR EASILY FABRICATED CERAMIC ARMOR.

CHARLES RIVER ANALYTICS INC — AF — $ 49,960
55 WHEELER ST
CAMBRIDGE, MA 02138
DR GREG L ZACHARIAS
TITLE:
MODEL-BASED METHODOLOGY FOR TERRAIN-FOLLOWING DISPLAY DESIGN
TOPIC: 206 OFFICE: AMD/RDO

THE PRIMARY OBJECTIVE OF THIS STUDY IS TO EVALUATE THE FEASIBILITY OF

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DEVELOPING A MODEL-BASED METHODOLOGY FOR TERRAIN-FOLLOWING DISPLAY DESIGN AND EVALUATION. THE BASIC APPROACH CENTERS ON THE DEVELOPMENT OF A PILOT/SYSTEM MODEL THAT INTEGRATES GENERAL KNOWLEDGE OF HUMAN PERCEPTION AND PERFORMANCE WITH SPECIFIC KNOWLEDGE OF AIRCRAFT AND AVIONICS CAPABILITIES PECULIAR TO THE TERRAIN-FOLLOWING MISSION. THE PROPOSED MODEL INTEGRATES SEVERAL STATE-OF-THE-ART SUB-MODELS, COVERING VISUAL PERCEPTION, INFORMATION FUSION, DISCRETE DECISION-MAKING, AND CONTINUOUS CONTROL. WE PROPOSE TO USE IT TO PROVIDE PREDICTIONS OF PILOT/SYSTEM PERFORMANCE, AS A FUNCTION OF TF DISPLAY CONFIGURATION, WITHIN A FORMAL STRUCTURE PROVIDED BY A PROCEDURE-ORIENTED METHODOLOGY, TO MINIMIZE THE REQUIREMENT FOR SUBJECTIVE DISPLAY DECISIONS. WE PROPOSE TO EVALUATE FEASIBILITY OVER THREE TASKS: 1) DEVELOPMENT OF A DEMONSTRATION MODEL AND METHODOLOGY; 2) EVAUATION VIA DESIGN EXAMPLE; AND 3) METHODOLOGY SPECIFICATION FOR FURTHER DEVELOPMENT. A FINAL REPORT WILL SUMMARIZE THE PHASE I STUDY OBJECTIVES, ACCOMPLISHMENTS, AND RECOMMENDATIONS FOR FURTHER WORK.

CHRISTIAN MECHS INC — ARMY — $ 50,133
PO BOX 5806
SPARTANBURG, SC 29304
DRON CHRISTIAN
TITLE:
HEAT SEALING MACHINE TO HERMETICALLY SEAL FLANGELESS POLYMERIC CONTAINERS DESIGN
TOPIC: 85 OFFICE: NRDC

IT WILL BE THE OBJECTIVE OF THE PROGRAM TO: 1) OUTLINE A NUMBER OF POSSIBLE SOLUTIONS TRUSTING THAT ONE OR MORE MAY BE APPLICABLE TO THE YET UNDEFINED SITUATION. 2) OUTLINE AN APPROACH TO EACH OF THE POSSIBLE SOLUTIONS REFERRED TO IN PARAGRAPH 1. 3) DEFINE OUR ABILITY TO CONCEIVE AND EXECUTE THE PRACTICAL DESIGN OF A HEAT SEALING MACHINE FOR WHATEVER CONFIGURATION OF PACKAGE MAY CONSTITUTE THE PROBLEM. 4) OUTLINE THE OUTSIDE SOURCES WHICH WILL BE USED TO DEAL WITH EACH SPECIFIC SOLUTION.

COHERENT TECHNOLOGIES INC — AF — $ 45,844
PO BOX 7488
BOULDER, CO 80306
R MILTON HUFFAKER
TITLE:
COHERENT-INCOHERENT LIDAR SYSTEM CAPABILITY STUDY
TOPIC: 129 OFFICE: AFSTC

RESULTS OF FEASIBILITY ANALYSES INDICATE THAT A PULSED COHERENT CO2

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LIDAR SYSTEM IS CAPABLE OF MEASURING THE GLOBAL WIND FIELD. CHANGING LASER TECHNOLOGY INDICATES THAT SOLID STATE LASERS MAY ALSO BE CAPABLE OF COHERENT WIND MEASUREMENT. THIS EFFORT WILL DETERMINE THE CAPABILITY OF SHORTER WAVELENGTH LASERS (1-10 MICROMETERS) FOR COHERENT ATMOSPHERIC MEASUREMENTS OF WIND, TEMPERATURE, AND WATER VAPOR CONCENTRATION BY USING A DETAILED LIDAR PERFORMANCE COMPUTER SIMULATION. THE LIDAR COMPUTER SIMULATION WILL ALSO BE USED TO STUDY INCOHERENT LIDAR SYSTEM PERFORMANCE OF CLOUD TOP HEIGHTS AND AERSOL BACKSCATTER IN THE EYE-SAFE LASER WAVELENGTH REGIONS. THE SOLID STATE LASER TECHNOLOGY WILL BE REVIEWED IN-DEPTH TO PERFORM A STATE-OF-THE-ART ASSESSMENT FOR THE LIDAR APPLICATIONS ANALYZED IN THIS STUDY. EMPHASIS WILL BE PLACED ON IDENTIFYING THE LASER TECHNOLOGY IN THE EYE-SAFE INFRARED WAVELENGTHS FOR BOTH COHERENT AND INCOHERENT LIDAR SYSTEMS. RECOMMENDATIONS WILL BE MADE ON COMMON LASERS THAT CAN BE USED EFFECTIVELY FOR BOTH INCOHERENT AND COHERENT OBSERVATIONS.

COHERENT TECHNOLOGIES INC AF $ 48,129
PO BOX 7488
BOULDER, CO 80306
R MILTON HUFFAKER
TITLE:
SOLID STATE PULSED COHERENT LASER RADAR SPECIFICATIONS AND DESIGN
TOPIC: 132 OFFICE: AFSTC

SOLID STATE LASER TECHNOLOGY HAS NOW REACHED THE STATE OF DEVELOPMENT IN WHICH COHERENT, RANGE RESOLVED MEASUREMENTS OF ATMOSPHERIC WIND VELOCITY AND OTHER PARAMETERS IS NOW POSSIBLE. A COHERENT Nd:YAG LASER SOURCE HAS RECENTLY BEEN DEVELOPED AT STANFORD UNIVERSITY. WE PROPOSE TO USE THE DETAILED LIDAR COMPUTER SIMULATION AVAILABLE AT COHERENT TECHNOLOGIES, INC. TO DETERMINE THE PERFORMANCE PARAMETERS OF SUCH A SOLID STATE LIDAR SYSTEM. THE COMPONENT TECHNOLOGIES WILL BE SURVEYED IN DETAIL AND THE EXPERIENCE WITH PREVIOUS CO2 COHERENT LIDAR SYSTEMS USED TO IDENTIFY THE CRITICAL SYSTEMS PROBLEMS AND THEIR SOLUTIONS. THE SPECIFICATIONS AND DESIGN OF A SOLID STATE LIDAR WILL THEN BE DEVELOPED. A SOLID STATE COHERENT LIDAR WILL OFFER SIGNIFICANT ADVANTAGES FOR SPACE APPLICATIONS SUCH AS REDUCED POWER AND WEIGHT REQUIREMENTS, AND LONG LIFETIMES NEEDED FOR PRACTICAL USES.

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COLORADO RESEARCH DEVELOPMENT CORP — DARPA — $ 56,539
2629 REDWING - DRAKE CREEKSIDE 2/STE 250
FORT COLLINS, CO 80526
JOHN E MAHAN
TITLE:
SEMICONDUCTING TRANSITION METAL SILICIDES FOR ELECTRO-OPTIC VLSI INTERCONNECTS
TOPIC: 3 OFFICE: DARPA

THE PHASE I RESEARCH IS A FUNDAMENTAL INVESTIGATION OF THE OPTICAL PROPERTIES OF SEMICONDUCTING TRANSITION METAL SILICIDES OF POTENTIAL UTILITY AS ACTIVE MATERIALS FOR ELECTRO-OPTIC INTERCONNECTS IN SILICON MICROELECTRONICS. THIN FILMS OF CrSi2, MnSi2, AND IrSi1.75 WILL BE PREPARED BY ION BEAM SPUTTER DEPOSITION OF THE METALS ONTO SINGLE CRYSTAL SILICON WAFERS, FOLLOWED BY FURNACE REACTION WITH THE SUBSTRATES TO FORM THE SILICIDE LAYERS. THE FILMS WILL BE CHARACTERIZED STRUCTURALLY AND COMPOSITIONALLY BY X-RAY ANALYSIS, ELECTRON MICROSCOPY, AND AUGER/ESCA SPECTROSCOPY. SPECTRAL TRANSMITTANCE AND REFLECTANCE DATA WILL BE OBTAINED, AND FROM THESE, THE ENERGY DEPENDENCES OF THE OPTICAL ABSORPTION CONSTANTS AND THE COMPLEX INDICES OF REFRACTION WILL BE DETERMINED. THE RESEARCH CONSTITUTES THE FIRST STEP IN THE EVALUATION OF THESE NARROW BANDGAP SEMICONDUCTORS FOR POSSIBLE APPLICATION IN THE ELECTRO-OPTIC VLSI INTERCONNECTS. PHASE II RESEARCH WILL FOCUS ON PHOTOELECTRONIC (RATHER THAN OPTICAL) MATERIAL PROPERTIES CRUCIAL TO OPTOELECTRONIC DEVICE PERFORMANCE, AND TECHNIQUES FOR FABRICATING SUCH DEVICES.

COMPUTER AIDED PLANNING & SCHEDULING INC — NAVY — $ 50,000
3715 NORTHSIDE PKWY NE-BLDG 300/STE 715
ATLANTA, GA 30327
WILLIAM G NULTY
TITLE:
INTERACTIVE LOGISTICS WORKSTATION DESIGN
TOPIC: 4 OFFICE: ONR

THE OBJECTIVE OF THE PROPOSED EFFORT IS THE DESIGN AND CONSTRUCTION OF A MICROCOMPUTER-BASED WORKSTATION WHICH MAKES IT EASY FOR LOGISTICS PLANNERS TO MODEL AND ANALYZE THEIR PROBLEM. THE DESIGN WILL BE BASED ON CONCEPTS OF INTERACTIVE OPTIMIZATION - A PROBLEM SOLVING METHODOLOGY WHICH EMBODIES OPTIMIZATION COMPONENTS IN A FLEXIBLE

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STRUCTURE WITH SIGNIFICANT HUMAN PARTICIPATION AND CONTROL. PHASE I WILL FOCUS ON THE DESIGN AND PROTOTYPE OF AN INTERACTIVE LOGISTICS WORKSTATION FOR THE VEHICLE ROUTING AND WAREHOUSE LOCATION PROBLEMS. THE CONCEPTS WILL BE EXTENDED IN PHASE II TO INCORPORATE BROADER CLASSES OF LOGISTICS PLANNING PROBLEMS.

CORDEC CORP NAVY $ 49,880
PO BOX 188 - 8270-B CINDER BEE RD
LORTON, VA 22079
DR RAYMOND J WEIMER
TITLE:
INTERPHASES IN GRAPHITE/ALUMINUM COMPOSITES
TOPIC: 111 OFFICE: NSWC

THE UTILIZATION OF GRAPHITE/ALUMINUM (Gr/Al) COMPOSITES IN ENGINEERING STRUCTURES HAS BEEN SEVERELY LIMITED BY LOW TRANSVERSE TENSILE STRENGTH. HOWEVER, RECENT DEVELOPMENTS IN THE MANUFACTURE OF METAL MATRIX COMPOSITE BY PHYSICAL VAPOR DEPOSITION TECHNIQUES HAVE RESULTED IN THIN-SHEET Gr/Al COMPOSITES HAVING TRANSVERSE TENSILE STRENGTHS OF 70-110 MPa (10-16ksi), WHICH WAS ATTRIBUTED TO IMPROVED FIBER/MATRIX BONDING. BETTER DEFINITION OF BOND QUALITY WILL BE OBTAINED IN THIS PROGRAM BY PRODUCING CONTINUOUS ION-PLATED Gr/Al COMPOSITE PRECURSOR TAPES WITH A WELL-DEFINED CARBON INTERPHASE INTRODUCED BETWEEN THE FIBERS AND MATRIX SUCH THAT ITS EFFECT ON TRANSVERSE TENSILE STRENGTH IS CLARIFIED. THIS CARBON COATING IS DEPOSITED DIRECTLY ON EACH CARBON FIBER BY A PLASMA-ENHANCED CHEMICAL VAPOR DEPOSITION PROCESS, THE PARAMETERS OF WHICH CONTROL THE MECHANICAL PROPERTIES OF THE INTERPHASE. CONCURRENTLY, A FINITE ELEMENT MICROMECHANICAL ANALYSIS OF THE COMPOSITE WILL BE DEVELOPED WHICH INCORPORATES THE INTERPHASE EFFECTS AND PREDICTS MACROSCOPIC BEHAVIOR OF THE COMPOSITE. FOUR INTERPHASE COATINGS WILL BE PRODUCED. MECHANICAL PROPERTIES OF THE CONSOLIDATED COMPOSITES WILL BE COMPARED TO THEORETICAL PREDICTIONS OF THE MODEL AND AN OPTIMIZATION PROGRAM WILL BE FORMULATED.

CORDEC CORP SDIO $ 0
PO BOX 188 - 7371 C LOCKPORT PL
LORTON, VA 22079
DR RAYMOND J WEIMER
TITLE:
THERMOPHYSICALLY TAILORED GRAPHITE/COPPER COMPOSITES FOR HIGH-TEMPERATURE AEROSPACE SYSTEMS
TOPIC: 5 OFFICE: IST

NEW DEVELOPMENTS IN THE MANUFACTURE OF ULTRA-THIN METAL MATRIX COM-

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POSITE PRECURSOR TAPES BY PHYSICAL VAPOR DEPOSITION TECHNIQUES HAVE CREATED AN OPPORTUNITY TO PRODUCE ATTRACTIVE FIBER/MATRX COMBINATIONS THAT WERE FANCIFUL, UNTIL RECENTLY. THIS TECHNOLOGY WILL BE EXPLOITED TO FABRICATE A VARIETY OF GRAPHITE/COPPER COMPOSITES TAPES WHICH WILL BE CONSOLIDATED INTO UNIDIRECTIONAL PANELS FOR THERMOPHYSICAL, MECHANICAL, AND MICROSTRUCTURAL CHARACTERIZATION. A PRELIMINARY DESIGN METHODOLOGY WILL BE DEVELOPED FOR HYBRIDIZING THE PANEL STRUCTURE WITH DIFFERENT FIBERS AND ANGLE PLIES TO CONSTRUCT MATERIALS HAVING PRESCRIBED ORTHOTROPIC LINEAR THERMAL EXPANSION COEFFICIENTS, WHILE RETAINING HIGH SPECIFIC STRENGTHS AND STIFFNESSES. A NON-TOXIC PROTOTYPE PANEL WILL BE FABRICATED THAT SUBSTITUTES FOR THE BERYLLIUM RADIATOR PANELS IN THE SP-100 SPACE-BASED NUCLEAR REACTOR SYSTEM. THIS PANEL WILL MATCH THE TRANSVERSE THERMAL CONDUCTANCE OF THE BERYLLIUM BASELINE MATERIAL AND, MORE IMPORTANTLY, MATCH THE LONGITUDINAL THERMAL EXPANSION COEFFICIENT OF THE ATTACHED TITANIUM HEAT PIPES. INDEPENDENT TAILORING OF MATERIALS PROPERTIES PROVIDES A PRACTICAL DEMONSTRATION OF THE UNIQUE CAPABILITIES OF METAL MATRIX COMPOSITES TO PROVIDE CONSIDERABLE PAYOFFS IN HIGH PERFORMANCE APPLICATIONS AND SHOULD STIMULATE MORE INNOVATIVE STRUCTURAL DESIGNS.

CRAIG DEVELOPMENT CORP AF $ 53,020
7767 E QUAKER RD
ORCHARD PARK, NY 14127
DWIGHT R CRAIG
TITLE:
VERY HIGH POWER DENSITY BATTERIES FOR AIRBORNE APPLICATIONS
TOPIC: 61 OFFICE: AFWAL/PO

THE AIR FORCE NEEDS HIGH POWER DENSITY RESERVE BATTERIES FOR AIRBORNE APPLICATIONS WHICH MUST PROVIDE PULSES OF POWER AT RATES OF OVER 10,000 W/# DURING A LIFETIME OF 300 SECONDS. AN AVERAGE POWER DENSITY REQUIREMENT OF 50 WH/# MAKES THIS A CHALLENGING TASK. SMALL SILVER-ZINC BATTERIES HAVE BEEN REPORTED TO YIELD THIS LEVEL OF POWER IN SINGLE BURSTS, BUT AT ONLY HALF THE ENERGY DENSITY. THE ENCLOSED PROPOSAL DESCRIBES AN INNOVATIVE CONCEPT FOR EXTREMELY HIGH POWER DENSITY, FUNCTIONING ON PRINCIPLES NOT PREVIOUSLY USED IN ELECTROCHEMICAL POWER SYSTEMS. FEASIBILITY OF 100 WH/# HAS BEEN SHOWN, AND POWER DENSITY SIGNIFICANTLY HIGHER THAN THE REQUIRED 10,000 W/# IS ANTICIPATED FROM THIS NEW CONCEPT.

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SUBMITTED BY	DEPT	AWARDED AMOUNT

CRC AUTOMATIC WELDING
3450 LAND RD
HOUSTON, TX 77092
MILTON D RANDALL
TITLE:
SUBMERGED ARC WELDING CONTROL VIA ARC SENSING
TOPIC: 5 OFFICE: ONR

NAVY $ 68,500

THE OBJECTIVE OF THE PROPOSED RESEARCH IS TO ESTABLISH THE FEASIBILITY OF USING INTELLIGENCE GLEANED FROM THE ELECTRICAL ARC SIGNALS OF THE SUBMERGED ARC WELDING PROCESS TO ADAPTIVELY CONTROL THE POSITION AND GEOMETRY OF THE WELD BEAD RELATIVE TO THE WELD JOINT. BY SO DOING, IT WILL BE ESTABLISHED THAT PROPER SIDEWALL AND INTERBEAD FUSION AND UNIFORM FILL CAN BE ADAPTIVELY MAINTAINED IN REAL-TIME. IT WILL BE THE OBJECTIVE OF THE PROPOSED RESEARCH TO DEMONSTRATE THE FEASIBILITY OF ACCOMPLISHING THIS FOR BOTH CONVENTIONAL JOINTS AND NARROW GAP JOINTS OF VARYING WIDTH AND PARALLELISM WITH RESPECT TO THE TORCH MOTION. A FURTHER OBJECTIVE OF THE RESEARCH EFFORT WILL BE TO ESTABLISH THE FEASIBILITY OF DOING THIS WHILE MAINTAINING THE HEAT INPUT WITHIN MAXIMUM AND MINIMUM LIMITS AS PRESCRIBED FOR PROPER METALLURGICAL PROPERTIES. THE SPECIFIC WORK TASKS ARE: (1) DETERMINATION OF THE EFFECT OF LATERAL ARC OSCILLATION ON THE OBSERVED SIGNAL FEATURES AND THE METALLURGICAL AND MECHANICAL PROPERTIES OF THE WELD, (2) ESTABLISHMENT OF MODELS OF THE SUBMERGE ARC WELDING PROCESS VARIABLES, (3) IDENTIFICATION OF OPTIMUM WAVEFORM FEATURES FOR PATTERN RECOGNITION, (4) ESTABLISHMENT OF RELIABLE PATTERN RECOGNITION ALGORITHMS, AND (5) ESTABLISHMENT OF CONTROL ALGORITHMS.

CREARE INC
PO BOX 71
HANOVER, NH 03755
DR HERBERT SIXSMITH
TITLE:
GAS BEARING TURBOEXPANDERS FOR SHIPBOARD NITROGEN/OXYGEN LIQUEFIERS
TOPIC: 36 OFFICE: NSSC

NAVY $ 49,051

SHIPBOARD LIQUEFIERS IN USE BY THE NAVY FOR PRODUCING LIQUID OXYGEN AND LIQUID NITROGEN EMPLOY HIGH-SPEED TURBOEXPANDERS WITH OIL-LUBRICATED BEARINGS. MECHANICAL SHAFT SEALS WITH BUFFER GAS STAGES

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ARE USED IN THESE MACHINES TO PREVENT CONTAMINATION OF THE SYSTEM BY THE LUBRICANT. SUCCESSFUL CONTINUOUS OPERATION OF THE TURBOEXPANDERS, AND THE LIQUEFIER SYSTEM AS A WHOLE, DEPENDS UPON THE INTEGRITY OF THE TURBOEXPANDER SHAFT SEALS, AND ON THE RELIABILITY OF THE OIL LUBRICATION PUMP AND FILTERING SYSTEM. OIL CONTAMINATION FROM LEAKING SEALS, OR INTERRUPTION OF THE TURBOEXPANDER BEARING OIL SUPPLY RESULTS IN EXTENSIVE SYSTEM DOWNTIME AND RELATED HIGH MAINTENANCE COSTS. THE NAVY NEEDS AN ALTERNATIVE TURBOEXPANDER DESIGN WHICH IS HIGHLY RELIABLE IN OPERATION, AND WHICH WILL ELIMINATE THE POTENTIAL FOR CONTAMINATION OF THE PRODUCT GASES INHERENT IN THE PRESENT HARDWARE. THIS PROPOSAL DESCRIBES PHASE I OF A PROJECT TO DEVELOP A TURBOEXPANDER OPERATING IN GAS BEARINGS FOR SHIPBOARD LIQUEFIERS. PHASE I CONSISTS OF ESTABLISHING SPECIFICATIONS FOR THE TURBOEXPANDER, DESIGNING A SHAFT/GAS-BEARING SYSTEM WHICH WILL MEET THESE SPECIFICATIONS AND PRODUCING A PRELIMINARY DESIGN OF THE TURBOEXPANDER.

CREARE INC AF $ 74,349
PO BOX 71
HANOVER, NH 03755
DR BHARATAN R PATEL
TITLE:
LOW TEMPERATURE LOW PRESSURE WATER SEPARATOR DEVELOPMENT
TOPIC: 2 OFFICE: ASD/AE

THE PRESENT AIRCRAFT ENVIRONMENTAL CONTROL SYSTEM (ECS) CANNOT OPERATE AT TEMPERATURES BELOW OR NEAR FREEZING. THIS IS DUE TO THE PRESENCE OF SUBMIRCON WATER DROPLETS THAT FREEZE AND FORM ICE ON ANY SURFACE ON WHICH THEY IMPINGE. IF IT WERE POSSIBLE TO REMOVE THESE WATER DROPLETS FROM THE ECS, THE ECS COULD OPERATE AT TEMPERATURES BELOW FREEZING AND ITS PERFORMANCE WOULD BE SIGNIFICANTLY IMPROVED. THIS PROPOSAL DESCRIBES PHASE I OF A PROJECT TO DEVELOP A LOW TEMPERATURES, LOW PRESSURE WATER SEPARATOR THAT WOULD REMOVE WATER DROPLETS FROM THE ECS AND DUMP THE COLLECTED ICE OVERBOARD WITHOUT UTILIZING ADDITIONAL HEAT. PHASE I CONSISTS OF DEFINING THE DESIGN ENVELOPE FOR SUCH A SEPARATOR, DEVELOPING SEPARATOR DESIGNS USING STATE-OF-THE-ART TECHNOLOGY, AND FABRICATING AND TESTING PROMISING SEPARATOR CONFIGURATIONS AT PROTOTYPICAL CONDITIONS. THE RESULTS OF PHASE I WILL PROVIDE THE DESIGN AND TEST DATA NECESSARY TO PRODUCE A FIELD UNIT.

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SUBMITTED BY	DEPT	AWARDED AMOUNT
CREARE INC PO BOX 71 HANOVER, NH 03755 CHRISTOPHER J CROWLEY TITLE: MAGNETIC PUMP FOR THERMAL LOOPS TOPIC: 35 OFFICE: AFWAL/FI	AF	$ 45,479

THE CONTEXT OF THE PROPOSED WORK IS THERMAL TRANSPORT IN SPACECRAFT. RELIABLE PUMPS ARE NEEDED FOR LONG TERM MISSIONS. A WIDE RANGE OF ADJUSTMENT AND CONTROL OF THE FLOW RATE IS NEEDED TO RESPOND TO CHANGING HEAT LOADS. IN THE APPROACH TO BE INVESTIGATED, MAGNETIC FIELDS WOULD BE USED TO DRIVE A MAGNETICALLY-SUSCEPTIBLE FLUID IN A PUMP WITH NO MOVING PARTS. WE EXPECT TO SHOW THAT THE BODY FORCE DRIVING THE FLUID CAN BE APPLIED WITH RELATIVELY SMALL MAGNETS--SUITABLE FOR SPACECRAFT--BECAUSE OF HIGH MAGNETIC SUSCEPTIBILITY OF THE FLUID. SINCE THE ENERGY INPUT TO THE FLUID CAN BE ORDERS OF MAGNITUDE LARGER USING MAGNETIC PRINCIPLES, HEAT TRANSPORT RATES MUCH LARGER THAN THERMOCAPILLARY SYSTEMS SHOULD BE ACHIEVED. THE RELIABILITY OF SUCH A SYSTEM SHOULD BE HIGHER THAN THOSE USING MECHANICAL PUMPS AND THE COST LOWER. THE FEASIBILITY OF A MAGNETIC PUMP FOR THERMAL LOOPS WILL BE DEMONSTRATED ANALYTICALLY.

CREARE INC PO BOX 71 HANOVER, NH 03755 DR PAUL H ROTHE TITLE: DIRECT CONTACT HEAT EXCHANGERS FOR SPACE POWER SYSTEMS TOPIC: 2 OFFICE: IST	SDIO	$ 0

DIRECT CONTACT HEAT EXCHANGERS EMPLOY DIRECT PHYSICAL CONTACT AND MIXING OF FLUIDS OFTEN MULTIPHASE, TO TAKE ADVANTAGE OF HIGH RATES OF HEAT TRANSFER DUE TO FLUID MIXING OR PHASE CHAGE. MUCH IS KNOWN ABOUT MULTICOMPONENT AND TWO-PHASE FLOW AND HEAT TRANSFER FROM INDUSTRIAL APPLICATIONS IN THE POWER (GEOTHERMAL, NUCLEAR, SOLAR, OCEAN), MINING, AND PETROLEUM INDUSTRIES PARTICULARLY. DIRECT CONTACT HEAT EXCHANGERS (DCHX) ARE USED ROUTINELY FOR MANY TERRESTRIAL APPLICATIONS. HOWEVER, THE UNDERLYING DCHX SCIENCE AND TECHNOLOGY ARE STILL IN A RAPID STATE

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OF DEVELOPMENT. APPLICATION IN SPACE, WITHOUT GRAVITY AND WITH STRINGENT SPECIFICATIONS ON FACTORS SUCH AS WEIGHT, RELIABILITY AND SAFETY IS HIGHLY CHALLENGING, AND FEASIBILITY IS NOT YET ASSUMED. THE NEED THEREFORE IS TO ESTABLISH TECHNICAL INFORMATION AND DEVELOP FEASIBLE DCHX CONCEPTS SOON SO THAT ADVANCED SPACECRAFT THERMAL ENERGY MANAGEMENT SYSTEMS CAN BE SPECIFIED WITH CONFIDENCE. THIS PROJECT OBJECTIVE CALLS FOR INVENTION AND EVALUATION OF A SPECTRUM OF DCHX CONCEPTS (RATHER THAN DETAILED ENGINEERING OF A SINGLE DCHX) IN ORDER TO ESTABLISH FEASIBILITY, LEVEL OF OPPORTUNITY, AND AREAS OF DESIGN RISK OR UNCERTAINTY.

CREATIVE ENTERPRISES — SDIO — $ 59,000
1033 RUE FINISTERRE
SAN DIEGO, CA 92131
DR RALPH S COOPER
TITLE:
A CONTAINED CATAPULT FOR ORBITING LARGE PAYLOADS
TOPIC: 3 OFFICE: IST

THE SURVIVABILITY OF SPACE ASSETS CAN BE GREATLY ENHANCED BY ARMOR, MANEUVERING, HIGH ORBITS AND DEFENSIVE WEAPONS, ALL OF WHICH REQUIRE LARGE MASS IN ORBIT. THE LARGE ENERGY REQUIREMENTS OF LAUNCH FROM EARTH CAN BE MET WITH ENERGY IN THE "CONTAINED CATAPULT", A PRACTICAL, POLITICALLY ACCEPTABLE SYSTEM. THIS CONCEPT USES A CHARGE TO HEAT HYDROGEN PROPELLANT IN A CHAMBER TO DRIVE A MASSIVE PAYLOAD TO HIGH VELOCITY IN A LONG TUBE, WITH ON-BOARD PROPULSION ACHIEVING ORBIT. PROPRIETARY MEANS ARE USED TO CONTAIN THE FISSION AND ACTIVATION PRODUCTS. UNDERGROUND TEST EXPERIENCE INDICATES A FACTOR OF FIVE OR MORE REDUCTION IN LAUNCH COSTS FOR LARGE PAYLOADS LAUNCHED FROM REUSEABLE CATAPULTS. IN PHASE I, THE FEASIBILITY OF THIS CONCEPT WILL BE EXAMINED WITH EMPHASIS ON THE INTERIOR BALLISTICS AND FLUID FLOW IN THE ACCELERATING MECHANISM. IN PHASE II WE WILL EVALUATE THE OTHER ASPECTS (CHARGE/PROPELLANT, SABOT AND PROJECTILE, EXTERIOR BALLISTICS, OPERATIONS AND COSTS). WE WILL ALSO DESIGN AND ANALYZE A LAUNCHER, AND DEFINE AN EXPERIMENT IN COOPERATION WITH A NATIONAL LABORATORY TO TEST CRUCIAL PRACTICAL ASPECTS OF THE CONCEPT.

CTL-AEROSPACE INC — AF — $ 46,376
1240 GLENDAL-MILFORD RD
CINCINNATI, OH 45215
CHARLES R HARRISON
TITLE:
TRANS-LAMINAR REINFORCEMENT OF ORGANIC MATRIX COMPOSITE
TOPIC: 40 OFFICE: AFWAL/FI

THIS PROJECT WILL DEVELOP AND TEST A MEANS OF INCREASING TRANSLAMINAR

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STRENGTH IN RESIN MATRIX COMPOSITES BY IMPLANTING HIGH MODULUS FIBERS OR STRANDS BETWEEN PLIES. ADDITIONAL EFFECT WILL BE GIVEN TO DEVELOPING A LOW COST METHOD OF SKIN/SPAR REINFORCEMENT.

CVD INC — ARMY — $ 49,510
185 NEW BOSTON ST
WOBURN, MA 01801
DR MICHAEL A PICKERING
TITLE:
ELECTROMAGNETIC SHIELDING FOR INFRARED TRANSMISSIVE MATERIALS DEVELOPMENT
TOPIC: 38 OFFICE: LABCOM

A REQUIREMENT EXISTS TO DEVELOP ELECTROMAGNETIC SHIELDING TECHNIQUES APPLICABLE TO INFRARED TRANSMISSIVE WINDOWS, LENSES AND DOMES TO COUNTER THE GROWING THREAT OF ELECTROMAGNETIC COUNTERMEASURES. THIS PROGRAM WILL EXAMINE THE FEASIBILITY OF PRODUCING INDUCTIVE GRIDS AND PATTERNS THAT CAN BE APPLIED TO THE INFRARED OPTICAL MATERIALS ZINC SULFIDE (ZnS) AND ZINC SELENIDE (ZnSe) TO PROVIDE EMI PROTECTION OVER THE FREQUENCY RANGE OF 0.5 MHz TO 2 GHz. SEVERAL TEST METALLIC GRIDS AND PATTERNS WILL BE DESIGNED USING A COMBINATION OF ANALYTICAL METHODS AND EXISTING COMPUTER MODELS. THESE GRIDS WILL BE APPLIED TO SAMPLES OF ZnS AND ZnSe BY PHOTOLITHOGRAPHY AND CHEMICAL VAPOR DEPOSITION. THE EMI SHIELDING EFFECTIVENESS OF THE GRIDS WILL BE MEASURED AT X-BAND USING A WAVEGUIDE SIMULATOR. ADDITIONAL ANALYSIS WILL BE PERFORMED TO INTERPRET THE DATA AND TO EXAMINE DESIGN ISSUES FOR MORE SPECIFIC OR STRESSING REQUIREMENTS.

CVD INC — ARMY — $ 48,093
185 NEW BOSTON ST
WOBURN, MA 01801
DR JITENDRA S GOELA
TITLE:
CVD CdZnTe AS A SUBSTRATE FOR HgCdTe DETECTORS
TOPIC: 44 OFFICE: CECOM/NVEO

THE PERFORMANCE OF PHOTOVOLTAIC AND PHOTOCONDUCTIVE HgCdTe INFRARED DETECTOR, FOCAL PLANE ARRAYS IS CURRENTLY LIMITED DUE TO MATERIALS PROBLEMS ASSOCIATED WITH THE CdTe SUBSTRATES. THE MATERIAL CdZnTe,

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A PSEUDOBINARY SYSTEM, HAS BEEN IDENTIFIED AS A POTENTIALLY SUPERIOR SUBSTRATE MATERIAL DUE TO ITS ABILITY TO PROVIDE A PRECISE LATTICE-MATCH TO HgCdTe AND POSSIBLY AN IMPROVED QUALITY, CRYSTALLINE STRUCTURE. THE AIM OF THIS PROGRAM WILL BE TO ESTABLISH GROWTH CONDITIONS WHICH WILL PROVIDE HIGH PURITY, HIGH QUALITY EPITAXIAL CdZnTe MATERIAL, PERFORM DETAILED CHARACTERIZATION OF THE MATERIAL AND DEMONSTRATE THE SUPERIORITY OF LATTICE MATCHED CdZnTe SUBSTRATE MATERIAL FOR HgCdTe DETECTORS. IN PHASE I OF THIS PROGRAM, THE FEASIBILITY OF GROWING HIGH QUALITY EPILAYERS OF CdZnTe ON FIVE DIFFERENT SUBSTRATE MATERIALS - InSb, GaAs, SILICON, CdTe AND SAPPHIRE VIA THE LOW PRESSURE CVD PROCESS WILL BE PERFORMED. THE MATERIAL CdZnTe WILL BE FABRICATED BY USING H2Te GAS AND ELEMENTAL CADMIUM AND ZINC METALS IN A CVD REACTOR. THE EPILAYERS WILL BE CHARACTERIZED BY EXAMINING SURFACE MORPHOLOGY UNDER AN ORDINARY AND SCANNING ELECTRON MICROSCOPES, PERFORMING SCANNING ELECTRON MICROSCOPE ENERGY DISPERSIVE X-RAY ANALYSIS (SEM-EDAX) AND X-RAY DIFFRACTION ANALYSIS.

DAINA NAVY $ 38,282
4960 FILLMORE AVE NE
COLUMBIA HEIGHTS, MN 55421
JANIS PUKITE
TITLE:
IMPLEMENTATION OF LOGISTICS SOFTWARE ON MICROCOMPUTERS
TOPIC: 4 OFFICE: ONR

MICROCOMPUTER SYSTEMS HAVE THE POTENTIAL OF AIDING THE OPERATIONS RESEARCH PROFESSIONALS ENGAGED IN LOGISTICS APPLICATIONS IN THE NAVY AND IN OTHER MILITARY, GOVERNMENT AND COMMERCIAL OPERATIONS. THE COMPLEXITY OF THE PROBLEMS ENCOUNTERED AND THE LIMITATIONS OF MICROCOMPUTER HARDWARE AND SOFTWARE HAVE PREVENTED THEIR USE IN THE PAST. THE PROPOSED EXPLORATORY DEVELOPMENT WILL CONCENTRATE ON THE SOFTWARE IMPLEMENTATION PROBLEMS AND ON THE DECOMPOSITION OF THE LARGE-SCALE LOGISTICS PROBLEMS, PARTITIONING THEM INTO SUBPROBLEMS, TEARING OF THE INDIVIDUAL SUBPROBLEMS FOR COMPUTER CONTROLLED ITERATION, AND ON SPECIFYING THE REQUIREMENTS FOR THE OPERATOR INTERFACE. EMPHASIS WILL BE PLACED ON SELECTING THOSE ALGORITHMS THAT ARE FAST, REQUIRE MINIMUM STORAGE AND ALLOW FOR AN EASY INTERFACE TO THE PROBLEM DATABASE. A SHIP LOADING PROBLEM WILL BE USED TO DEMONSTRATE THE APPLICATION OF THE DECOMPOSITION-BASED SOLUTION TECHNIQUES.

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DATASPAN INC — NAVY — $ 42,437
3645 CALIFORNIA RD
ORCHARD PARK, NY 14127
DR C MICHAEL ALLEN
TITLE:
EVALUATION OF SELECTED-KEY PARAMETERS AFFECTING NMOS (KPAN) MICROCIRCUITS
TOPIC: 119 OFFICE: NWSC

THE EFFECTS OF NEGATIVE VOLTAGE PULSES (RESULTING FROM SIGNAL REFLECTIONS) ON THE INPUT SIGNAL PINS OF NMOS TECHNOLOGY MICROCIRCUITS ARE LARGELY UNKNOWN. THIS PHASE I PROPOSAL EXPLORES THE FEASIBILITY OF AN EXTENSIVE TEST AND EVALUATION PROGRAM TO DETERMINE THE SHORT-TERM AND LONG-TERM EFFECTS ON PERFORMANCE AND RELIABILITY DEGRADATION. THE PROGRAMS WILL EXAMINE THE EFFECTS OF NEGATIVE VOLTAGE PULSE AMPLITUDE AND DURATION, PULSE RISE/FALL-TIMES, AND PULSE REPETITION RATES ON NMOS DYNAMIC RAM MICROCIRCUIT ANTICIPATED RESULTS INCLUDE: 1) AN ACCURATE CHARACTERIZATION OF THE EFFECT OF THOSE PARAMETERS RELATED TO UNDERSHOOT IN NMOS MICROCIRCUITS, AND 2) PRELIMINARY WORK TOWARD THE DESIGN OF AN INPUT STRUCTURE WHICH MINIMIZES THE SUSCEPTIBILITY OF NMOS DEVICES TO THOSE EFFECTS. BASED UPON THESE RESULTS SUGGESTIONS WILL BE MADE FOR: MINIMIZING THE EFFECTS OF UNDERSHOOT IN BOTH EXISTING CIRCUITS AND SYSTEMS; NEW DESIGNS FOR BOTH MILITARY AND COMMERCIAL APPLICATIONS.

DAUBIN SYSTEMS CORP — ARMY — $ 50,000
104 CRANDON BLVD - STE 315
KEY BISCAYNE, FL 33149
SCOTT C DAUBIN
TITLE:
COHERENT DOPPLER SODAR SONDE R AND D
TOPIC: 28 OFFICE: LABCOM

AN IMPROVED ACOUSTIC WIND PROFILER IS PROPOSED, MEASURING VELOCITIES TO 100 KNOTS WITH A 2 KNOT RESOLUTION, TO HEIGHTS > OR = TO 3 KILOMETERS. TO ACHIEVE THIS IMPROVEMENT IN PERFORMANCE OVER EXISTING ACOUSTIC PROFILERS, THREE TECHNIQUES ARE BORROWED FROM UNDERWATER ACOUSTICS AND APPLIED FOR THE FIRST TIME TO WIND PROFILING TECHNOLOGY. THESE ARE: (A) A PARAMETRIC TRANSMITTING ARRAY, (B) COHERENT TRANSVERSE DOPPLER PROCESSING OF SCATTERED ECHOES AND (C) CODED PULSE

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SEQUENCES. NON-LINEAR ACOUSTIC INTERACTIONS AT THE SOURCE PRODUCE A LOW FREQUENCY (500 Hz) TRANSMITTED PULSE IN A NARROW (APPROX 10 DEG) BEAM WHICH IS TOTALLY FREE OF SIDE LOBES, AN IMPORTANT FEATURE IN COVERT SYSTEMS. THIS IS ACCOMPLISHED IN A PROJECTOR OF ONLY 63 CENTIMETERS IN DIAMETER. THE RECEIVERS (MICROPHONES) ARE SEPARATED BY ONLY 1.2 METERS, FURTHER ENSURING SYSTEM COMPACTNESS. BECAUSE OF LOW ABSORPTION LENGTHS AT 500 Hz, ONLY 1.11 WATTS OF RADIATED POWER ARE REQUIRED TO GIVE A RETURN ECHO FROM A HEIGHT OF 3 KILOMETERS, WITH A RECEIVED SIGNAL TO THERMAL NOISE OF 20 DB UNDER WORST CONDITIONS. COHERENT DEMODULATION OF THE DOPPLER SIDEBANDS, FREQUENCY (WIND SPEED) ESTIMATION, DISPLAY AND TABULATION ARE ACCOMPLISHED DIGITALLY. PHASE I EFFORT PROVES CONCEPT AND OPTIMIZES PARAMETERS TO ACHIEVE CONCEPT DESIGN OF OPERATIONAL SYSTEM.

DEACON RESEARCH — SDIO — $ 0
900 WELCH RD - STE 203
PALO ALTO, CA 94304
DAVID A G DEACON
TITLE:
CALCULATION OF THE ANGULAR SPECTRUM OF THE COHERENT HARMONICS RADIATED IN THE FREE ELECTRON LASER
TOPIC: 17 OFFICE: IST

WE PROPOSE TO INVESTIGATE THE MEANS FOR REDUCING THE HARMONIC POWER RADIATED BY THE FEL. THIS REQUIRES FIRST AN ANALYTIC FORMULATION OF THE ANGULAR AND SPECTRAL DEPENDENCE OF THE INTENSITY FOR THE CONSTANT PERIOD AND TAPERED UNDULATORS, BOTH IN THE LINEAR POLARIZED AND THE CIRCULAR POLARIZED CONFIGURATIONS. WE PROPOSE TO PERFORM THIS CALCULATION IN THE PHASE I EFFORT AND TO GENERATE EXPRESSIONS WHICH RELATE THE EMITTED INTENSITIES TO THE LASER INTENSITY AT THE FUNDAMENTAL. THE ANALYTIC WORK PROVIDES THE FOUNDATION FOR THE CONSTRUCTION OF A NUMERICAL CODE IN THE PHASE II EFFORT WHICH WOULD ALLOW US TO CALCULATE THE HARMONIC POWER PRODUCED IN THE FEL SYSTEMS NOW UNDER CONSTRUCTION AT BOEING AND LIVERMORE, AND TO ASSESS THE PERFORMANCE OF THE PROPOSED TECHNIQUES FOR REDUCING THE HARMONIC POWER.

DECISION SCIENCE CONSORTIUM INC — ARMY — $ 0
7700 LEESBURG PIKE - STE 421
FALLS CHURCH, VA 22043
STUART H RAKOFF
TITLE:
CONSIDERATIONS DETERMINING ENLISTMENT AND REENLISTMENT BEHAVIOR - QUANTITATIVE MODEL
TOPIC: 105 OFFICE: ARI

THE SUCCESS OF FUTURE ARMY PERSONNEL PROGRAMS RESTS ON OVER ONE MIL-

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LION INDIVIDUAL DECISIONS TO ENTER OR REMAIN IN THE FORCE WHICH ARE MADE EACH YEAR BY CURRENT AND POTENTIAL ARMY PERSONNEL. CURRENT APPROACHES TO UNDERSTANDING AND PREDICTING THESE INDIVIDUAL DECISIONS ARE LIMITED BY THEIR FAILURE TO CAPTURE THE MULTITUDE OF VARIABLES AND CONSIDERATIONS WHICH PEOPLE WEIGH IN EVALUATING THEIR OPTIONS. DECISION ANALYSIS THEORY AND DECISION-ANALYTIC METHODS PROVIDE A MEANS FOR SYSTEMATICALLY PORTRAYING AND EVALUATING THE PROCESS OF INDIVIDUAL DECISION-MAKIN DSC PROPOSES TO APPLY DECISION-ANALYTIC APPROACHES, SPECIFICALLY MULTI-ATTRIBUTE UTILITY ANALYSIS, TO DEVELOP A PRESCRIPTIVE MODEL OF INDIVIDUAL REENLISTMENT DECISIONS, AND THEN TO TEND THIS PRESCRIPTIVE MODEL TO BUILD A DESCRIPTIVE/PREDICTIVE MODEL OF THE REENLISTMENT DECISION THAT WILL ALLOW THE ARMY TO IMPROVE ITS ABILITY TO UNDERSTAND AND PREDICT THESE DECISIONS AND TO FORMULATE POLICIES AND PROGRAMS WHICH WILL BE COST-EFFECTIVE SOLUTIONS TO MEETING FUTURE PERSONNEL NEEDS.

DECISION SCIENCE CONSORTIUM INC ARMY $ 0
7700 LEESBURG PIKE - STE 421
FALLS CHURCH, VA 22043
JAMES O CHINNIS JR
TITLE:
COGNITIVE PROCESSES IN DECISION MAKING UNDER UNCERTAINTY AND TIME STRESS
TOPIC: 108 OFFICE: ARI

GREATER UNDERSTANDING IS NEEDED TO COGNITIVE PROCESSES WHICH ARE MOST AFFECTED BY UNCERTAINTY AND TIME STRESS. WE PROPOSE TO DEVELOP A FRAMEWORK OF COGNITIVE STRUCTURES AND PROCESSES RELATED TO DECISION MAKING UNDER UNCERTAINTY AND TIME STRESS, SELECT AN APPROPRIATE ARMY TESTBED, AND CONDUCT A SERIES OF SMALL EXPERIMENTS. IN OUR EXPERIMENTAL PLAN, WE DISTINGUISH AMONG DIFFERENT FORMS OF UNCERTAINTY AND THEIR RELATIONS TO MODELS OF COGNITIVE STRUCTURES AND PROCESSES, AND TO ESTABLISHED COGNITIVE SHORTCOMINGS AND BIASES.

DECISION SCIENCE CONSORTIUM INC AF $ 67,833
7700 LEESBURG PIKE - STE 421
FALLS CHURCH, VA 22043
MARVIN S COHEN
TITLE:
ARTIFICIAL INTELLIGENCE (AI) DEVELOPMENT FOR PILOT AID APPLICATIONS
TOPIC: 20 OFFICE: AFWAL/AA

THE SUCCESSFUL INTRODUCTION OF AI TECHNOLOGY INTO AIR FORCE AVIONICS

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HAS BEEN HINDERED BY THE NEED FOR REAL-TIME REASONING WITH INCOMPLETE AND INCONSISTENT DATA, INTEGRATION OF HIGH LEVEL SUBSYSTEMS WITH SYSTEMS FOR SIGNAL ANALYSIS, AND AN ADAPTIVE HUMAN-COMPUTER INTERFACE. DSC PROPOSES TO TEST THE HYPOTHESIS THAT SOLUTIONS FOR ALL THREE PROBLEMS ARE LINKED, AND THAT IMPROVED ARCHITECTURES CAN BE DEVELOPED BY INCORPORATING FEATURES FROM FUZZY LOGIC, BELIEF FUNCTIONS, RECENT WORK IN BAYESIAN PROBABILITY, AND NON-MONOTONIC REASONING. THE PRIMARY OBJECTIVE OF PHASE I RESEARCH IS TO EXPLORE THE FEASIBILITY OF DEVELOPING NEW METHODS FOR INFERENCE IN AVIONICS EXPERT SYSTEMS, WHICH ADDRESS SPECIFIC SHORTCOMINGS IN EXISTING APPROACHES AND COMBINE SOME OF THEIR DISTINCT VIRTUES. THE SECOND OBJECTIVE OF PHASE I RESEARCH IS TO IMPROVE UNDERSTANDING OF THE CHARACTERISTICS OF AVIONICS APPLICATION DOMAINS THAT MAKE ONE INFERENCE SCHEME MORE APPROPRIATE THAN ANOTHER. FIVE TASKS HAVE BEEN PROPOSED: (1) A SYSTEMATIC EXAMINATION OF ALTERNATIVE INFERENCE MECHANISMS IN TERMS OF FACTORS RELEVANT TO AVIONICS PILOT AID APPLICATIONS; (2) DEVELOPMENT OF IMPROVED PILOT AID INFERENCE FRAMEWORK; (3) DEVELOPMENT OF CONCEPTS FOR ADAPTIVE HUMAN-COMPUTER INTERACTIONS; (4) IMPLEMENTATION OF A SMALL-SCALE PROTOTYPE SYSTEM IN AN OPERATIONAL CONTEXT; (5) DEMONSTRATION AND TESTING OF ALTERNATIVE INFERENCE SCHEMES IN THE SELECTED CONTEXT.

DEFENSE SYSTEMS INC — AF — $ 50,000
7903 WESTPARK DR
MCLEAN, VA 22102
JAMES B HAGER
TITLE:
SPREAD SPECTRUM AUTOMATIC DIRECTIONAL FINDER FEASIBILITY OF AUTOMATIC DIRECTION FINDING FOR SPREAD SPECTRUM COMMUNICATIONS
TOPIC: 5 OFFICE: ASD/EN

AUTOMATIC DIRECTION FINDING ON UHF COMMUNICATION FREQUENCIES IS AN ESSENTIAL MILITARY CAPABILITY NOW PERFORMED BY TUNING A RECEIVER TO THE COMMUNICATION FREQUENCY AND OBTAINING A SINE/COSINE COMPONENT OF THE OUTPUT OF DIRECTIONAL ANTENNAS WHICH, WHEN COMPARED, PROVIDE THE BEARING TO THE TARGET. THIS TECHNIQUE IS NOT APPLICABLE TO MODERN SPREAD SPECTRUM AND FREQUENCY HOPPING RADIOS. THERE IS A NEED TO DEVELOP AN ARDF CAPABILITY AGAINST FREQUENCY HOPPERS. DSI PROPOSES TO OBTAIN DF BY USING A DUAL CHANNEL PULSE COMPRESSOR RECEIVER ON THE TWO AMPLITUDE/PHASE COMPARISON ANTENNA OUTPUTS AND COMPUTING BEARING ON-THE-FLY FOR EACH SWEEP OF THE SAW PULSE COMPRESSION FILTERS. DSI

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HAS BUILT SINGLE CHANNEL EXTREMELY HIGH SWEEP RATE PC RECEIVERS. THE 225-400 MHz UHF BAND (WITH 25 KHz CHANNEL RESOLUTION) CAN BE SWEPT AT A RATE HIGH ENOUGH TO PROVIDE REVISIT RATES SUFFICIENT TO DETECT FREQUENCY HOPPERS EVEN IF THEY HAS VERY HIGH HOP RATES. IN PHASE I, DSI WILL PERFORM A FEASIBILITY STUDY AND WILL DESIGN AN ARDF SYSTEM THAT WILL WORK BOTH AGAINST STANDARD AND SPREAD SPECTRUM SIGNALS. IN PHASE II DSI WILL BUILD A BRASSBOARD SYSTEM.

DELFIN SYSTEMS ARMY $ 48,639
2001 GATEWAY PL - STE 420W
SAN JOSE, CA 95110
DR GARO KIREMIDJIAN
TITLE:
INTELLIGENT SENSOR RESOURCE MANAGEMENT
TOPIC: 47 OFFICE: CECOM/SWL

THE FUNCTION OF VALIDATING OR DISPROVING ORDER OF BATTLE (OB) HYPOTHESES DEVELOPED BY FUSING A SIDE DIVERSITY OF INTELLIGENCE INFORMATION PLAYS A KEY ROLE IN THE TACTICAL COMMANDER'S DECISION MAKING PROCESS SINCE IT PROVIDES INDICATIONS OF ENEMY INTENT. THE MAJOR SOURCE OF THIS TYPE OF ASSESSMENT IS THE SET OF INTELLIGENCE SENSORS MANAGED BY THE INTELLIGENCE STAFF OFFICER (G2). THE MAIN GOAL OF THE PROPOSED EFFORT IS TO EXPLORE THE UTILITY OF ARTIFICAL INTELLIGENCE (AI) TECHNOLOGY TOWARDS THE DEVELOPMENT OF A ROBUST AND DOMAIN-INDEPENDENT SENSOR RESOURCE MANAGEMENT SYSTEM FOR VERIFICATION OF OB HYPOTHESES. THE PRINCIPLE PHASE I OBJECTIVES CONSIST OF IDENTIFYING AN AI-BASED SYSTEM ARCHITECTURE AND PROVIDING A LIMITED-DOMAIN TEST IMPLEMENTATION.

DELPHI RESEARCH INC NAVY $ 49,993
701 HAINES AVE NW
ALBUQUERQUE, NM 87102
DR PATRICK M DHOOGE
TITLE:
INDIRECT ANTILASER EYE PROTECTION SYSTEM
TOPIC: 24 OFFICE: NESC

PERSONNEL REQUIRED SOME MEANS OF EYE PROTECTION AGAINST VARIOUS TYPES

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SUBMITTED BY	DEPT	AWARDED AMOUNT

OF LASERS WHILE INVOLVED IN OPERATIONAL SITUATIONS, BUT ALSO NEED TO BE ABLE TO SEE IN A NORMAL MANNER. WE PROPOSE HERE AN INDIRECT VIEWING SYSTEM CONTAINING A MIRROR WHICH WILL NOT PASS ANY LIGHT INTENSE ENOUGH TO HARM THE EYE BUT WILL OTHERWISE ALLOW NORMAL VIEWING. THE MIRROR WILL BE CONSTRUCTED OF REFLECTIVE THIN FILM AND ORGANIC GLASS WHICH WILL BE DAMAGED BY INTENSE LIGHT SUFFICIENTLY TO PREVENT THE LIGHT'S REFLECTION. THE PROJECT WILL INVOLVE STUDYING THE APPLICABILITY OF VARIOUS THIN REFLECTIVE FILMS AND ORGANIC GLASSES TO SUCH A MIRROR, AND SUBSEQUENTLY FABRICATING AND TESTING PREPROTOTYPE ARTICLES.

DELPHI RESEARCH INC — ARMY — $ 0
701 HAINES AVE NW
ALBUQUERQUE, NM 87102
DR PATRICK M DHOOGE
TITLE:
INDIRECT ANTILASER EYE PROTECTION SYSTEM
TOPIC: 96 OFFICE: MED FT. DET

PERSONNEL REQUIRE SOME MEANS OF EYE PROTECTION AGAINST VARIOUS TYPES OF LASERS WHILE INVOLVED IN OPERATIONAL SITUATIONS, BUT ALSO NEED TO BE ABLE TO SEE IN A NORMAL MANNER. WE PROPOSE HERE INDIRECT VIEWING SYSTEM CONTAINING A MIRROR WHICH WILL NOT PASS ANY LIGHT INTENSE ENOUGH TO HARM THE EYE BUT WILL OTHERWISE ALLOW NORMAL VIEWING. THE MIRROR WILL BE CONSTRUCTED OF REFLECTIVE THIN FILM AND ORGANIC GLASS WHICH WILL BE DAMAGED BY INTENSE LIGHT SUFFICIENTLY TO PREVENT THE LIGHT'S REFLECTION. THE PROJECT WILL INVOLVE STUDYING THE APPLICABILITY OF VARIOUS THIN REFLECTIVE FILMS AND ORGANIC GLASSES TO SUCH A MIRROR, AND SUBSEQUENTLY FABRICATING AND TESTING PREPROTOTYPE ARTICLES.

DESIGNATRONICS INC — DARPA — $ 49,700
2101 JERICHO TURNPIKE
NEW HYDE PARK, NY 11040
TOM MADSEN
TITLE:
VERY HIGH SPEED LOW VIBRATION ROBOTS
TOPIC: 4 OFFICE: DARPA

A PROMISING METHOD OF SIGNIFICANTLY INCREASING THE OPERATING SPEEDS

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SUBMITTED BY	DEPT	AWARDED AMOUNT

OF ROBOTS WILL BE INVESTIGATED. THE PRIMARY ROBOT SPEED LIMITATION IS FROM RESONANCES IN THE ARM, AND THE ASSOCIATED DIFFICULTY OF CONTROL LAW DESIGN. THE PROPOSED APPROACH FOCUSES ON ANNIHILATING THE VIBRATIONS AS THE ARM APPROACHES THE ENDPOINT OF ITS MANEUVER WHICH IS USUALLY THE ONLY POINT WHERE STRINGENT ACCURACY IS REQUIRED. THE VIBRATIONS WILL BE ELIMINATED WITH THE USE OF DISCRETE TIME-OPTIMAL CONTROL THEORY AS OPPOSED TO THE CONVENTIONAL CLASSICAL CONTROL METHODS. THE RESULTS SHOULD PROVIDE A DRAMATIC IMPROVEMENT IN SPEED (A FACTOR OF AT LEAST 2) WITHOUT PRODUCING VIBRATIONS AT THE END OF A MOVE. FURTHERMORE, THESE RESULTS WILL BE IN FEEDBACK FORM ACCOUNTING FOR DEVIATIONS IN OPERATING CONDITIONS. THE PHASE I RESEARCH WILL DEVELOP ALGORITHMS AND SOFTWARE, AND EXPERIMENTALLY DEMONSTRATE THE METHOD ON A SINGLE ROBOT LINK. THE METHOD REQUIRES ONLY THE SOFTWARE AND A FEW EXTRA SENSORS, SO THE RESULTING ROBOTS WILL HAVE A TREMENDOUS PERFORMANCE VS. COST ADVANTAGE OVER THE CURRENTLY AVAILABLE TECHNOLOGY.

DIRECTED TECHNOLOGIES INC — NAVY — $ 49,920
1226 POTOMAC SCHOOL RD
MCLEAN, VA 22101
IRA F KUHN JR
TITLE:
DEWPOINT - AN ANTI-SENSOR SYSTEM FOR TERMINAL PHASE FLEET DEFENSE AGAINST OPTICAL AND RF HOMING MISSILES
TOPIC: 86 OFFICE: NSWC

THE DEWPOINT CONCEPT UTILIZES CO-ALIGNED HIGH POWER MICROWAVE AND MODERATE POWER LASER DEVICES TO IRRADIATE OPTICAL AND/OR RF RECEIVERS IN THE INCOMING ANTI-SHIP MISSILE. THIS FLEET DEFENSE WEAPON CONCEPT HAS THREE IMPORTANT CHARACTERISTICS: 1. ABILITY TO PERMANENTLY OR INTERMITTENTLY DEBILITATE THE GUIDANCE/HOMING SUBSYSTEM OF ALL CLASSES OF THREAT ANTI-SHIP MISSILE EXCEPT PURE BALLISTIC NUCLEAR WARHEAD MISSILES. 2. NEAR-TERM DEPLOYMENT ON EXISTING SHIPS (I.E., BOLT-ON CAPABILITY BY EARLY 1990s) AND POTENTIAL FOR FAR-TERM DEPLOYMENT ON FLEET AIRCRAFT, 3. MAXIMAL EFFECTIVENESS WHEN USED IN CONJUNCTION WITH RAPIDLY DEPLOYABLE OFFBOARD RF/OPTICAL DECOYS AND JAMMERS. THE PROPOSED PHASE I EFFORT WILL EVALUATE ALTERNATIVE CONFIGURATIONS (RF AND OPTICAL SOURCE TECHNOLOGIES, FREQUENCY, WAVEFORM) FOR THE SHIP-BORNE DEWPOINT SYSTEM AND DEVELOP A CONCEPTUAL DESIGN WHICH INCLUDES MICROWAVE AND LASER COMPONENTS, BEAM DIRECTOR, PRIME POWER, AND TARGETING.

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DISPLAYTECH INC
PO BOX 7246
BOULDER, CO 80306
MARK A HANDSCHY
TITLE:
FIBER OPTIC SWITCHES WITH FERROELECTRIC LIQUID CRYSTALS FABRICATION
TOPIC: 172 OFFICE: RADC/DORM

AF $ 59,140

THE PROPOSED PROJECT AIMS TO DEVELOP ELECTRO-OPTIC ROUTING SWITCHES SUITABLE FOR FIBER OPTIC NETWORKS. BY EMPLOYING LIGHT VALVES USING FERROELECTRIC LIQUID CRYSTALS, THE DEVICES TO BE DEVELOPED WOULD EXHIBIT MICROSECOND TO SUBMICROSECOND SWITCHING TIMES, LOW ELECTRICAL POWER CONSUMPTION, LOW INSERTION LOSS, AND LOW CROSSTALK, EVEN WITH UNPOLARIZED, MULTIMODE INPUT LIGHT. THE SWITCHING WILL BE ACCOMPLISHED BY A TRANSMISSION/TOTAL-INTERNAL-REFLECTION SCHEME.

DISTRIBUTION ANALYSIS RSCH & TECH INC
ONE BALA PLAZA - STE 511
BALA CYNWYD, PA 19004
HELEN MORRISON
TITLE:
INTERACTIVE SHIP SCHEDULING ON A MICRO COMPUTER
TOPIC: 4 OFFICE: ONR

NAVY $ 78,770

WE PROPOSE TO DEVELOP AN INTERACTIVE OPTIMIZATION SYSTEM FOR CARGO SHIP SCHEDULING. THE SYSTEM WILL BE RESIDENT ON A MICRO VAX AND HAVE A COLOR GRAPHICS INTERFACE TO ENABLE EASY INTERACTION. WE WILL USE THIS SYSTEM TO EXPLORE A VARIETY OF RESEARCH QUESTIONS INCLUDING THE APPROPRIATE MODEL FOR SHIP SCHEDULING, DETAILED DESIGN OF THE OPTIMIZATION ALGORITHM TO ACHIEVE RUN TIME EFFICIENCY, AND USEFUL DESIGN OF COLOR GRAPHICS DISPLAYS TO ENABLE EFFECTIVE USER INTERACTION. OUR WORK WILL BE BASED IN PART ON PRIOR SUCCESSFUL RESEARCH FUNDED BY THE OFFICE OF NAVAL RESEARCH.

DWA COMPOSITE SPECIALTIES INC
21119 SUPERIOR ST
CHATSWORTH, CA 91311
ALBIN M NOWITZKY
TITLE:
FATIGUE RESISTANT/HIGH DAMPING CAPABLE METAL MATRIX COMPOSITE
TOPIC: 5 OFFICE: IST

SDIO $ 0

FEASIBILITY WILL BE DEMONSTRATED BY PRODUCING A SERIES OF HYBRID

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COMPOSITE PLATES MADE OF MAGNESIUM-GRAPHITE INTERLEAVED AND CLAD WITH EITHER ALUMINUM OR TITANIUM THIN FOILS. KEY VARIABLES WILL BE a) GRAPHITE V/O; b) GRAPHITE STIFFNESS (P55 NAD P100 ARE SUGGESTED); c) GRAPHITE/METAL TO FOIL RATIO (1 THICKNESS AND 2 METALS).

DYNA EAST CORP — AF — $ 49,034
3132 MARKET ST
PHILADELPHIA, PA 19104
RICHARD M WEST
TITLE:
CUTTER CHARGE WARHEAD FOR DEFEAT OF REACTIVE ARMOR
TOPIC: 182 OFFICE: AD/PMR

RECENT DEVELOPMENTS IN ARMOR TECHNOLOGY AND THE INTRODUCTION OF EFFECTIVE APPLIQUES HAVE GREATLY INCREASED THE DIFFICULTY OF MUNITION DESIGN. WARHEADS CAPABLE OF DEFEATING THESE ADVANCED ARMORS MUST BE DEVELOPED. IMPROVEMENTS IN UNITARY WARHEADS, SUCH AS INCREASING THE DENSITY OF THE LINER IN A SHAPED-CHARGE DEVICE, ARE CURRENTLY BEING RESEARCHED. TWO-STAGE CONCEPTS RECENTLY UNDER INVESTIGATION MAY ALSO OFFER IMPROVEMENTS IN PERFORMANCE, BUT ARE NOT EASILY INCORPORATED INTO A MISSILE SYSTEM. THE OBJECTIVE OF THE PROPOSED PROGRAM IS TO DEMONSTRATE THE FEASIBILITY OF A CUTTER CHARGE WARHEAD CONCEPT THAT WILL GREATLY INCREASE THE CAPABILITY OF A HIGH-EXPLOSIVE WARHEAD TO DEFEAT MODERN ARMORS WITHOUT INCREASING SYSTEM COST OR COMPLEXITY. THE CUTTER CHARGE IS A SIMPLIFIED TWO-STAGE WARHEAD THAT CONSISTS OF A MAIN WARHEAD WITH A LINEAR SHAPED-CHARGE CUTTER CHARGE DEVICE IN FRONT. THE CUTTER CHARGE OPENS A LARGE HOLE IN THE ARMOR PLATING OR APPLIQUE AND THE JET FROM THE MAIN CHARGE FOLLOWS THROUGH. DYNA EAST CORPORATION IS UNIQUELY QUALIFIED TO DEMONSTRATE THE FEASIBILITY OF THE CUTTER CHARGE WARHEAD CONCEPT.

DYNA EAST CORP — ARMY — $ 49,206
3132 MARKET ST
PHILADELPHIA, PA 19104
WILLIAM J FLIS
TITLE:
WARHEAD CONCEPTS FOR ANTI-ARMOR MISSILE WITH CROSSING VELOCITY
TOPIC: 61 OFFICE: MICOM

RECENTLY, TO AVOID THE DIFFICULTIES OF FRONTAL ATTACK OF MODERN ARMOR

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VEHICLES, FLY-OVER-SHOOT-DOWN MISSILES HAVE BEEN PROPOSED. HOWEVER, TESTS HAVE SHOWN THAT THE RESULTING CROSSING VELOCITY CAN REDUCE THE PENETRATION OF CONVENTIONAL SHAPED-CHARGE WARHEADS BY UP TO 60%. THEREFORE, A PROGRAM IS PROPOSED TO DEVELOP AN IMPROVED WARHEAD FOR TOP-ATTACK APPLICATION. FIRST, THE FEASIBILITY OF TWO NOVEL ADVANCED CONCEPTS WILL BE EXAMINED. THEN, A PENETRATION COMPUTER CODE, MODIFIED TO ACCOUNT FOR CROSSING VELOCITY, WILL BE USED TO GENERATE AN IMPROVED WARHEAD DESIGN, FROM AN ADVANCED CONCEPT OR A MORE CONVENTIONAL TYPE. IN PHASE II, THE WARHEAD WILL BE FURTHER OPTIMIZED THROUGH AN ITERATIVE PROCESS OF DESIGN, FABRICATION, TESTING, AND ANALYSIS.

DYNAMET TECHNOLOGY INC ARMY $ 48,393
EIGHT A STREET
BURLINGTON, MA 01803
STANLEY ABKOWITX
TITLE:
DUCTILE ALLOY ENCAPSULATED CERAMIC ARMOR DEVELOPMENT
TOPIC: 76 OFFICE: AMMRC

IMPROVED ARMOR RESISTANT MATERIALS ARE REQUIRED TO KEEP PACE WITH TECHNOLOGICAL IMPROVEMENTS IN PENETRATOR MATERIALS. CERAMIC ARMOR OFFERS POTENTIAL BUT LACKS THE REQUIRED TOUGHNESS REQUIRED FOR GOOD BALLISTIC PROPERTIES. ENCAPSULATION OF THE CERAMIC MATERIAL IN A DUCTILE ALLOY CLADDING COULD OFFER SIGNIFICANT ADVANTAGE IN OVERALL BALLISTIC BEHAVIOR. THE PROPOSED PROGRAM WILL ENCOMPASS A PRELIMINARY LOOK AT THE ENCAPSULATION OF THREE PROMISING LIGHT WEIGHT CERAMIC MATERIALS UTILIZING Ti-6Al-4V ALLOY AND Al6061 ALLOY AS THE CLADDING MATERIALS. INNOVATIVE TECHNIQUES OF COLD ISOSTATIC PRESSING, VACUUM SINTERING AND HOT ISOSTATIC PRESSING WILL BE UTILIZED TO PRODUCE THE ENCAPSULATION. PROTOTYPE TEST PLATES PRODUCED IN THIS MANNER WILL BE BALLISTICALLY EVALUATED AT AMMRC.

DYNAMIC ANALYSIS & TESTING ASSOCS AF $ 49,000
766 SECOND ST
ENCINITAS, CA 92024
DR JAY TOOR
TITLE:
EFFECT OF CLOUD COVER ON SURVEILLANCE OF MOBILE SMALL ICBM
TOPIC: 125 OFFICE: AFBMO/PMX

THE PROPOSED EFFORT WILL DETERMINE THE EFFECT OF CLOUD COVER AND

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OTHER OBSCURANTS UPON SOVIET SATELLITE BASED PHOTO SENSORS DEGRADATION, ATTEMPTING TO DETECT AND IDENTIFY SMALL ICBM MOBILE LAUNCHER SYSTEMS FOR THE PROPOSED SITES. THE EFFORT WILL CONSIDER THE HISTORICAL CLOUD COVER AND OTHER OBSCURANT DATA STATISTICALLY AND USE IT PARAMETRICALLY TO DETERMINE SENSOR DEGRADATION AS A FUNCTION OF THE ABOVE PARAMETERS INCLUDING SATELLITE ALTITUDE AND SENSOR SENSITIVITY AND RESOLUTION CAPABILITY. THE DATA FOR THE PROPOSED SITES WILL BE OBTAINED, COMPILED, STATISTICALLY ANALYZED, PARAMETRIZED AND DATA GAPS FILLED USING EXPERIENCED JUDGMENT. PARAMETRIC STUDY WILL RESULT IN DETERMINING NOT ONLY SENSOR IMAGE DEGRADATION BUT ALSO THE PROBABILITY OF DETECTION AS A FUNCTION OF LAUNCHER INHERENT CONTRAST AND SATELLITE ALTITUDE. THE END RESULT OF THIS STUDY WILL BE TABLES AND FIGURES CONTAINING THE PARAMETRIC RESULTS FOR SENSOR IMAGE DEGRADATION WHICH CAN BE COMBINED WITH SATELLITE INFORMATION CYCLE TIME TO EVALUATE DETECTION/IDENTIFICATION AND DETERMINATION OF LAUNCHER LOCALIZATION PROBABILITY.

DYNAMIC ANALYSIS & TESTING ASSOCS ARMY $ 47,353
766 SECOND ST
ENCINITAS, CA 92024
JOHN F JAKOVICH
TITLE:
CORROSION DATA MANAGEMENT SYSTEM FOR VEHICLE LOGISTICS CONTROL
TOPIC: 70 OFFICE: TACOM

AN INTEGRATED LOGISTICS SUPPORT SYSTEM WILL BE DEVELOPED TO EVALUATE, MONITOR AND REPORT THE CORROSION DAMAGE TO THE ARMY'S TACTICAL WHEEL VEHICLE FLEET. THIS SYSTEM WILL BE BASED ON A RELATIONAL DATA BASE MANAGER AND WILL PERMIT THE EFFICIENT RECORDING OF THE DATA, USER FRIENDLY INQUIRIES AND STANDARD PERIODIC REPORTS OF THE RESULTS. ITEMS EVALUATED INCLUDE: VEHICLE IDENTIFICATION, LOCATION, NATURE AND DEGREE OF RUST DAMAGE, PREVENTATIVE MAINTENANCE EFFORTS, RATE OF REPAIR AND COST OF REPAIR.

DYNATHERM CORP ARMY $ 58,925
10108 MARBLE COURT
COCKEYSVILLE, MD 21030
WALTER B BIENERT
TITLE:
STEAM GENERATOR WITH HEAT PIPE HEAT EXCHANGER
TOPIC: 84 OFFICE: NRDC

THE OBJECTIVE OF THE PROPOSED PROGRAM IS TO DEVELOP A FIELD STEAM

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GENERATOR CAPABLE OF USING ANY UNTREATED WATER. THE PROPOSED CONCEPT UTILIZES HEAT PIPES AS INTERMEDIATE HEAT TRANSFER ELEMENTS BETWEEN THE BURNER AND THE BOILER SECTIONS. THE INCORPORATION OF HEAT PIPES CONVERTS THE STEAM GENERATOR FROM A "WATER TUBE" TO A "FIRE TUBE" BOILER. STEAM LOCOMOTIVES HAVE USED THIS DESIGN FOR OVER A CENTURY WITHOUT REQUIRING A TREATED WATER SUPPLY. THE HEAT PIPES WOULD BE FABRICATED FROM STAINLESS STEEL AND USE WATER AS THE WORKING FLUID. THE EVAPORATOR SECTIONS OF THE HEAT PIPE ARE LOCATED WITHIN THE BURNER COMPARTMENT; THE CONDENSERS ARE IMMERSED IN THE BOILER SECTION OF THE STEAM GENERATOR. BOILING AND STEAM GENERATION OCCURS ON THE OUTSIDE OF THE HEAT PIPES WHICH REDUCES THE TENDENCY OF BUILD-UP OF DEPOSITS. SINCE THE PIPES HAVE SMOOTH WALLS ANY DEPOSITS CAN BE REMOVED BY PERIODIC MAINTENANCE OPERATIONS. DURING THE PROPOSED PROJECT SEVERAL CONFIGURATIONS OF HEAT PIPE STEAM GENERATORS WILL BE STUDIES. PERFORMANCE ANALYSIS AND DESIGN STUDIES WILL BE CONDUCTED AND CRITICAL DEVELOPMENT ITEMS IDENTIFIED. TYPICAL HEAT PIPES WILL BE TESTED UNDER CONDITIONS WHICH SIMULATE THOSE OF A STEAM GENERATOR. THE FINAL OBJECTIVE OF THE PROGRAM IS TO FABRICATE AND TEST A FUNCTIONAL MODEL, EITHER A COMPLETE SUBSCALE UNIT OR A REPRESENTATIVE SECTION OF A FULL SCALE STEAM GENERATOR.

E-TEK DYNAMICS INC — AF — $ 48,823
250 EAST DR
MELBOURNE, FL 32901
J J PAN
TITLE:
MULTI-WAVELENGTH NARROW BAND SOURCES
TOPIC: 169 OFFICE: RADC/DORM

E-TEK PROPOSES FOUR SOUND METHODS TO CONSTRUCT THE TUNABLE OPTICAL SOURCES HAVING A WIDE TUNING RANGE, STABLE SINGLE-MODE, AND LOW NOISE OPERATION. THE FOUR METHODS ARE: (1) SUPERLUMINESCENT DIODE WITH TUNABLE/FIXED NARROW BAND WAVEGUIDE FILTER; (2) TUNABLE LASER DIODE SOURCE USING AN EXTERNAL $LiNbO_3$ ELECTRO-OPTIC MODULATOR; (3) LASER DIODE WITH A FEEDBACK LOOP; AND (4) TUNABLE INTERFEROMETRIC LASER DIODE. DURING PHASE I R&D, E-TEK WILL PERFORM DETAILED THEORETICAL ANALYSES AND COMPUTATIONS, INCLUDING FABRICATION FEASIBILITY, WAVELENGTH TUNABILITY, TUNING RANGE, TUNING SENSITIVITY, SPECTRAL PURITY, DEVICE STABILITY, POWER OUTPUT, TEMPERATURE EFFECTS, ETC.

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EASTAN CORP
700 MELVIN AVE - #5
ANNAPOLIS, MD 21401
GARY A BESAW
TITLE:
ALGORITHM TO PREDICT LEVELS OF COSITE INTERFERENCE
TOPIC: 12 OFFICE: CMC

NAVY $ 48,500

COSITE CONFIGURATIONS SUCH AS A BEACHHEAD OR COMMAND POST CAN BE QUITE VARIABLE IN EQUIPMENT COMPLEMENT, EQUIPMENT LOCATION, FREQUENCY AVAILABILITY, ETC. THE CONFIGURATION CAN ALSO CHANGE WITH TIME. BECAUSE OF THIS VARIABILITY IT IS DESIRABLE TO PROVIDE THE CAPABILITY TO PREDICT THE LEVEL OF INTERFERENCE. THIS PREDICTION CAPABILITY WOULD SIGNIFICANTLY AUGMENT THE COMMUNICATORS ABILITY TO BETTER MANAGE HIS SYSTEM. COMMUNICATION-ELECTRONIC EQUIPMENT COLLOCATION IMPLIES RELATIVELY LARGE, UNDESIRED SIGNALS IMPINGING ON RECEIVER INPUTS AND TRANSMITTER OUTPUTS. THE PRESENCE OF LARGE SIGNALS CAN RESULT IN A VARIETY OF NONLINEAR INTERACTIONS WITHIN RECEIVERS AND TRANSMITTERS. A STUDY IS PROPOSED TO DEVELOP A COMPUTER PROGRAM FOR A PERSONAL COMPUTER THAT WOULD PREDICT LEVELS OF INTERFERENCE IN A COSITE CONFIGURATION FOR SINGLE-CHANNEL AND FREQUENCY-HOPPING SYSTEMS. THE PHASE I EFFORT THAT IS PROPOSED WOULD INVOLVE THE DEVELOPMENT OF THE ENGINEERING ALGORITHM FOR THIS ANALYSIS CAPABILITY.

EDEN LABS
6408 CLAREMONT AVE
RICHMOND, CA 94805
HAROLD B ARSEM
TITLE:
LYOPHILIZATION IN FLEXIBLE BAGS - FEASIBILITY STUDY
TOPIC: 92 OFFICE: MED FT. DET

ARMY $ 0

MOST OF THE TECHNIQUES DEVELOPED FOR THE FREEZE DRYING OF PHARMACEUTICALS HAVE EVOLVED SLOWLY OVER TIME. A DEPARTURE FROM THE STANDARD PRACTICES OFTEN UNCOVERS A VARIETY OF PROBLEMS, SOME MAY BE ANTICIPATED, OTHERS MAY APPEAR UNEXPECTED. THE PROPOSED RESEARCH PROGRAM WILL INVOLVE A SERIES OF EXPERIMENTS DESIGNED TO EVALUATE THE BEHAVIOR OF FLEXIBLE POUCHES IN THE FREEZE DRYING CYCLE. THESE INCLUDES, THE SELECTION OF A SUITABLE TEST SOLUTION, IN BAG FREEZING STUDIES, AND A

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STUDY OF THE PARAMETERS EFFECTING THE CONFINED LYOPHILIZATION PROCESS. THE EXPERIMENTAL DATA WILL BE INCORPORATED INTO A MODIFIED NUMERICAL SIMULATION OF THE LYOPHILIZATION WITHIN A FLEXIBLE BAG TO PROJECT THE EFFECTS OF PACKAGE CONFIGURATION AS WELL AS TO TEST PROSPECTIVE CONTROL STRATEGIES. KNOWLEDGE OF THE COMPROMISES INHERENT IN DEFINING OPERATING CONDITIONS, CONTROL METHODS, AND SELECTING A BAG DESIGN WILL ESTABLISH THE NECESSARY FOUNDATION FOR THE OVERALL DEVELOPMENT PROGRAM.

EDWARDS COMMUNICATIONS ELECTO-OPTICS — NAVY — $ 43,890
335 PARK ST NE
VIENNA, VA 22180
RAJ B EDWARDS
TITLE:
ELF ON-HULL ANTENNA DESIGN FEASIBILITY
TOPIC: 26 OFFICE: NESC

THE TECHNICAL FEASIBILITY OF A HIGH PERFORMANCE ON-HULL ELF ANTENNA WILL BE DETERMINED BY A COMPREHENSIVE INVESTIGATION OF ON-HULL ELF NOISE AS A BASIS FOR DETERMINING FEASIBILITY OF THREE ADAPTIVE CONCEPTS: (I) A REAL-TIME STOCHASTIC ADAPTIVE PROCESS; (II) A REAL-TIME DETERMINISTIC ADAPTIVE SYSTEM, SPEED, ACCELERATION AND SHAFT SPEED; AND (III) AN ARRAY OF SHORT HIGHLY DIRECTIVE AND SENSITIVE FIBER-OPTIC SENSOR ELEMENTS. AN ANALYTICAL SYSTEM DESCRIPTION OF EACH OF THE THREE CONCEPTS WILL BE DEVELOPED BASED ON CHARACTERISTICS OF EACH PRACTICAL ELEMENT OF THE SYSTEM. FIRST ORDER APPROXIMATIONS WILL BE USED TO CHARACTERIZE SYSTEM PERFORMANCE. PERFORMANCE CRITERIA WILL BE DEVELOPED AND APPLIED TO A COMPARATIVE EVALUATION OF THE CONCEPTS AND PRACTICAL FEASIBILITY OF THE BEST APPROACH WILL BE ASSESSED.

EIC LABS INC — NAVY — $ 50,000
111 DOWNEY ST
NORWOOD, MA 02062
R DAVID RAUH
TITLE:
INTRINSICALLY CONDUCTING AIR STABLE ORGANIC POLYMERS
TOPIC: 92 OFFICE: NSWC

THE PROPOSED RESEARCH WILL FOCUS ON THE DEVELOPMENT OF A NEW CLASS

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OF CHEMICALLY STABLE CONDUCTIVE ORGANIC POLYMERS. THESE WILL BE SINGLE PHASE SYSTEMS WHICH DO NOT REQUIRE THE DISSOLUTION OF EXTERNALLY ADDED "DOPANTS" IN THE POLYMER MATRIX TO IMPART CONDUCTIVITY. INSTEAD, A MOIETY WHICH CAN CREATE FREE CARRIERS IN THE POLYMER CHAIN VIA AN INTERNAL ELECTRON TRANSFER REACTION WILL BE INCORPORATED CHEMICALLY INTO THE POLYMER BACKBONE. THE DENSITY OF FREE CHARGE CARRIERS MAY BE VARIED AND OPTIMIZED BY CHANGING THE CONCENTRATION OF THE REDOX CENTER IN THE CHAIN VIA COPOLYMERIZATION. THE GOAL OF THE PHASE I IS TO PRODUCE COPOLYMER WITH AN INTRINSIC CONDUCTIVITY OF >10 mho PER cm USING THIS APPROACH AND WITHOUT EXTERNAL DOPANTS. THE CONDUCTIVE BACKBONE WILL CONSIST OF DERIVATIZED POLY-3-METHYLTHIOPHENE, A SYSTEM WHICH SHOWS EXCELLENT STABILITY TOWARD OXYGEN. PHASE II WOULD ENTAIL OPTIMIZING THE COPOLYMERIZATION STOICHIOMETRY AND PROCESS TO PRODUCE BULK OXYGEN STABLE CONDUCTIVE (<100 mho -1cm) POLYMERS WHICH ARE MECHANICALLY WORKABLE AND WHICH HAVE UNIFORM ELECTRICAL PROPERTIES.

EIC LABS INC SDIO $ 0
111 DOWNEY ST
NORWOOD, MA 02062
STUART F COGAN
TITLE:
METAL-METAL MICROFILAMENTARY COMPOSITES FOR HIGH CURRENT ELECTRICAL CONDUCTOR APPLICATIONS
TOPIC: 5 OFFICE: IST

THE DEVELOPMENT OF SPACEBORNE WEAPONS SYSTEMS FOR THE STRATEGIC DEFENSE INITIATIVE ORGANIZATION (SDIO) HAS CREATED THE NEED FOR MATERIALS CAPABLE OF HANDLING SUBSTANTIAL ELECTRIC POWER LOAD. IN THIS PROPOSAL, WE SUGGEST THE DEVELOPMENT OF METAL-METAL MICROFILAMENTARY COMPOSITES AS HIGH CURRENT CONDUCTORS FOR SPACEBORNE APPLICATIONS. METAL-METAL MICROFILAMENTARY COMPOSITES ARE A NOVEL CLASS OF MATERIALS THAT DERIVE THEIR STRENGTH AND STIFFNESS FROM THE DETAILS OF THEIR UNIQUE MICROSTRUCTURAL STATE. ENHANCEMENTS IN THE TENSILE STRENGTH AND ELASTIC MODULUS OF 300% AND 100%, RESPECTIVELY, ABOVE RULE OF MIXTURES HAVE ALREADY BEEN ACHIEVED IN Cu-Nb MICROFILAMENTARY COMPOSITES. IN ADDITION, THESE COMPOSITES ARE EXCELLENT ELECTRICAL CONDUCTORS. THE SUPERIOR MECHANICAL PROPERTIES OF MICROFILAMENTARY COMPOSITES WILL REDUCE FLEXURE AND VIBRATION OF THE CONDUCTORS DURING HIGH OR PULSED CURRENT OPERATION, THEREBY MINIMIZING VIBRATIONAL INPUT TO SPACE PLATFORMS. IN THE PHASE I PROGRAM, WE PROPOSE TO DE-

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MONSTRATE THE FABRICATION OF Cu-Nb AND Cu-Al MICROFILAMENTARY COMPOSITES AND TO CHARACTERIZE THEIR MECHANICAL AND ELECTRICAL PROPERTIES.

EL DORADO ENGINEERING INC — NAVY — $ 48,101
3460 S REDWOOD RD
SALT LAKE CITY, UT 84119
RALPH W HAYES
TITLE:
ATMOSPHERIC DISPERSION OF ORDNANCE PRODUCTS
TOPIC: 87 OFFICE: NSWC

THE OBJECTIVE OF THE PROJECT IS TO DEVELOP A MATHEMATICAL MODEL FOR PREDICTING DISPERSION FROM OPEN AIR DETONATION OR BURNING OF THE NAVY'S PEP (PROPELLANT EXPLOSIVE, PYROTECHNIC) MATERIALS. THE FIRST STEP OF THE PROJECT WILL BE TO DEFINE THE CONTROLLING PARAMETERS, I.E., PRODUCTS OF COMBUSTION FORMED, PARTICLE SIZE ANALYSES AND PLUM CHARACTERISTICS. GENERALIZED PREDICTION MODELS DEVELOPED FOR CHEMICAL MUNITION WILL THEN BE MODIFIED IN ORDER TO INCORPORATE THE GENERATED DATA DEVELOPED FOR THE NAVY'S MUNITIONS.

ELECTROCHIMICA CORP — SDIO — $ 0
20 KELLY CT
MENLO PARK, CA 94025
DR M EISENBERG
TITLE:
NOVEL HIGH POWER DENSITY BATTERY DESIGN FOR SPACE PRIME POWER
TOPIC: 2 OFFICE: IST

A RADICALLY NEW CONCEPT OF A VERY HIGH PULSE POWER DENSITY BATTERY IS PROPOSED FOR PRELIMINARY EVALUATION IN PHASE I. IT IS BASED ON THE USE OF A NEW CLASS OF ACTIVATED CARBON FIBERS (ACF) AND THEIR MATS OR FABRICS AS STARTING ELECTRODE MATERIALS WHICH WOULD BE, FOR INSTANCE, P-DOPED BYE ELECTROCHEMICAL INSERTION OF AsF6 IONS FROM AN APPROPRIATE ORGANIC ELECTROLYTE AND COUPLED WITH A SOLID LITHIUM ANODE TO PRODUCE NEW HYBRID CELLS WITH GALVANIC AND SOME CAPACITIVE CONTRIBUTIONS. THE EXTREMELY HIGH SPECIFIC SURFACE AREAS OF THE ACF MATERIALS AND THE HIGH ENERGY DENSITY-EMF OF LITHIUM ARE EXPECTED TO

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SUBMITTED BY	DEPT	AWARDED AMOUNT

LEAD TO A NEW CLASS OF VERY HIGH POWER DENSITY BATTERIES WITH PEAK POWERS UP TO 1000 WATTS/Kg OR GREATER COMPARED TO 100-150 FOR TODAYS BATTERIES.

ELECTROMAGNETIC LAUNCH RESEARCH INC — DARPA — $ 49,991
625 PUTNAM AVE
CAMBRIDGE, MA 02139
P MONGEAU/H KOLM
TITLE:
FAST ACTING RHEOSTATS
TOPIC: 12 OFFICE: DARPA

PULSED POWER CONDITIONING FOR ELECTROMAGNETIC LAUNCHER SYSTEMS REQUIRES FAST-ACTING RHEOSTATS (MODULATORS) WITH ENOUGH THERMAL INERTIA TO ABSORB TENS OF MEGAJOULES ADIABATICALLY WITHIN MILLISECONDS, AND ENOUGH COOLING CAPABILITY TO DISSIPATE THE ABSORBED ENERGY BETWEEN LAUNCHES. ONE UNEXPLORED CLASS OF DEVICES FOR ACCOMPLISHING THIS ARE MODERN VERSIONS OF THE CLASSIC CARBON PILE RHEOSTAT, IN WHICH THE BULK RESISTIVITY OF A LAMINATED OR SINTERED COMPOSITE IS MODULATED RAPIDLY BY THE APPLICATION OF PRESSURE. PHASE I WILL INVESTIGATE RESISTIVITY RANGES AND OPERATING TEMPERATURES ATTAINABLE WITH VARIOUS LAMINATED AND SINTERED COMPOSITES, AND PRACTICAL MEANS FOR MODULATING THE APPLIED PRESSURE MECHANICALLY, HYDRAULICALLY, PIEZOELECTRICALLY AND MAGNETOSTRICTIVELY. PHASE I WILL RESULT IN THE CONSTRUCTION AND TESTING OF A HYDRAULICALLY ACTUATED 1 MEGAWATT RHEOSTAT.

ELECTROMAGNETIC LAUNCH RESEARCH INC — AF — $ 49,962
625 PUTNAM AVE
CAMBRIDGE, MA 02139
DR PETER MONGEAU
TITLE:
COIL STRUCTURES FOR ENERGY STORAGE
TOPIC: 62 OFFICE: AFWAL/PO

COIL STRUCTURES FOR ENERGY STORAGE WHICH ARE FABRICATED, BY NOVEL TECHNIQUES FOR ACHIEVING MAXIMUM STRENGTH AND ENERGY DENSITY, AND WHICH LEND THEMSELVES TO THE USE OF NEW HIGH-STRENGTH COMPOSITES. ONE TYPE OF STRUCTURE COMPRISES STACKED SPIRAL PANCAKE MODULES WOUND

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FROM REINFORCED BAR STOCK OR MACHINED FROM SOLID SLABS, WITH INSULATION INSTALLED AFTER THE CONDUCTOR HAS BEEN FORMED, MACHINED AND HEAT-TREATED. ANOTHER TYPE OF STRUCTURE IS A HELIX FABRICATION BY EDGE-WINDING FLAT BAR STOCK (IN THE HARD DIRECTION), BY WELDING SLOTTED DISKS, OR BY MACHINING FROM A MONOLITHIC CYLINDER. IN PHASE I, SCALE SIZE PROTOTYPE STORAGE COILS WILL BE MADE BY TWO MEANS: BY WINDING 6061 ALUMINUM ALLOY REINFORCED WITH SILICON CARBIDE FILAMENTS, AND BY STACKING SPIRAL PANCAKE MODULES MACHINED FROM 6061 ALUMINUM PLATE STOCK REINFORCED WITH SILICON CARBIDE FLAKES. THESE COILS WILL BE TESTED TO DESTRUCTION AT AMBIENT AND LIQUID NITROGEN TEMPERATURES. RESULTS WILL BE EXTRAPOLATED SO AS TO DEFINE SCALING LAWS AND LIMITS OF ENERGY STORAGE DENSITY.

ELECTROMAGNETIC SCIENCES INC — AF — $ 73,392
125 TECHNOLOGY PARK/ATLANTA
NORCROSS, GA 30092
MARK W TOOLAN
TITLE:
LOW LOSS FERRITE COMPONENTS FOR EXTREMELY HIGH FREQUENCY APPLICATIONS
TOPIC: 140 OFFICE: AFSTC

THE RESEARCH IS FOCUSED ON EVALUATING THE FEASIBILITY OF USING A NOVEL ELECTROFORMING PROCESS TO PRODUCE LOW LOSS FERRITE COMPONENTS FOR APPLICATION IN THE EHF REGION. THE PROPOSED PROCESS HAS POTENTIAL FOR REDUCING CONDUCTION LOSS AND IMPROVING DIMENSIONAL CONTROL. ADDITIONAL BENEFITS REGARDING CONFIGURATION AND RELIABILITY ARE ANTICIPATED.

ELECTRONIC DESIGN ASSOCS — NAVY — $ 48,660
3184-H AIRWAY AVE
COSTA MESA, CA 92626
DR HOWARD JELINEK
TITLE:
AUTOMATED RECOGNITION OF HELIUM SPEECH: PHASE I INVESTIGATION OF UP BASED ANALYSIS/SYNTHESIS SYSTEM
TOPIC: 54 OFFICE: NMC

THIS PROJECT ADDRESSES A METHOD FOR SOLVING THE PROBLEM OF HELIUM SPEECH, AS EXPERIENCED IN DIVER-SURFACE COMMUNICATION. THE GOAL OF

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THE PHASE I STUDY IS TO DESIGN, PROTOTYPE, AND EVALUATE A REAL TIME HELIUM SPEECH CORRECTOR SYSTEM BASED UPON DIGITAL SIGNAL PROCESSING TECHNIQUES. HIGHER FREQUENCY FORMAT INFORMATION WILL BE EXTRACTED AND RE-INSERTED INTO THE SPEECH WAVE FORM AT AN ADJUSTED FREQUENCY, THEREBY, "RECONSTRUCTING" THE WORDS WITH APPROPRIATE FREQUENCY CORRECTION. THIS WILL BE ACCOMPLISHED IN SIX MONTHS.

ELFIN CORP d/b/a US COMPOSITES — ARMY — $ 65,036
5 SCIENCE PK
NEW HAVEN, CT 06511
AUGUST H KRUESI
TITLE:
MULTI-HOLLOW COMPOSITE SHELL BRIDGE DECK
TOPIC: 53 OFFICE: BRDC

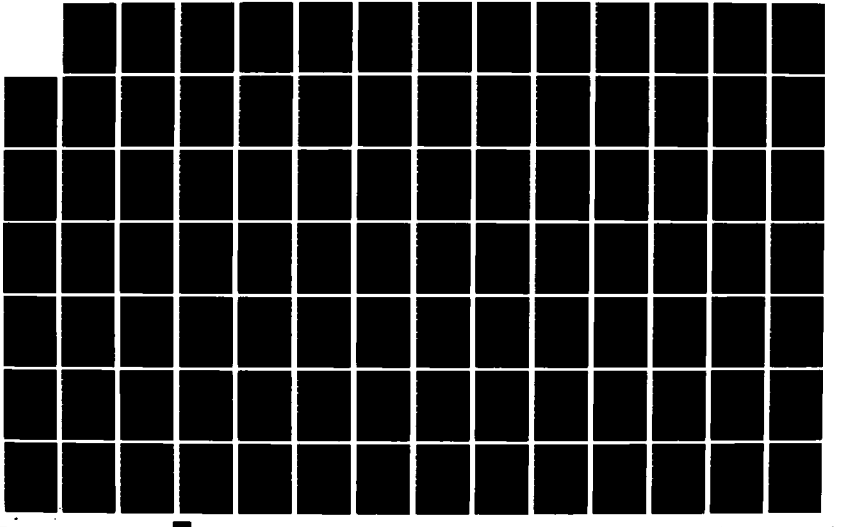
COMPOSITE MATERIALS OFFER SEVERAL ADVANTAGES OVER METALS FOR PORTABLE BRIDGING: WEIGHT SAVINGS OF 25% OR MORE, CORROSION AND FATIGUE RESISTANCE. THE DESIGN OF A COMPOSITE STRUCTURE IS COMPLEX: COMPOSITE PROPERTIES ARE HIGHLY ANISOTROPIC, MOISTURE ABSORPTION AND TEMPERATURE CHANGES CAUSE CONSIDERABLE STRAINS AND FIT-UP SENSITIVITY IS HIGH. U.S. COMPOSITES WILL DESIGN A COMPOSITE MULTI-HOLLOW BRIDGE DECK BASED ON NEW MANUFACTURING TECHNIQUES INCLUDING BRAIDING AND WET LAMINATION TO ACHIEVE THE NECESSARY PERFORMANCE AT AN ACCEPTABLE COST. CDS MICROCOMPUTER CODES WILL BE USED TO QUICKLY CONVERGE ON A PRELIMINARY DESIGN, THEN A FINAL DESIGN WILL BE VERIFIED BY FINITE ELEMENT ANALYSES. THE DESIGNERS WILL APPLY THEIR EXPERIENCE FROM LARGE, DYNAMICALLY LOADED COMPOSITE ROTORS TO ENSURE ADEQUACY OF THE ENTIRE STRUCTURE: COMPOSITES, METAL ATTACHMENTS AND COMPOSITE/METAL JOINTS.

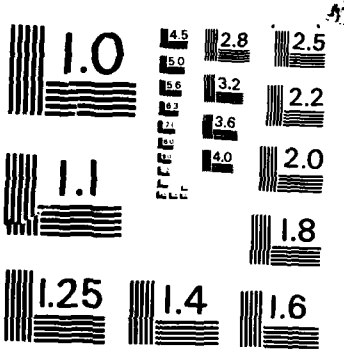
ELFIN CORP d/b/a US COMPOSITES — NAVY — $ 66,384
5 SCIENCE PK
NEW HAVEN, CT 06511
AUGUST H KRUESI
TITLE:
HIGH PERFORMANCE POROUS COMPOSITE MATERIALS FOR LAMINAR FLOW APPLICATIONS
TOPIC: 128 OFFICE: NUSC

HIGH PERFORMANCE POROUS MATERIALS ARE NEEDED FOR THE DEVELOPMENT OF

AD-A166 980 DEFENSE SMALL BUSINESS INNOVATION RESEARCH PROGRAM (SBIR) ABSTRACTS OF PHASE I AWARDS 1985(U) DEPARTMENT OF DEFENSE WASHINGTON DC 1985 2/4

UNCLASSIFIED F/G 5/3 NL





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

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LAMINAR FLOW TECHNOLOGY. LAMINAR FLOW CONTROL IN AIRCRAFT COULD PROVIDE FUEL SAVINGS UP TO 20%. IN SUBMERSIBLES, THIS TECHNIQUE WILL REDUCE BOTH DRAG AND RADIATED NOISE. COMPOSITE MATERIALS HAVE ADVANTAGES FOR UNDERSEA SUBMERSIBLES: THEY PROVIDE HIGH STRENGTH, ARE NON-CORRODING, NON-MAGNETIC AND ARE READILY MOLDED. COMPOSITES CAN HAVE HIGH INTERNAL DAMPING TO REDUCE RADIATED NOISE. THE CHALLANGE ADDRESSED BY THIS PROPOSAL IS TO DEVELOP A RELIABLE AND ECONOMIC MEANS OF CREATING SMALL PORES IN A COMPOSITE LAMINATE. THREE VARIATIONS OF A NOVEL TECHNIQUE WILL BE USED TO FABRICATE POROUS COMPOSITE TEST CYLINDERS. SURFACE WAVINESS AND FINISH WILL BE MEASURED AND FLOW CHARACTERISTICS WILL BE EVALUATED.

ENERGY & MINERALS RESEARCH CO — ARMY — $ 49,950
PO BOX 389 - 964 E SWEDESFORD RD
EXTON, PA 19341
GEORGE R MOULDER
TITLE:
ULTRASONICALLY IMPROVED RESIN MATRIX COMPOSITES
TOPIC: 78 OFFICE: AMMRC

INNOVATIVE APPROACHES COMPATIBLE WITH WET LAMINATING PROCESSES SUCH AS FILAMENT WINDING ARE SOUGHT WHICH WILL ELIMINATE OR REDUCE FORMATION OF VOIDS DUE TO ENTRAPPED AIR. THE PROBLEM HAS BEEN THAT IN ADDITION TO AIR BUBBLES CONTAINED IN THE EPOXY ITSELF, AIR BUBBLES ARE ALSO TRAPPED BETWEEN RESIN AND THE FIBER DURING THE WETTING PROCESS. UPON CURING, VOIDS ARE CREATED WHICH REDUCE THE PERFORMANCE OF THE COMPOSITE. ALTHOUGH NON-DESTRUCTIVE EVALUATION TECHNIQUES ARE AVAILABLE TO SPOT THE VOIDS AND HELP TO DETERMINE THEIR SIGNIFICANCE, A PRODUCT FREE OF VOIDS AND POROSITIES IS DESIRED. THE APPLICATION OF ULTRASONIC ENERGY TO THIXOTROPIC AND VISCOUS MATERIALS HAS CONSISTENTLY DEMONSTRATED FLOW PROMOTION EFFECTS. ADDITIONALLY, ULTRASONIC ACTIVATION CAN IMPORVE OR CAUSE FLOW AT SIGNIFICANT LOWER TEMPERATURES THAT WOULD BE REQUIRED WITHOUT ULTRASONICS. AS DEMONSTRATED BY OUR EARLIER WORK, APPLICATION OF ULTRASONICS DURING RESIN PREPARATION, PREPREG PREPARATION AND COMPOSITE LAY-UP AND CURE CAN PROVIDE UNIFORM RESIN FLOW AND WETTING. THE OBJECTIVE OF THIS PHASE I EFFORT IS TO DEMONSTRATE THE TECHNICAL FEASIBILITY OF UTILIZING ULTRASONIC REACTION ENHANCEMENT TO CAUSE 100% "WET-OUT" OF RESIN MATRIX COMPOSITES. THE TOTAL IMPREGNATION OF THE FIBERS WOULD ELIMINATE TRAPPED AIR THUS ELIMINATING VOIDS AND POROSITIES. THIS

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TECHNICAL FEASIBILITY DEMONSTRATION WILL PROVIDE THE ENGINEERING DATA NECESSARY FOR FURTHER PHASE II AND III DEVELOPMENT OF PRODUCTION ARRAYS.

ENERGY COMPRESSION RESEARCH CORP ARMY $ 49,679
2043 DE MAYO RD
DEL MAR, CA 92014
OVED S F ZUCKER
TITLE:
NOVEL COMPACT HIGH PEAK AND AVERAGE POWER LARGE TUNABLE BANDWIDTH MICROWAVE GENERATION USING LASS SWITCHES
TOPIC: 46 OFFICE: LABCOM

A LIGHT COMPACT HIGH EFFICIENCY EXTREMELY HIGH POWER AND BANDWIDTH MICROWAVE SOURCE IS PROPOSED TO DISABLE ELECTRONIC EQUIPMENT WITH MICROWAVE EMP. THE CONCEPT IS BASED ON THE USE OF THE LIGHT ACTIVATED SEMICONDUCTOR SWITCHES (LASS) IN VERY LOW IMPEDANCE TEM CONFIGURATIONS ALLOWING OPERATION AT THE VARIOUS FUNDAMENTAL LIMITS CONCURRENTLY RESULTING IN A POYNTING VECTOR OF 10 DEG W/CM SQ, PEAK POWERS IN EXCESS OF 10 DEG W PER MODULE AND AVERAGE POWERS OF 10 >W PER MODULE WITH OVERALL EFFICIENCIES (NOT INCLUDING LASER EFFICIENCY) GREATER THAN 50%. THE MODULES CONSTITUTE INTEGRATED FOLDED STRIPLINES ON PRINTED CIRCUIT BOARD 10 CM SQUARE. A UNIQUE FEATURE OF A LASS BASED SOURCE IS THE ABSOLUTE COHERENCE BETWEEN INDIVIDUAL SOURCES ALLOWING FOR CONSTRUCTIVE INTERFERENCE FROM MULTIPLE SOURCE LARGE BASE LINE PHASED ARRAY SYSTEMS. THIS ALLOWS FOR ARBITRARILY HIGH TARGET ILLUMINATION POWER AND ENERGY AND IS APPLICABLE FROM THE 100 MHk TO 50 GHz REGIME. THE PROPOSED WORK WILL MODEL THE SOURCE, PERFORM A SYSTEM ANALYSIS ON THE ANTENNA-SOURCE LASER SYSTEM TO DETERMINE OVERALL PERFORMANCE, AND DESIGN CRITICAL DEMONSTRATION EXPERIMENTS FOR PHASE II OF THE PROGRAM.

ENERGY COMPRESSION RESEARCH CORP DNA $ 49,966
2043 DE MAYO RD
DEL MAR, CA 92014
OVED S F ZUCKER
TITLE:
MULTI GW MICROWAVE GENERATION WITH SUB NANOSECOND RISETIME FOR DNA EFFECTS SIMULATION USING LASS SWITCHES
TOPIC: 2 OFFICE: OAAM

WE PROPOSE A NOVEL MICROWAVE GENERATION SCHEME UTILIZING LIGHT

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ACTIVATED SEMICONDUCTOR SWITCHES (LASS). THE PROPRIETARY CONCEPT DIFFERS FROM ALL OTHER LASS BASED GENERATION SCHEMES IN THAT IT ALLOWS THE SEMICONDUCTOR TO OPERATE AT ITS MAXIMUM CURRENT DENSITY AND ELECTRIC FIELD CONCURRENTLY THEREBY PROVIDING FOR ONE TO TWO ORDERS HIGHER MICROWAVE POWERS THAN OTHER APPROACHES. SPECIFICALLY 10 TO THE 8TH POWER W PEAK AND 10 TO THE 7TH POWER W AVERAGE POWERS ARE EXPECTED AT 10 TO THE 8TH POWER W/CM SQ FROM AN INDIVIDUAL SOURCE OCCUPYING 100 CM SQ PRINTED CIRCUIT BOARD WITH ELECTRICAL TO MICROWAVE CONVERSION EFFICIENCY IN EXCESS OF 70% (NOT INCLUDING LASER EFFICIENCY). THESE RESULTS ARE BASED ON EXPERIMENTS PERFORMED BY TWO ECR STAFF MEMBERS (LOG AND ZUCKER) WHILE AT LLL WHERE 5 kA, 1 kV PULSES WERE SWITCHED IN 150 PICOSECONDS. COHERENT POWER SCALING TO THE MULTI-GW LEVEL IS STRAIGHTFORWARD DUE TO THE ABSOLUTE LASER TIMING. SIMULTANEOUSLY SINGLE CYCLE RISE TIME AND TUNED BANDWIDTH ARE AVAILABLE BY SELECTING THE PROPER LASER TIMING SEQUENCE.

ENERGY CONVERSION DEVICES INC ARMY $ 0
1675 W MAPLE RD
TROY, MI 48084
GEORGE CHEROFF
TITLE:
OVONIC THRESHOLD SWITCH (OTS) FOR EMP PROTECTION OF MEDICAL ELECTRONIC EQUIPMENT
TOPIC: 93 OFFICE: MED FT. DET

A DEVELOPMENT PROGRAM IS DESCRIBED WHICH WILL CONFIRM THE FEASIBILITY OF THE OVONIC THRESHOLD SWITCH (OTS) TO PROTECT ELECTRONIC SYSTEMS FROM EMP OR OTHER ELECTROMAGNETIC DISTURBANCES. THE DEVICE WILL BE INVESTIGATED FOR THE CASE OF VERY LARGE ELECTRODE AREAS IN ORDER TO CONFIRM AN EXPANDING CHANNEL MODEL WHICH ALLOWS FOR VERY HIGH CURRENT CARRYING CAPABILITY. THE KEY TECHNICAL ISSUES FOR THE LARGE ELECTRODE CASE ARE: 1) THE CAPABILITY OF THE OTS TO ABSORB THE ENERGY FROM THE CAPACITIVE DISCHARGE; 2) THE ABILITY OF THE OTS TO PROVIDE NANOSECOND SWITCHING SPEEDS AT THE VERY HIGH CURRENT LEVELS; 3) THE CAPABILITY OF THE OTS TO OPERATE OVER A WIDE TEMPERATURE RANGE. TONC (TRANSIENT ON-STATE CHARACTERISTICS) EXPERIMENTS WILL BE EMPLOYED AS THE PRIMARY ELECTRICAL CHARACTERIZATION METHODOLOGY. OPERATION OF THE DEVICE WILL BE MEASURED AT TEMPERATURES UP TO 125 DEGREES CENTIGRADE, AND DATA FOR 2000 HOURS OF SHELF LIFE AT 10 DEGREES CENTRIGRADE BELOW THE RECRYSTALLIZATION TEMPERATURE WILL ALSO BE ACQUIRED. A FULL RANGE OF MATERIALS ANALYSIS EQUIPMENT WILL BE UTILIZED TO SUBSTANTIATE

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PROPOSED DEVICE MODELS AND TO IDENTIFY SPECIFIC FAILURE MODES.

ENERGYSTICS CORP — AF — $ 74,075
1225 JEFFERSON DAVIS HWY - STE 1500
ARLINGTON, VA 22202
RAM NANDAN P SINGH
TITLE:
EXPERT SYSTEM TOOLS FOR JOB AIDING
TOPIC: 205 OFFICE: AMD/RDO

THIS PROPOSAL PRESENTS AN APPROACH FOR ASSESSING THE FEASIBILITY OF DEVELOPING AN EXPERT DIAGNOSTIC SYSTEM FOR AIRCRAFT COMPLEX MAIN-TENANCE TASKS. THE EXPERT SYSTEM WILL EMBODY BOTH PROCEDURAL KNOW-LEDGE DERIVED FROM AIR FORCE TECHNICAL ORDERS, AND EXPERTISE FROM MAINTENANCE EXPERTS ON AN AIRCRAFT. THE SYSTEM WILL ATTEMPT TO EMU-LATE THE CAPABILITIES OF AN EXPERT TECHNICIAN: IT WILL ASSIST LESS QUALIFIED TECHNICIANS IN THE DIAGNOSES OF AIRCRAFT MALFUNCTIONS. THIS EXPERT SYSTEM WILL NOT BE A REPLACEMENT FOR THE HUMAN; IT WILL SIMPLY ACT AS HER/HIS ASSISTANT. THE SYSTEM WILL BE DESIGNED TO RESIDE IN A PORTABLE MICROCOMPUTER. THE PHASE I EFFORT WILL YIELD TWO INDEPEN-DENT SYSTEM DESIGNS TO THIS EXPERT SYSTEM - ONE USING LISP AND THE OTHER PROLOG. THIS WILL PROVIDE THE FOUNDATION UPON WHICH TO DEVELOP A FULL SCALE EXPERT DIAGNOSTIC SYSTEM.

ENVIRONMENTAL INSTRUMENTS INC — NAVY — $ 49,782
6 MERCER RD
NATICK, MA 01760
CHARLE COHEN
TITLE:
SOLID STATE ELECTRONIC WIND SENSOR
TOPIC: 131 OFFICE: NAEC

ENVIRONMENTAL INSTRUMENTS, INC. (EII) PROPOSES TO CONDUCT ADVANCED ENGINEERING DEVELOPMENT OF ITS MODEL 200M SOLID STATE (NO MOVING PARTS) WIND VELOCITY AND WIND DIRECTION MEASUREMENT SYSTEM WITH THE OBJECTIVE OF ADAPTING THE SYSTEM FOR OPERATION IN A NAVAL ENVIRONMENT. THIS ADVANCED ENGINEERING DEVELOPMENT WILL INCLUDE MODIFICATION NECESSARY TO PASS ELECTRO-MAGNETIC INTERFERENCE TESTS, INTERROGATION

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RELATING TO THE POSSIBLE EFFECTS OF SALT AIR ON PERFORMANCE, FEASIBILITY OF DIFFERENT NON-CORROSIVE PROBE ENVELOPES, AND COMPILATION OF CONCRETE EVIDENCE THAT EII'S SOLID STATE WIND MEASUREMENT SYSTEM PERFORMS IN SEVERE NAVAL ENVIRONMENTS INCLUDING HIGH WINDS, TROPICAL STORMS, DRIVING RAIN, FREEZING RAIN, AND SNOW STORMS. EII'S STATE-OF-THE-ART WIND SYSTEM COMBINES THE ACCURACY OF A RESEARCH TOOL WITH THE DURABILITY OF AN ALL-WEATHER INSTRUMENT. OTHER SOLID STATE WIND MEASURMENT SYSTEMS EXIST; HOWEVER, EACH OF THEM POSSESSES TECHNICAL CHARACTERISTICS THAT MAKE THEM UNSUITABLE FOR AT SEA OPERATION. EII HAS CONCENTRATED DEVELOPMENT EFFORTS ON THERMAL RESISTIVE FILM SENSORS AS BEING WITHIN THE REALM OF FEASIBILITY FOR THE NAVAL ENVIRONMENT. OUR COMPANY IS CONFIDENT THAT WITHIN SIX MONTHS AFTER AWARD THE MODEL 200M SOLID STATE SYSTEM WILL MEET U.S. NAVY SPECIFICATIONS.

ENZON INC ARMY $ 0
300C CORPORATE CT
SOUTH PLAINFIELD, NJ 07080
FRANK F DAVIS
TITLE:
THERAPEUTIC RHODANESE FOR CYANIDE POISONING
TOPIC: 87 OFFICE: MED FT. DET

CYANIDE IS A RAPIDLY ACTING POISON THAT AFFECTS RESPIRATION IN BIOLOGICAL SYSTEMS. VICTIMS MAY DIE IN MINUTES. ENZON, INC. IS THE EXCLUSIVE LICENSEE FOR A PATENTED PROCESS FOR THE CHEMICAL MODIFICATION OF ENZYMES THAT GREATLY EXTEND THEIR BLOOD CIRCULATING LIFE, ELIMINATES OR MINIMIZES IMMUNOGENICITY, AND INCREASES STABILITY. ENZYMES THUS MODIFIED ("PEG-ENZYMES") ARE EFFECTIVE THERAPEUTIC AGENTS. RHODANESE IS AN ENZYME THAT DETOXIFIES CYANIDE. ENZON WILL PREPARE PEG-RHODANESE AND EVALUATE IT FOR THERAPEUTIC EFFECTIVENESS AGAINST CYANIDE POISONING IN MICE. THE OBJECT IS TO DEVELOP A THERAPY THAT IS FAR SUPERIOR TO THOSE CURRENTLY AVAILABLE. IN ADDITION, THE PROPHYLACTIC EFFECTIVENESS OF PEG-RHODANESE WILL BE EVALUATED. THE GREATLY EXTENDED BLOOD LIFE OF PEG-RHODANESE SHOULD MAKE IT EFFECTIVE EVEN WHEN INJECTED SEVERAL HOURS PRIOR TO CYANIDE ADMINISTRATION. THE RESEARCH AND DEVELOPMENT WILL FEATURE (A) THE PURIFICATION OF RHODANESE; (B) ITS CHEMICAL MODIFICATION TO PRODUCE PEG-RHODANESE; (C) AN EVALUATION OF THE ACTIVITY, STABILITY, BLOOD CIRCULATING LIFE, AND IMMUNOGENICITY OF PEG-RHODANESE, AND (D) EVALUATION OF PEG-RHODANESE'S THERAPEUTIC AND PROPHYLACTIC EFFECTIVENESS.

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EOTEC CORP
420 FRONTAGE RD
W HAVEN, CT 06516
M S MAKLAD
TITLE:
RADIATION HARD GRADED INDEX OPTICAL FIBERS DEVELOPMENT
TOPIC: 171 OFFICE: RADC/DORM

AF $ 49,930

OPTICAL FIBERS ARE BEING CONSIDERED IN THE DESIGNS OF MANY MILITARY SYSTEMS BECAUSE OF THE NUMEROUS ADVANTAGES INCLUDING EMP AND EMI. HIGH BANDWWIDTH AND/OR LONG RUN SYSTEMS REQUIRES GRADED INDEX FIBERS. ALL COMMERCIALLY AVAILABLE FIBERS SHOW HIGH PERMANENT AND TRANSIENT RADIATION INDUCED OPTICAL LOSSES AND, THEREFORE, DO NOT MET THE NUCLEAR VULNERABILITY REQUIREMENTS OF MANY SYSTEMS. THIS PROGRAM PROPOSES NEW GLASS COMPOSITION WHICH WILL HAVE LOW RADIATION RESPONSE IN THE RESULTING FIBER. THE PROPOSED DOPANT FORM STABLE GLASS AND DOES NOT PRODUCE INTRINSIC ABSORPTION BANDS IN THE WAVELENGTH RANGE OF INTEREST. THE NATURE OF COLOR CENTER FORMATION IN TELECOMMUNICATION FIBERS WILL BE INVESTIGATED IN THE GeO2.SiO2 SYSTEM. SMALL AMOUNT OF CERIUM DOPING WILL BE INTRODUCED WITH THE CORE FIBER CHEMICALS UNDER VARIOUS REDOX CONDITIONS. RADIATION INDUCED COLORATION WILL BE INVESTIGATED USING OPTICAL ABSORPTION SPECTRONSCOPY AND ELECTRON MAGNETIC RESONANCE. TEST RESULTS WILL BE USED TO ESTABLISH REDOX CONDITION FOR MULTIVALENT ELEMENTS OTHER THAN Ce AND Sb, KNOWN TO FORM STABLE GLASSES WHICH DO NOT EXHIBIT STRONG OPTICAL ABSORPTION IN THE WAVELENGTH OF INTEREST. THE REDOX CONDITION WILL BE CORRELATED WITH THE OPTICAL FIBER RESPONSE TO PULSED AND STEADY STATE IONIZING RADIATION.

EPOLIN INC
103 WASHINGTON ST - STE 305
MORRISTOWN, NJ 07960
DR MURRAY S COHEN
TITLE:
USE OF EXPANDING MONOMER COMPOSITIONS FOR AIRCRAFT TRANSPARENCY COATINGS
TOPIC: 45 OFFICE: AFWAL/ML

AF $ 49,018

THE PROPOSAL DESCRIBES THE IMPROVEMENTS THAT CAN BE MADE USING

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EXPANDING MONOMERS IN COATING COMPOSITIONS FOR AIRCRAFT TRANSPARENCIES SUCH AS THOSE USED IN POLYCARBONATE WINDOWS. IT SHOWS HOW THE BONDING BETWEEN THE COATING FILM AND THE SUBSTRATE CAN BE MADE EXTREMELY INTIMATE SO THAT CHANGES IN TEMPERATURE, PRESSURE AND HUMIDITY DO NOT RESULT IN DELAMINATION OR DESTRUCTION OF COATING PROPERTIES. A PROGRAM IS OUTLINES WHICH WILL RELATE THE PHYSICAL PROPERTIES OF THE CURED POLYMERIC FILM WITH THAT OF THE SUBSTRATE. TO ACCOMPLISH THIS TASK IN AN EFFECTIVE MANNER, THE PROPOSAL CITES THE UNIQUE EXPERIENCE OF THIS COMPANY, EPOLIN, INC. AND ITS FOUNDER, DR. MURRAY S. COHEN AS PIONEERS IN THE DEVELOPMENT OF EXPANDING POLYMER TECHNOLOGY.

EPSILON LAMBDA ELECTRONICS CORP AF $ 49,784
427 STEVENS ST
GENEVA, IL 60134
DR PETER P TOULIOS
TITLE:
INSULAR GUIDE CIRCULATOR FOR USE IN MILLIMETER INTEGRATED SEEKER TRANSCEIVERS
TOPIC: 182 OFFICE: AD/PRM

MILLIMETER-WAVE SYSTEMS ARE RAPIDLY EMERGING WITH NUMEROUS APPLICATIONS, INCLUDING GUIDANCE FOR SELF-CONTAINED MUNITION. VIABILITY OF MANY MILLIMETER-WAVE SYSTEMS RELIES HEAVILY UPON ACHIEVING THE LOWER COST AND SMALL SIZE AFFORDED BY CIRCUIT INTEGRATION TECHNIQUES. DIELECTRIC-BASED WAVEGUIDES, SUCH AS INSULAR LINE, ARE HIGHLY APPROPRIATED MEDIA FOR SYSTEM INTEGRATION BY FABRICATING ALL CIRCUIT COMPONENTS BY SUITABLY MODIFYING THE BASIC WAVEGUIDE. CIRCULATORS ARE AN ESSENTIAL COMPONENT OF PRACTICALLY ALL THE SYSTEMS. HOWEVER, INTEGRABLE VERSIONS OF DIELECTRIC BASED WIDEBAND CIRCULATORS HAVE NOT BEEN FULLY DEVELOPED AS YET. THE PROPOSED RESEARCH WILL STUDY AND DEVELOP HIGH PERFORMANCE INSULAR GUIDE CIRCULATORS. DESIGN CONCEPTS FOR FUNDAMENTAL AND HIGHER ORDER MODE FERRITE POST CIRCULATORS ARE PROPOSED. THEORETICAL WORK WILL FOCUS ON THE MODEL CHARACTERIZATION OF THE FERRITE POST AND ANALYTIC PERFORMANCE COMPUTATIONS. PROTOTYPE WILL BE FABRICATED AND TESTED TO VERIGY THEORY AND TO ESTABLISH OPTIMIZATION PROCEDURES USING THE MOST RECENTLY AVAILABLE, HIGH QUALITY FERRITE AND ALUMINA DIELECTRIC MATERIALS.

EPSILON LAMBDA ELECTRONICS CORP AF $ 49,293
427 STEVENS ST
GENEVA, IL 60134
DR PETER P TOULIOS
TITLE:
INSULAR GUIDE INTEGRATED MONOPULSE ANTENNA FEED AND COMPARATOR FOR MILLIMETER WAVE TERMINAL GUIDANCE SEEKER
TOPIC: 182 OFFICE: AD/PMR

A NEED EXISTS FOR LOW COST, HIGHLY RELIABLE FRONT END HARDWARE FOR

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MILLIMETER WAVELENGTH MISSILE HOMING (TARGET SEEKER) SYSTEMS. DIELECTRIC WAVEGUIDE PLANAR INTEGRATED CIRCUITS FOR THIS PURPOSE WERE FIRST PROPOSED IN THE EARLY 1970'S BY THE FOUNDERS OF EPSILON LAMBDA. THE MORE SOPHISTICATED MILLIMETER SEEKERS REQUIRE USE OF A MONOPULSE FRONT END CONFIGURATION. TWO YEARS OF RESEARCH AND DEVELOPMENT HAS BEEN ACCOMPLISHED AT EPSILON LAMBDA ON A DIELECTRIC INSULAR WAVEGUIDE INTEGRATED MONOPULSED FRONT END. THE PROPOSED SBIR PHASE I PROGRAM WOULD UNDERTAKE TO DEMONSTRATE A FULLY INTEGRATED FEED/COMPARATOR ASSEMBLY USING A UNIQUE NEW APPROACH WHICH LENDS ITSELF TO EFFICIENT (AND EVENTUALLY) FULLY AUTOMATED MASS PRODUCTION. THE NEW APPROACH PERMITS FABRICATION AND PRETEST OF FIVE SUBASSEMBLIES SO THAT CRITICAL PHASE AND AMPLITUDE ALIGNMENT CAN BE ACHIEVED. THE SUBASSEMBLIES ARE SUBSEQUENTLY INSERTED INTO THE INTEGRADED FEED/COMPARATOR ASSEMBLY. A SUBSEQUENT PHASE II EFFORT WOULD ALLOW COMPLETION OF THE ENTIRE FRONT END DEVELOPMENT AND DEMONSTRATION IN A FORM SUITABLE FOR HIGH VOLUME MANUFACTURING. THE ENTIRE FRONT END WOULD BE FORM-FACTORED FOR MISSILE AND PROJECTILE APPLICATION AND BE CAPABLE OF USE IN VERY HIGH G ENVIRONMENTS.

EPSILON LAMBDA ELECTRONICS CORP — AF — $ 49,951
427 STEVENS ST
GENEVA, IL 60134
DR NARESH DEO
TITLE:
INSULAR GUIDE INTEGRATED PULSE TRANSCEIVER FOR MILLIMETER WAVE TERMINAL GUIDANCE
TOPIC: 182 OFFICE: AD/PMR

THE EFFECTIVENESS OF NON-NUCLEAR MUNITIONS AND ARMAMENTS IS ENHANCED IF TERMINAL GUIDANCE IS PROVIDED. ILLUMINATION OF THE TARGET FROM A SELF-CONTAINED TRANSMITTER PROVIDES THE GREATEST MISSION FLEXIBILITY. THE USE OF MILLIMETER WAVELENGTH TERMINAL GUIDANCE TARGET SEEKERS IS NOW UNDER FAVORABLE CONSIDERATION BECAUSE OF SUPERIOR PERFORMANCE RELATIVE TO OPTICAL WAVELENGTH SYSTEMS IN ADVERSE BATTLEFIELD ENVIRONMENTS. MILLIMETER SEEKERS USING CONVENTIONAL WAVEGUIDE TECHNIQUES WOULD BE TOO BULKY AND COSTLY FOR USE IN SMALLER DIAMETER MUNITIONS. A SOLUTION TO THE NEED FOR LOW COST, RELIABLE AND COMPACT TRANSCEIVERS IS PROPOSED. A PLANAR MILLIMETER INTEGRATED CIRCUIT TRANSCEIVER BASED ON DIELECTRIC INSULAR GUIDE IS DESCRIBED. TOTAL PROGRAM WORK WILL LEAD TO THE COMPLETE TRANSCEIVER DEMONSTRATION. PHASE I WORK WILL FOCUS ON SHOWING THE FEASIBILITY OF AN INSULAR PULSED IM-

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PATT DIODE AMPLIFIER STAGE FOR THE TRANSMITTER. THEORETICAL MODELING OF THE AMPLIFIER CIRCUIT WILL PROVIDE A FOUNDATION FOR FABRICATION, TESTING AND OPTIMIZATION OF THE INSULAR IMPATT AMPLIFIER. THE COMPLETE MULTI-STAGE TRANSMITTER, TO BE REALIZED DURING A SUBSEQUENT PHASE II RESEARCH PROGRAM, WOULD DEMONSTRATE STATE-OF-THE-ART PERFORMANCE USING COMMERCIALLY AVAILABLE DIODE. DESIGN EMPHASIS WILL BE ON SIMPLICITY OF CONFIGURATION, EASE OF TEST AND EQUIPMENT, REPRODUCIBILITY AND LOW COST IN MANUFACTURING.

ERGO-TECH SYSTEMS INC — AF — $ 67,720
4529 ANGELES CREST HWY - STE 312
LA CANADA, CA 91011
JOSE E CHIRIVELLA
TITLE:
ROCKET NOZZLE COMPUTER CODE SENSITIVITY ANALYSIS
TOPIC: 161 OFFICE: AFRPL/TSPR

THE ULTIMATE OBJECTIVE OF THIS PROPOSED WORK IS THE DEVELOPMENT OF THE CAPABILITY TO DESIGN AND PREDICT THE PERFORMANCE OF HIGH EXPANSION-RATIO OPTIMIZED-CONTOUR NOZZLES. CURRENT PROCEDURES AND COMPUTATIONAL TOOLS ARE APPLICABLE ONLY TO LARGE ENGINES AND MODERATE EXPANSION RATIOS. A NEED EXISTS TO DESIGN VERY HIGH EXPANSION RATIO NOZZLES WITH OPTIMIZED CONTOURS WHICH WILL FULLY EXPLOIT THE VACUUM SPECIFIC IMPULSE SYSTEM AND PROPELLANT COMBINATION POTENTIALS. BEFORE ANY RESOURCES ARE COMMITTED TO ANY NOZZLE OPTIMIZATION, IT IS NECESSARY TO UPDATE AND IMPROVE PRESENT METHODS. ERGO-TECH PROPOSES THE DEVELOPMENT OF NEW PROCEDURES AND THE MODIFICATION OF EXISTING SOFTWARE TO OPTIMIZE THE DESIGN OF SPACE ENGINES NOZZLES AND VERIFY THEIR PERFORMANCE, TAKING ADVANTAGE OF THE EXPERIMENTAL PROGRAM WHICH IS PRESENTLY UNDER WAY AT AFRPL. IN PHASE I, THE PREDICTION CAPABILITIES AND RANGE OF APPLICABILITY OF THE EXISTING CODES (SPP, TDK, BLIMP, BLM AND RAO'S PROGRAM) WILL BE SUBJECTED TO A SENSITIVITY ANALYSIS, AND A SET OF PARAMETERS AND ENGINE OPERATING CONDITIONS WILL BE SELECTED FOR TEST VERIFICATION. IN PHASE II, ADDITIONAL SOFTWARE WILL BE DEVELOPED, AND CORRECT PROCEDURES ESTABLISHED. IN PHASE III THE DEVELOPMENT CAPABILITIES WILL BE MARKETED THROUGHOUT AEROSPACE INDUSTRY.

ESPRIT TECHNOLOGY INC — NAVY — $ 49,884
144-A MAYHEW WY
WALNUT CREEK, CA 94596
PHILIP D FLANNER
TITLE:
SMALL RUGGED SELF-CONTAINED FATIGUE RECORDER FOR LOCALIZED STRUCTURAL SURVEYS
TOPIC: 127 OFFICE: NADC

BECAUSE OF EXTENDED USE OF OLDER AIRFRAMES, INCREASED MISSION RE-

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QUIREMENTS SUCH AS MORE SEVERE CATAPULTS AND ARRESTMENTS, AND ADOPTION OF MORE BRITTLE ALLOYS, MONITORING OF FATIGUE DAMAGE ACCUMULATION AT PARTICULAR LOCATIONS ON MILITARY AIRCRAFT HAS BECOME IMPORTANT. WHILE NO SMALL, SELF-CONTINED DATA RECORDERS FOR USE IN MILITARY ENVIRONMENTS ARE PRESENTLY AVAILABLE, ADVANCES IN LOW-POWER CMOS CIRCUITRY, BATTERY TECHNOLOGY, AND HIGH-DENSITY PACKAGING INDICATE THAT MECHANIZATION OF SUCH A UNIT IS ACHIEVABLE. THE PHASE I FEASIBILITY STUDY WILL INVESTIGATE MEANS FOR INTEGRATING THE LATEST MICROPROCESSOR AND DIGITAL MEMORY TECHNOLOGY WITH OPTIONAL ALGORITHMS, AND VARIOUS SENSORS (ACCELERATION, STRAIN, PRESSURE AND TEMPERATURE). THE PROJECT WILL CULMINATE IN A CONCEPTUAL HARDWARE DESIGN LAYOUT AND PERFORMANCE ANALYSIS OF A RECORDING INSTRUMENT HAVING TARGET SPECIFICATIONS OF: 8 CUBIC INCHES VOLUME, 30 DAYS SELF-POWER, USE WITH INTERNAL OR EXTERNAL TRANSDUCERS, MULTI-CHANNEL OPERATION, 50Hz BANDWIDTH, AND USER CONTROL OF RANGE, DATA EXCLUSIONS, BANDWIDTH AND STORAGE FORMAT.

ESSEX CORP — AF — $ 48,937
1040 WOODCOCK RD - STE 227
ORLANDO, FL 32803
ROBERT S KENNEDY
TITLE:
BIOCYBERNETIC INDICANTS OF WORKLOAD
TOPIC: 198 OFFICE: AFOSR/XOT

GRADUAL PROGRESS HAS BEEN ACHIEVED IN USING AS WORKLOAD INDICATORS A VARIETY OF ELECTROPHYSIOLOGICAL TECHNIQUES, INCLUDING EEG AND NEURAL EVOKED POTENTIALS. THESE TECHNIQUES TEND TO BE INTRUSIVE, RELATIVELY ARTIFICIAL, AND NON-PORTABLE. THERE MAY BE MORE READILY OBTAINABLE MEASURES THAT CAN SERVE AS SIMPLE EXTERNAL INDICANTS OF NEURAL ACTIVITY, BROADENING THE ABILITY TO CAPTURE CNS-RELATED VARIANCE IN APPLIED WORKLOAD ASSESSMENT. WE PROPOSE TO MONITOR EYE MOVEMENT VELOCITY AS SUCH AN ALTERNATIVE INDEX. THESE MEASURES ARE AS UNOBTRUSIVE AS EEG, ARE KNOWN TO REFLECT NEUROLOGICAL EVENTS, AND HAVE GREATER FACE VALIDITY AND SPECIFICITY FOR MANY TASKS THAN DO MORE GLOBAL CNS MEASURES. INITIAL EXPERIMENTS WILL EXAMINE EYE MOVEMENT VELOCITY DURING AN AUDITORY VIGILANCE TASK AND A VISUAL MOTOR PERFORMANCE TASK UNDER OPTIMAL (RESTED) AND DEGRADED (SLEEP DEPRIVED) CONDITIONS, WITH EXPERIMENTAL VARIATION OF TASK COMPLEXITY (WORKLOAD).

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ESSEX CORP — AF — $ 48,488
1040 WOODCOCK RD - STE 227
ORLANDO, FL 32803
ROBERT S KENNEDY
TITLE:
ISOPERFORMANCE FROM DISPARATE COMBINATIONS OF PRACTICE SELECTION AND EQUIPMENT
TOPIC: 204 OFFICE: AMD/RDO

AN INNOVATIVE PERFORMANCE MEASUREMENT METHODOLOGY IS PROPOSED TO PERMIT MEANINGFUL ANALYSIS OF TEST/EVALUATION CRITERIAL FOR MAN/MACHINE COMBINATIONS. THREE AREAS: INDIVIDUAL DIFFERENCES (HUMAN BASIC CAABILITIES, APTITUDES), PRACTICE EFFECTS (INSTRUCTION AND TRAINING) AND CRITERIA FOR HUMAN ENGINEERING OF EQUIPMENT DESIGN WILL BE TREATED AS VARIABLES AND WILL BE SET OFF IN EXPERIMENTAL APPOSITION IN ORDER TO BE STUDIES TOGETHER. A FORMAL ANALYSIS WILL BE DERIVED WHICH WILL PERMIT TRADEOFFS BETWEEN THE RELATIVE CONTRIBUTIONS OF EACH OF THESE AREAS. THE HUMAN FACTORS LITERATURE WILL BE SURVEYED FOR CANDIDATE STUDIES WHERE THE ANALYSIS CAN BE EXERCISED AND TESTED. THEN, AS A MEANS OF DEMONSTRATING THE EFFICIENCY OF SUCH A MODEL, A MULTIFACTOR EXPERIMENT USING A LOW-COST HOME COMPUTER SYSTEM WILL BE PROPOSED. THE TASK WILL BE A MICROPROCESSOR BASED VIDEO GAME REQUIRING PSYCHOMOTOR SKILLS AND DECISION MAKING, AND THE EXPERIMENTAL FACTORS TO BE VARIED WILL INVOLVE EQUIPMENT FEATURES AS WELL AS TASK DIFFICULTY, SUBJECTS AND TRAINING. THE EXPERIMENT WILL BE DESIGNED SUCH THAT THE RELATIVE CONTRIBUTIONS OF ALL THE FACTORS TO PERFORMANCE ON THE TASK CAN BE DETERMINED.

ESSEX CORP — AF — $ 54,692
333 N FAIRFAX ST
ALEXANDRIA, VA 22314
RONALD REINER
TITLE:
QUANTITATIVE TECHNIQUES FOR ASSESSING COMPLEX HUMAN-MACHINE INTERFACE DESIGNS
TOPIC: 204 OFFICE: AMD/RDO

THE ESSEX CORPORATION RECENTLY COMPLETED DEVELOPMENT OF AN AUTOMATED TOOL FOR PREDICTING TIME-ON-TASK AND PROBABILITY OF SUCCESS FOR OPERATORS OF REPROGRAPHIC DEVICES. THE TOOL, CALLED CAPRA, IS CURRENTLY USED BY THE XEROX CORPORATION TO EVALUATE THE INTERFACE

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CHARACTERISTICS OF PROPOSED COPIERS AND OTHER OFFICE PRODUCTS. CAPRA USES A STATE-SPACE APPROACH TO CHARACTERIZING AN INTERFACE. THE MODEL SIMULATES THE OPERATOR IN ORDER TO PREDICT IMPORTANT METRICS SUCH AS OPERATOR OPTIONS, TASKS AND DECISIONS. IT ALSO IDENTIFIES THE CRITICAL OPERATOR TIME AMONG THE NEARLY INFINITE NUMBER OF PATHS CONNECTING THE TASK START TO THE TASK CONCLUSION. THE SUCCESS OF A STRUCTURAL MODEL LIKE CAPRA FOR SIMPLE OFFICE MACHINE INTERFACES INDICATES A NEED FOR A SIMILAR CAPABILITY FOR THE MORE COMPLEX HUMAN-MACHINE INTERFACES. THE PURPOSE OF THIS PROPOSAL IS TO SET FORTH A MODELING CONCEPT THAT WILL LEAD TO A GENERAL-PURPOSE PREDICTION AND EVALUATION TOOL FOR THE DESIGN OF COMPLEX HUMAN-MACHINE INTERACTIONS. THE FOUNDATION OF THE PROPOSED CONCEPT RESTS ON THE IDEA OF REDUCING THE MODELED STATE-SPACE BY OVERLAYING IT WITH PATTERNS. THE FORM OF THIS STATE-SPACE REDUCTION TECHNIQUE APPEARS TO BE BY WAY OF THE HIERARCHICAL DECOMPOSITION OF COMPLEX HUMAN-MACHINE INTERFACES AND ESTABLISHING THE RELATIONS BETWEEN INTERFACE FUNCTIONAL PATTERNS AND THE OPERATOR'S MENTAL MODELS.

ESSEX CORP ARMY $ 49,138
333 N FAIRFAX ST
ALEXANDRIA, VA 22314
HENRY M PARSONS
TITLE:
HUMAN-MACHINE INTERFACE IN INDUSTRIAL ROBOTICS
TOPIC: 81 OFFICE: HEL

THIS IS A PROPOSAL TO CONDUCT A HUMAN FACTORS ENGINEERING INVESTIGATION OF HUMAN-ROBOT INTERFACES IN INDUSTRY, TO DESCRIBE COMPREHENSIVELY AND GENERICALLY WHAT ROBOT OPERATORS AND MAINTAINERS DO ON THE FACTORY FLOOR, AND THROUGH ANALYSIS TO UNCOVER PROBLEMS IN INTERFACE DESIGN INVOLVING BOTH PHYSICAL EQUIPMENT AND SOFTWARE. INFORMATION WILL BE SOUGHT THROUGH CORRESPONDENCE, DOCUMENTATION, VISITS, AND INTERVIEWS FROM AS MANY AS EIGHTEEN AMERICAN AND TWO JAPANESE ROBOT MANUFACTURERS. IF THE PHASE I INQUIRY DEMONSTRATES THAT MORE HUMAN FACTORS ENGINEERING IS NEEDED IN INDUSTRIAL ROBOTICS, A PHASE II WILL BE PROPOSED TO VERIFY PROBLEMS EMPIRICALLY IN ROBOT USER PLANTS AND DEVELOP SOLUTIONS TO BE INCORPORATED IN A HUMAN FACTORS ENGINEERING GUIDE FOR ROBOTICS.

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ESSEX CORP 1040 WOODCOCK RD - STE 227 ORLANDO, FL 32803 ROBERT S KENNEDY	ARMY	$ 0

TITLE:
MEASUREMENT AND MODELS OF EMPLOYMENT DECISION MAKING
TOPIC: 105 OFFICE: ARI

WE PROPOSE TO EXAMINE WHETHER MOTIVATIONAL TEST BATTERIES BASED ON CURRENT THEORIES OF HUMAN MOTIVATION AND STATE-OF-THE-ART ASSESSMENT METHODOLOGIES CAN BE GENERATED FOR PREDICTIONS OF DECISIONS TO (A) JOIN/REENLIST IN THE ARMY; (B) ENROLL/CONTINUE IN ROTC; (C) BE A CAREER ARMY OFFICER. IF VARIABLES ASSESSED IN THE MOTIVATIONAL TEST BATTERIES ADD UNIQUE VARIANCE IN RELATION TO CONVENTIONALLY USED ABILITY, BIOGRAPHICAL OR PERSONALITY PAPER-AND-PENCIL TESTS, THEN SCORES ON MEASURES OF THESE VARIABLES COULD BE INCORPORATED INTO A MULTIPLE PREDICTION EQUATION FOR PREDICTING ARMY EMPLOYMENT DECISION MAKING. IN PHASE I OF THE PROPOSED RESEARCH, THE OBJECTIVES ARE TO (1) REVIEW AND SYNTHESIZE ON LITERATURE RELEVANT TO MOTIVATION THEORY AND EMPLOYMENT DECISIONS; (2) DEVELOP CONTROLLED INTERVIEWS FOR DETERMINING AND VALIDATING MOTIVATIONAL VARIABLES RELATED TO DECISIONS FOR ARMY EMPLOYMENT; (3) SYNTHESIZE LITERATURE WITH CONTROLLED INTERVIEWS TO FORM A MULTIDIMENSIONAL MODEL OF EMPLOYMENT DECISION MAKING; (4) DEVELOP THEMATIC MOTIVATIONAL TEST BATTERIES; (5) GENERATE AN EXPERIMENTAL PLAN FOR PHASE II WHERE THE TEST BATTERIES WILL BE ADMINISTERED TO INDIVIDUALS AT VARIOUS STAGES OF DECISION MAKING.

EVANS C & ASSOCS 1670 S AMPHLETT #120 SAN MATEO, CA 94402 DR DAVID A REED	DARPA	$ 49,372

TITLE:
SPUTTERED NEUTRAL MASS SPECTROMETRY FOR THE QUANTITATIVE DEPTH PROFILING OF COMPOUND SEMICONDUCTOR MATERIALS DEVELOPMENT
TOPIC: 1 OFFICE: DARPA

THE DEVELOPMENT OF ADVANCED COMPOUND SEMICONDUCTOR MATERIALS FOR THE NEXT GENERATION SEMICONDUCTOR DEVICES WILL INCREASE THE DEMANDS FOR SOPHISTICATED MATERIALS CHARACTERIZATION. ALTHOUGH A VARIETY OF SURFACE AND MICROANALYTICAL TECHNIQUES EXIST FOR CHEMICAL CHARACTERIZA-

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TION OF THESE MATERIALS, NO TECHNIQUE YET EXISTS FOR QUANTITATIVE MICROSCALE STOICHIOMETRIC ANALYSES. THE RESEARCH PROPOSED FOR PHASE I WILL EVALUATE AND DEVELOP AN APPROACH FOR THE DIRECT MICROCHARACTERIZATION OF COMPOUND SEMICONDUCTOR STOICHIOMETRY BY SPUTTERED NEUTRAL MASS SPECTROMETRY EMPLOYING ION SPUTTERING TO INTRODUCE ATOMS INTO A PLASMA FOR ELECTRON IMPACT IONIZATION. THUS, THE ATOMS ARE EXCITED IN AN ARGON-BASED PLASMA RATHER THAN IN THE MATERIAL ITSELF, THEREBY CIRCUMVENTING THE "MATRIX EFFECT," WHICH SERIOUSLY COMPLICATES QUANTITATIVE MAJOR CONSTITUENT ANALYSIS. THE GOAL OF PHASE I WILL BE TO DETERMINE THE EFFICACY OF THIS TECHNIQUE AND TO EXAMINE AND EVALUATE INSTRUMENTAL CONFIGURATIONS AS THEY RELATE TO OTHER DEFENSE RELATED MATERIALS CHARACTERIZATION NEEDS. A SUBSEQUENT PHASE II PROGRAM, IF FUNDED, WOULD BE TO DESIGN, ASSEMBLE, AND EVALUATE AN INSTRUMENTAL CONFIGURATION, WHILE PHASE III WILL CARRY THIS INSTRUMENTATION INTO THE COMMERCIAL MARKETPLACE.

EVANS C & ASSOCS AF $ 48,500
1670 S AMPHLETT BLVD - STE 120
SAN MATEO, CA 94402
R J BLATTNER/J C HUNEKE
TITLE:
NEW TECHNIQUE FOR ULTRA-TRACE IMPURITY ANALYSIS OF GaAs CRYSTALS WAFERS AND EPITAXIAL LAYERS
TOPIC: 59 OFFICE: AFWAL/ML

RECENT IMPROVEMENTS IN LEC-GROWN GaAs CRYSTALS AND MBE-GROWN EPITAXIAL LAYERS HAVE LED TO MATERIAL PURITIES EXCEEDING THE DETECTION LIMITS OF CONTEMPORARY TRACE-ELEMENT ANALYSIS, E.G. SPARK SOURCE MASS SPECTROMETRY (SSMS) AND HIGH PERFORMANCE SECONDARY ION MASS SPECTROMETRY (SIMS). THIS IS NOT TO SAY, HOWEVER, THAT DOPANTS/IMPURITIES ARE NO LONGER OF CONCERN IN ADVANCED DEVICES GIVEN SUCH PHENOMENA AS ELECTROMIGRATION OR DEFECT GETTERING AND THE DESIRE TO FABRICATE MORE COMPLEX, HIGHER POWER GaAs CIRCUITS WITH LONG TERM RELIABILITY. EVEN WHEN EXISTING ANALYTICAL TECHNIQUES ARE ABLE TO DETECT IMPURITIES, QUANTITATION HAS BEEN, AT BEST, DIFFICULT AND TIME CONSUMING. A NEW TECHNIQUE, VIZ. GLOW DISCHARGE MASS SPECTROMETRY (GDMS), HAS NOW BECOME COMMERCIALLY AVAILABLE AND OFFERS THE POTENTIAL FOR DRAMATICALLY IMPROVED DETECTION LIMITS AND MORE ACCURATE ROUTINE QUANTITATION COMPARED TO EITHER SIMS OR SSMS. RESEARCH IS NEEDED TO REALIZE THESE CAPABILITIES IN THE CONTEXT OF GaAs. THE PHASE I PROGRAM PROPOSED HEREIN IS DESIGNED TO EVALUATE THE

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INSTRUMENT AND THE TECHNIQUE SPECIFICALLY FOR GaAs ANALYSIS (INCLUDING DEPTH PROFILING, IF POSSIBLE) AND ASSESS ANY HARDWARE/PROCEDURES OPTIMIZATION NEEDED TO ACHIEVE SUB-PART-PER-BILLION DETECTION LIMITS AND QUANTITATIVE ACCURACIES OF 1-3% OF THE IMPURITY CONCENTRATION DETECTED.

EVAPORATED COATINGS INC — ARMY — $ 0
798 WELSH RD
HUNTINGDON VALLEY, PA 19006
JOHN J WALLS JR
TITLE:
EYE PROTECTION RESEARCH
TOPIC: 96 OFFICE: MED FT. DET

STUDIES WILL BE DIRECTED TOWARD THE FEASIBILITY OF PROVIDING A MULTILINE LASER REJECTION PLASTIC FILTER. A HYBRID SYSTEM COMPOSED OF A LASER ABSORBING MATERIAL (DYE) EMBEDED IN PLASTIC AND A MULTILAYER REFLECTION REJECTION COATING DEPOSITED ON THE PLASTIC SURFACE CAN PROVIDE THE REJECTION MECHANISM FOR LASER EMISSIONS. HOST PLASTIC MATERIALS SUCH AS ACRYLIC, CR-39 AND POLYCARBONATE ARE CANDIDATE MATERIALS FOR THIS INVESTIGATION. TO ENHANCE ADHESION AND REDUCE STRESS PROPERTIES OF THE MULTILAYER COATING, AN ION ASSISTED PLASMA TECHNIQUE WILL BE STUDIED AS PART OF THE COATING EVAPORATION PROCESS. THIN FILM COMPUTER DESIGN OPTIMIZATION TECHNIQUES WILL BE EMPLOYED TO YIELD OPTIMAL SPECTRAL PROPERTIES FOR THE ABSORPTION/REFLECTION COMPOSITE.

EXFLUOR RESEARCH CORP — AF — $ 50,000
PO BOX 7807
AUSTIN, TX 78713
DR THOMAS R BIERSCHENK
TITLE:
PREPARATION OF NEW PERFLUOROPOLYETHER ELASTOMERS EXHIBITING EXCELLENT OXIDATIVE AND THERMAL STABILITIES
TOPIC: 46 OFFICE: AFWAL/ML

EXFLUOR RESEARCH CORPORATION HAS DEVELOPED GENERAL PROCEDURES FOR PREPARING HIGH MOLECULAR WEIGHT PERFLUOROALKYL ETHER ELASTOMERIC POLYMERS. ONE PROCEDURE CONSISTS OF FIRST SYNTHESIZING THE HYDRO-

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CARBON ANALOGUE OF THE DESIRED PERFLUORO COMPOUND FOLLOWED BY REPLACEMENT OF THE HYDROGEN WITH FLUORINE USING A CONTROLLED REACTION WITH ELEMENTAL FLUORINE. THIS PROCEDURE ALLOWS ONE TO PREPARE FLUOROCARBON DERIVATIVES OF ESSENTIALLY ANY HYDROCARBON POLYMER OR MOLECULE. A SECOND BUT VERY IMPORTANT GENERAL PROCEDURE INVOLVES FLUORINATION OF LINEAR POLYESTERS, FOLLOWED BY CONVERSION OF THE LINEAR PERFLUOROPOLYESTER TO A PERFLUOROPOLYETHER USING SF(4). SPECIAL ADVANTAGES OF THIS TECHNOLOGY INCLUDE UNIQUE CAPABILITIES TO PREPARE HIGHLY BRANCHED PERFLUOROPOLYETHER SYSTEMS AND THE ABILITY TO GENERATE STRUCTURES HAVING MORE THAN TWO CARBON ATOMS (ANY NUMBER IS POSSIBLE) BETWEEN OXYGEN IN THE CENTRAL CHAIN OF THE POLYETHER. SEVERAL KEY POLYMERS, EACH WITH A UNIQUE STRUCTURE, WILL BE SYNTHESIZED. ATTEMPTS WILL BE MADE TO MOLD THESE POLYMERS INTO FILMS USING HIGH PRESSURES AND ELEVATED TEMPERATURES.

EXTRANUCLEAR LABS INC — ARMY — $ 46,988
PO BOX 11512 - 240 ALPHA DR
PITTSBURGH, PA 15238
WADE L FITE
TITLE:
SURFACE IONIZATION DUST DETECTORS TO PROTECT ENGINES OF COMBAT AND TACTICAL VEHICLES
TOPIC: 68 OFFICE: TACOM

SURFACE IONIZATION IS A PROCESS IN WHICH AN ATOM OR MOLECULE WITH A LOW IONIZATION POTENTIAL, IN CONTACT WITH A HOT METAL SURFACE WITH A HIGH WORK FUNCTION, TRANSFERS AN ELECTRON TO THE SURFACE AND IS EVAPORATED AS A POSITIVE ION. ALKALI-CONTAINING COMPOUNDS IN COMMON SMOKES AND DUSTS ARE SUFFICIENTLY PLENTIFUL TO ALLOW THE DETECTION OF DUST THROUGH SURFACES IONIZATION. IN THE PROCESS THE PARTICLE STRIKES A HOT PLATINUM WIRE WHERE IT PYROLIZES AND TRANSFERS SOME OF ITS MOLECULES TO THE WIRE. THOSE CONTAINING ALKALI ATOMS DISSOCIATE AND THE ALKALI ATOM LEAVES AS AN ION. SINCE THERE ARE MANY SUCH MOLECULES IN EVEN SMALL PARTICLES, A BURST OF IONS IS PRODUCED WHICH IS DETECTED AS ELECTRICAL CURRENT PULSE, THE HEIGHT OF WHICH INDICATES THE SIZE AND/OR RICHNESS IN ALKALI COMPOUND CONTENT OF THE PARTICLE. THE PULSE COUNTING RATE INDICATES THE CONCENTRATION OF DUST PARTICLES IN THE AIR. THIS PROPOSAL PROPOSES THE DESIGN OF A SIMPLE DUST DETECTOR BASED ON SURFACE IONIZATION, AND ITS CIRCUITRY MODIFICATIONS, SUITABLE FOR USE ON A MILITARY VEHICLE, THAT WOULD WARN THE OPERATOR WHEN EXCESSIVE DUST PARTICLES WERE ENTERING THE ENGINE.

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FALCON ASSOCS LTD — AF — $ 70,922
6862 ELM ST - STE 320
MCLEAN, VA 22101
HERBERT J MITCHELL
TITLE:
AUGMENTATION TO THE RAMSTAT RUNWAY CONDITION SENSING SYSTEM
TOPIC: 153 OFFICE: AFWL/PRP

THE PROPOSED EFFORT IS DIRECTED TOWARDS PROVIDING BOTH QUALITATIVE AND QUANTITATIVE IMPROVEMENTS TO THE CURRENT RAMSTAT RUNWAY CONDITION SENSING SYSTEM CONCEPT. THE TECHNICAL TASKS DESCRIBED HEREIN WILL ADD TO RAMSTAT THE FOLLOWING ADDITIONAL CAPABILITIES: (1) A SENSOR TO MEASURE THE PEAK WIND GUST FROM A NUDET TO GIVE A MORE DIRECT INDICATION OF ENVIRONMENTAL INSULT TO FACILITIES; (2) A TRAINING SIMULATOR TO ALLOW PILOT FAMILIARIZATION WITH RAMSTAT; (3) EXAMINATION AND THE ADDITION OF DATA FROM OTHER EXISTING WEATHER MONITORING SYSTEMS TO BROADEN THE DATA BASES FOR FALLOUT PREDICTION; AND (4) A CAPABILITY TO MEASURE RUNWAY SURFACE CONDITIONS PRIOR TO TOUCHDOWN AT UNMANNED RUNWAYS. ANY ONE OR A COMBINATION OF THESE FOUR AUGMENTATIONS WILL CONTRIBUTE TO INCREASE AIRCRAFT SURVIVAL AND RECOVERY.

FERROTEC INC — ARMY — $ 72,481
3050 INDUSTRIAL LN
BROOMFIELD, CO 80020
CHARLES L NEMNICH
TITLE:
FERROFLUIDIC ROLL-RATE SENSORS IN SMART MUNITIONS UTILIZATION
TOPIC: 1 OFFICE: ARDC

THE ARMY DESIRES INNOVATIVE ALTERNATIVES TO EXISTING ROLL-RATE SENSORS WHICH ARE NOT OPTIMUM FOR USE IN SMART MUNITIONS. WE PROPOSE THE USE OF "FERROFLUIDIC ROLL-RATE SENSORS (FRRS)" WHICH ARE SIMPLE, HAVE MILLIWATT POWER REQUIREMENTS, ARE INHERENTLY RUGGED, WEIGH A FEW OUNCES, AND ARE LESS THAN ONE CUBIC INCH IN SIZE. LABORATORY SENSORS SHOW EXCELLENT LONG TERM STABILITY AFTER DORMANT STORAGE, REPEATIBILITY TO WITHIN ONE PERCENT, AND ROLL RATES BETWEEN 0 DEG AND 3600 DEG/SECOND. PHASE ONE RESEARCH IS NEEDED TO DEFINE

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THEIR LIMITS AND SHOW THE FEASIBILITY OF FURTHER RUGGEDIZING. A CONCEPTUAL SMART MUNITIONS FRRS ROLL-RATE SENSOR DESIGN WILL BE PROVIDED FOR FURTHER DEVELOPMENT OF AN ARMY MODULARIZED AND ELECTRICALLY STANDARDIZED ROLL-RATE SENSOR IN PHASE TWO. EXTENSIVE MILITARY AND COMMERCIAL APPLICATIONS OF THE FRRS HAVE BEEN IDENTIFIED.

FIBER MATERIALS INC — AF — $ 50,840
BIDDEFORD INDUSTRIAL PK
BIDDEFORD, ME 04005
LOU LANDER
TITLE:
COMPENDIUM OF HEATSHIELD MATERIAL PROPERTY DATA
TOPIC: 110 OFFICE: AFBMO/PMX

A SUBSTANTIAL AMOUNT OF THERMAL PROTECTION SYSTEM (TPS) MATERIAL CAN BE REMOVED BY ABLATIVE AND MECHANICAL EROSION. THIS CAN CAUSE CATASTROPHIC FAILURE OR STABILITY AND ACCURACY PROBLEMS OF REENTRY VEHICLES. THE TPS MUST BE ABLE TO PROTECT THE SUBSTRUCTURE AND INTERNAL COMPONENTS FROM DAMAGE INCURRED BY AERODYNAMIC HEATING AND PARTICLE IMPACT BUT NOT SUFFER WEIGHT PENALTIES ASSOCIATED WITH "OVERKILL" DESIGNS. TO ACCURATELY ASSESS REQUIRED HEATSHIELD THICKNESS, A MODEL THAT CAN PREDICT ABLATION AND EROSION RECESSION AND INDEPTH THERMAL RESPONSE OF HEATSHIELD MATERIALS IS NECESSARY. EFFICIENT AND ACCURATE MODELING CAN BE ACCOMPLISHED IF TEST DATA CONSISTING OF PHYSICAL, MECHANICAL AND THERMAL PROPERTIES AND EROSION AND ABLATION RECESSIONS IS AVAILABLE. ACCUMULATED PROPERTY DATA WOULD BE ASSESSED FOR APPLICATION IN REENTRY VEHICLE DESIGN PREDICTIONS. FINALLY, A PROCEDURE WOULD BE GIVEN TO INCREASE THE ACCURACY OF THERMAL ABLATION AND MECHANICAL EROSION RECESSION RESPONSE MODELS.

FIBER MATERIALS INC — AF — $ 49,898
BIDDEFORD INDUSTRIAL PK
BIDDEFORD, ME 04005
LOUIS LANDER
TITLE:
HEAT RATE EFFECTS ON THERMAL AND MECHANICAL PROPERTIES OF PHENOLICS
TOPIC: 210 OFFICE: AFRPL/TSPR

A DEFINITION OF THE INFLUENCE OF HEATING RATE ON THE MECHANICAL AND

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THERMAL PROPERTIES OF PHENOLIC COMPOSITES USED IN ROCKET MOTOR COMPONENTS IS REQUIRED. IN ORDER TO ACCOMPLISH THIS GOAL, IT IS NECESSARY TO FIRST DEFINE THE INDEPTH TIME-TEMPERATURE RESPONSE OF THESE PHENOLIC COMPONENTS SUBJECTED TO THE MOTOR ENVIRONMENT. ONCE THIS HAS BEEN ACCOMPLISHED, THE VARIOUS TECHNIQUES WHICH HAVE BEEN USED CAN BE ASSESSED AND OPTIMUM APPROACHES FOR SIMULATION TO MOTOR TIME-TEMPERATURE HISTORY CAN BE MADE. IT IS ALSO BELIEVED THAT A PRELIMINARY ASSESSMENT OF THE HEATING RATE SENSITIVITY OF A REPRESENTATIVE PHENOLIC SHOULD AND CAN BE MADE IN THE PHASE I EFFORT.

FIBER MATERIALS INC DNA $ 49,478
BIDDEFORD INDUSTRIAL PK
BIDDEFORD, ME 04005
ROBERT L BURNS
TITLE:
EXOATMOSPHERIC NUCLEAR SHIELDING AND SURVIVABILITY FROM NUCLEAR EFFECTS
TOPIC: 5 OFFICE: OOAM

PROTECTION OF EXOATMOSPHERIC SYSTEMS AND STRUCTURES FROM NUCLEAR EFFECTS IS REQUIRED. THE MATERIAL CANDIDATE FOR THIS TYPE OF PROTECTION IS A CARBON-CARBON COMPOSITE FOR STRUCTURAL INTEGRITY AND TUNGSTEN CARBIDE COMPONENT FOR NUCLEAR HARDENING. THE CARBON-CARBON COMBINES A HIGH STRENGTH-TO-WEIGHT RATIO IN AN INTEGRAL STRUCTURAL COMPOSITE CAPABLE OF NUCLEAR HARDENING BY THE ADDITION OF TUNGSTEN CARBIDE. THE TECHNIQUE FOR ADDING THE TUNGSTEN CARBIDE INVOLVES REITERATIVE IMPREGNATIONS WITH AN AMMONIUM TUNGSTATE-PHENOLIC RESIN SOLUTION FOLLOWED BY TYPICAL DENSIFICATION CYCLES. EVALUATION OF THIS MATERIAL WILL BE CONDUCTED THROUGH THERMAL DIFFUSIVITY AND SCANNING ELECTRON MICROGRAPHY OF THE TUNGSTEN CARBIDE-CARBON MATRIX.

FIBER MATERIALS INC AF $ 48,889
BIDDEFORD INDUSTRIAL PK
BIDDEFORD, ME 04005
DANIEL C NELSON
TITLE:
HIGH STRENGTH FIBROUS CARBON COMPOSITES
TOPIC: 52 OFFICE: AFWAL/ML

THE DEVELOPMENT OF A NEW MATERIAL TERMED "FIBROUS CARBON" IS PRO-

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POSED. THIS MATERIAL IS FORMED BY THE PLASTICIZATION AND COMPACTION OF STABILIZED POLYACRYLONITRILE FIBERS FOLLOWED BY PYROLYSIS. PREVIOUS WORK HAS SHOWN GOOD TRANSLATION OF AXIAL FIBER PROPERTIES INTO THE FIBROUS CARBON. THIS PROPOSAL ADDRESSES THE DEVELOPMENT OF IMPROVED SHEAR PROPERTIES IN CARBON BASED MATERIALS NEEDED FOR AIR FORCE APPLICATIONS SUCH AS SATELLITE STRUCTURES AND GAS TURBINE COMPONENTS.

FIBERCOM INC — NAVY — $ 49,936
PO BOX 7317
ROANOKE, VA 24019
JOE WIENCKO
TITLE:
LOCAL AREA NETWORK DESIGN FOR NAVAL MATERIAL COMMAND ACTIVITIES
TOPIC: 59 OFFICE: NASC

FIBER OPTIC TECHNOLOGY WHICH HAS BEEN DEVELOPING OVER THE PAST FEW YEARS, OFFERS SIGNIFICANT ADVANTAGES COMPARED TO WIRE DATA LINKS: LOWER LOSS, GREATER BANDWIDTHS, TOLERANCE OF ADVERSE ENVIRONMENTS, AND INSTALLATION FLEXIBILITY. THE INCREASING DATA TRANSMISSION RATES AND DISTRIBUTED PROCESSING ARCHITECTURES OF COMPUTER SYSTEMS REQUIRE HIGH SPEED DATA NETWORKS. MUCH COMPONENT TECHNOLOGY AND COMMERCIAL LOCAL AREA NETWORK TECHNOLOGY CAN BE APPLIED TO IMPROVE THE COST EFFECTIVENESS OF NAVMAT FACILITY COMPUTER. THE PROPOSED PROJECT WILL ANALYZE REQUIREMENTS FOR A HIGH SPEED DATA NETWORK AND DEFINE THE OPTIMUM LAN CONFIGURATION TO MEET THOSE REQUIREMENTS. IN ADDITION, A PHASE IMPLEMENTATION PLAN CONSIDERING SCHEDULE/BUDGET WILL BE DEVELOPED.

FLAM & RUSSELL INC — ARMY — $ 49,430
PO BOX 444
HORSHAM, PA 19044
R P FLAM
TITLE:
HIGH POWER MILLIMETER WAVE RADIAL COMBINER FOR SOLID-STATE APPLICATIONS
TOPIC: 33 OFFICE: LABCOM

AN EFFICIENT WAY TO COMBINE OUTPUTS FROM MULTIPLE SOLID-STATE

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AMPLIFIERS USES A CAVITY STRUCTURE. THEIR ADVANTAGES INCLUDE: LOW LOSS, AMPLITUDE AND PHASE BALANCE, LARGE NUMBER OF INPUT PORTS, BROAD BANDWIDTH AND HIGH POWER HANDLING. THEIR MAJOR DISADVANTAGE, HOWEVER, IS THAT THEY MODE. MODING, WHICH CAUSES ISOLATION PROBLEMS, WILL OCCUR WHEN THE AMPLIFIERS ARE DISSIMILAR OR WHEN FAILURES EXIST UNLESS THE COMBINING STRUCTURE IS PROPERLY DESIGNED. PREVIOUS DESIGNS HAVE AVOIDED MODING BY USING MODE OBSORBERS AND/OR EXTERNAL ISOLATORS, WHICH INCREASES INSERTION LOSS. IN ORDER TO PROPERLY DESIGN SUCH A STRUCTURE, ONE MUST BE ABLE TO THEORETICALLY PREDICT A COMPLETE SCATTERING MATRIX NETWORK DESCRIPTION, NOT MERELY THE IMPEDANCE TRANSFORMATION PROPERTIES. THIS DIFFICULT MATHEMATICAL PROBLEM, HERETOFORE UNSOLVED, HAS RECENTLY BEEN SOLVED BY THE STAFF OF FLAM & RUSSELL, INC. (FR). USING THIS S-MATRIX COMPUTER MODEL IN CONJUNCTION WITH MODELS FOR MILLIMETER-WAVE SOLID-STATE AMPLIFIERS WILL OPTIMIZE THE DESIGN OF THE MILLIMETER-WAVE COMBINER. FR RECENTLY APPLIED THIS APPROACH TO A 60-WAY COMBINER FOR AN S-BAND RADAR TRANSMITTER, AND A 24-WAY DIVIDER FOR A KU-BAND ANTENNA ARRAY.

FLOW INDUSTRIES INC — AF — $ 75,000
21414 68TH AVE S
KENT, WA 98032
DR MOHAMED GAD-EL-HAK
TITLE:
DEVICE FOR CONTROLLING THE LEADING EDGE VORTICES ON A DELTA WING DEVELOPMENT
TOPIC: 191 OFFICE: AFOSR/XOT

EXPERIMENTAL OBSERVATIONS OBTAINED DURING A RECENT RESEARCH PROGRAM AT FLOW INDUSTRIES HAVE SHOWN THAT A LEADING EDGE VORTEX ON A DELTA WING AT CONSTANT ANGLE OF ATTACK CONSISTS OF A SERIES OF DISCRETE SMALLER VORTICES. THESE VORTICES PAIR, MUCH THE SAME AS IN A FREE SHEAR LAYER. A DEVICE IS PROPOSED TO MODULATE THE SHEDDING AND THE PAIRING OF THE DISCRETE VORTICES BY MECHANICALLY OR ACOUSTICALLY PERTURBING THE LEADING EDGE OF A DELTA WING. BY APPLYING THE PERTURBATION PREFERENTIALLY ON ONLY ONE SIDE OF THE WING, THE ROLLING MOMENT AROUND THE AXIS OF SYMMETRY OF THE AIRCRAFT IS CONTROLLED. THE PROPOSED DEVICE WILL ENABLE THE PILOT OF A FIGHTER AIRCRAFT TO ACHIEVE A PREVIOUSLY UNATTAINED DEGREE OF MANEUVERABILITY.

FLOW INDUSTRIES INC — DARPA — $ 49,992
21414 68TH AVE S
KENT, WA 98032
DR JACK KOLLE
TITLE:
AIRBORNE ELECTROMAGNETIC INDUCTION SENSING OF SEA ICE THICKNESS
TOPIC: 9 OFFICE: DARPA

A GROWING NEED EXISTS BY BOTH THE MILITARY AND INDUSTRY FOR A RAPID

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METHOD OF REMOTELY MEASURING THE THICKNESS OF THE ARCTIC SEA ICE COVER. WE PROPOSE TO DEVELOP AN ELECTROMAGNETIC INDUCTION SENSOR TO REMOTELY MEASURE SEA ICE THICKNESS FROM AN AIRCRAFT. THEORY SUGGESTS THIS TECHNIQUE HAS GOOD POTENTIAL. IN ORDER TO VERIFY THE THEORY, A COMPUTER ANALYSIS AND A BRIEF ARCTIC FIELD TEST WILL BE PERFORMED ON AN EXISTING, LOW-COST, GROUND-BASED ELECTROMAGNETIC INDUCTION SENSOR, NORMALLY USED FOR TERRESTRIAL SURVEYS. THE FIELD TEST RESULTS WILL BE ANALYZED AND EXTRAPOLATED TO PROVIDE A REALISTIC ESTIMATE OF THE FEASIBILITY AND EXPECTED PERFORMANCE OF AIRBORNE SYSTEMS. FLOW HAS EXTENSIVE EXPERIENCE IN ARCTIC RESEARCH, COMPUTER MODELING, AND THE COMMERCIALIZATION OF HIGH TECHNOLOGY PRODUCTS. THIS, COMBINED WITH THE EXPERTISE OF PROJECT CONSULTANTS, PROFESSOR ALEX BECKER, UNIVERSITY OF CALIFORNIA, BERKELEY, WILL HELP ENSURE THE SUCCESSFUL COMPLETION AND TECHNICAL ACCURACY OF THE PROPOSED WORK.

FLOW INDUSTRIES INC — AF — $ 49,741
21414 68TH AVE S
KENT, WA 98032
DR JACK KOLLE
TITLE:
HYDRAULIC EXPLOSIVE TECHNIQUE FOR RAPID EGRESS
TOPIC: 106 OFFICE: AFBMO/PMX

THE PROPOSED PROJECT ADDRESSES THE NEED FOR CONTINUOUS HARD ROCK EXCAVATION TECHNIQUES WHICH EXPLOIT THE EFFICIENCY AND VERSATILITY OF EXPLOSIVE ROCK FRAGMENTATION WHILE OVERCOMING THE DELAYS AND HAZARDS ASSOCIATED WITH THE USE OF CHEMICAL EXPLOSIVES. AN EVALUATION WILL BE MADE OF THE FEASIBILITY OF USING A HYDRAULIC EXPLOSIVE DEVICE FOR RAPID, ENERGY EFFICIENT EXCAVATION OF HARD ROCK. THE DEVICE WOULD USE THE ENERGY STORED IN A VOLUME OF WATER COMPRESSED TO VERY HIGH PRESSURES TO GENERATE A POWERFUL HYDRAULIC SHOCK WITHIN A CAVITY DRILLED INTO A ROCK FACE. ROCK FRAGMENTATION WITH THIS DEVICE SHOULD BE COMPARABLE TO THAT ACHIEVED BY EXPLOSIVE CHARGES WITHOUT THE HAZARDS ASSOCIATED WITH FLY ROCK AND TOXIC FUMES. THE DEVICE WOULD FORM THE BASIS FOR A CONTINUOUS HARD ROCK EXCAVATION SYSTEM SUITABLE FOR RAPID EGRESS FROM A DEEP BASE.

FLOW INDUSTRIES INC — ARMY — $ 65,287
21414 58TH AVE S
KENT, wA 98032
DR MOHAMED HASHISH
TITLE:
MACHINING OF LIGHTWEIGHT COMPOSITE MATERIALS WITH ABRASIVE-WATERJETS
TOPIC: 12 OFFICE: ARDC

THERE IS A GROWING NEED TO SIGNIFICANTLY LIGHTEN PRESENT MILITARY

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WEAPONS SYSTEMS AND MUNITIONS THROUGH USE OF ADVANCED LIGHTWEIGHT COMPOSITE MATERIALS. ONE OBSTACLE TO EXTENDED USE OF THESE MATERIALS IS THE DIFFICULTY OF MACHINING THEM. A METHOD THAT OFFERS GREAT POTENTIAL IS THE ABRASIVE-WATERJET MICROMACHINING PROCESS. THIS PROCESS HAS BEEN USED TO EFFECTIVELY CUT COMPOSITES OF VARIOUS THICKNESS. THE OBJECTIVE OF THIS PROPOSAL IS TO INTEGRATE THE MICROMACHINING CAPABILITIES OF ABRASIVE-WATERJETS WITH A LATHE TO PRODUCE A NEW TOOL FOR TURNING COMPOSITES. THIS TOOL WILL BE UED TO LABORATORY TEST TURNING OF LIGHTWEIGHT COMPOSITE MATERIALS. SEVERAL TYPES O COMPOSITE MATERIALS WILL BE MACHINED USING THE ABRASIVE-WATERJET LATHE AND THE RESULTS WILL BE EVALUATED WITH RESPECT TO QUALITY OF SURFACE FINISH, RATE OF MATERIAL REMOVAL AND THE GENERAL PROPERTIES OF GEOMETRIES PRODUCED.

FLOW INDUSTRIES INC NAVY $ 49,988
21414 68TH AVE S
KENT, WA 98032
DR G STUART KNOKE
TITLE:
HYDROFOIL PROFILING INSTRUMENT PLATFORM DEVELOPMENT
TOPIC: 3 OFFICE: ONR

THE DEVELOPMENT OF A HYDROFOIL PROFILING INSTRUMENT PLATFORM FOR MEASURING PHYSICAL, THERMODYNAMIC, GEOCHEMICAL, AND BIOLOGICAL PARAMETERS THROUGHOUT THE WATER COLUMN IS PROPOSED. THE PLATFORM WOULD EMPLOY A LOW-POWER, CONTROLLED HYDRODYNAMIC LIFT DEVICE TO "FLY" THE INSTRUMENT PACKAGE UP AND DOWN THE WATER COLUMN ALONG A TAUT CABLE. BECAUSE LOCAL CURRENTS WILL DRIVE THE PLATFORM, POWER REQUIREMENTS WILL BE LOW AND LONG DEPLOYMENTS WILL BE POSSIBLE. THE OBJECTIVES OF THIS STUDY ARE TO EVALUATE SUCH AN INSTRUMENT PLATFORM FOR OBTAINING LONG-TERM RECORDS OF UPPER OCEAN PARAMETERS AND TO DETERMINE IF THE PLATFORM CAN BE ADAPTED TO RETRIEVE REAL-TIME OCEANOGRAPHIC DATA. DURING PHASE I, THE FEASIBILITY OF THIS PROFILING CONCEPT WILL BE DETERMINED. PHASE I WILL INVOLVE AN ANALYTICAL AND EXPERIMENTAL STUDY OF VARIOUS ASPECTS OF THE PROBLEM: THE DESIGN OF THE HYDROFOIL AND CONTROL SYSTEM, THE EFFECTS OF BIOLOGICAL FOULING AND MARINE CORROSION, AND THE SELECTION OF COMMUNICATION AND DATA HANDLING HARDWARE TO INTERFACE WITH THE ANTICIPATED OCEANOGRAPHIC SENSORS (E.G., SENSORS FOR TEMPERATURE, SALINITY, PRESSURE, TURBIDITY, CURRENT, TURBULENCE, AND SOUND VELOCITY). BASED ON THE RESULTS OF PHASE I, A

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PHASE II RESEARCH AND DEVELOPMENT PROGRAM WILL BE PURSUED WITH THE GOAL OF DEVELOPING A PROTOTYPE HYDROFOIL PROFILING INSTRUMENT PLATFORM.

FLOW INDUSTRIES INC AF $ 48,949
1835 TERMINAL DR
RICHLAND, WA 99352
J M HALTER
TITLE:
INTERNAL INSPECTION OF LONG TUBES
TOPIC: 211 OFFICE: AEDC/DOT

THE DEVELOPMENT OF A REMOTE LONG TUBE INSPECTION SYSTEM IS PROPOSED. THE OBJECTIVES OF THIS RESEARCH AND DEVELOPMENT EFFORT ARE TO EVALUATE VARIOUS CONCEPTS CAPABLE OF INSPECTING THE TUBE SURFACE AND REMOVING FOREIGN OBJECTS AND TO SELECT THE MOST PROMISING TECHNIQUES FOR DEVELOPMENT INTO A REMOTE INSPECTION SYSTEM. THE OBJECTIVE OF PHASE I IS TO DEVELOP A CONCEPTUAL SYSTEM DESIGN. THIS PHASE WILL ENTAIL DETERMINING THE SPECIFIC EQUIPMENT REQUIREMENTS, CONCEPTUALLY DESIGNING A PROTOTYPE SYSTEM, AND EVALUATING THE MOST PROMISING INSPECTION TECHNIQUES. BASED ON PHASE I RESULTS, A PHASE II DEVELOPMENT EFFORT WILL BE PURSUED WITH THE GOAL OF DEVELOPING A PROTOTYPE REMOTE LONG TUBE INSPECTION SYSTEM.

FLOW INDUSTRIES INC AF $ 64,982
1835 TERMINAL DR
RICHLAND, WA 99352
FREDERICH R REICH
TITLE:
OPTICAL INTERFEROMETRY DIMENSIONAL GAUGE FOR DIMENSIONAL GAUGING OF PRECISION HIGH-SPEED AIRCRAFT BEARING COMPONENTS
TOPIC: 18 OFFICE: ASD/YZ

DIMENSIONAL GAUGING, WITH THE CURRENT GAUGE BLOCK BASED TECHNIQUES, IS RESPONSIBLE FOR OVER 50% OF THE COST OF PRODUCING PRECISION, HIGH-SPEED AIRCRAFT BEARING COMPONENTS. IN THIS APPLICATION, THE GAUGING PROCESS IS SUBJECT TO ERRORS FROM BOTH THE INHERENT LIMITS OF THE GAUGE BLOCKS AND FROM THE MANUAL PROCESS OF "WRINGING" THE BLOCKS TO PRODUCE VARIOUS REFERENCE LENGTHS. THE COST OF PRODUCING BEARING

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COMPONENTS COULD BE REDUCED WITH A DIMENSIONAL GAUGE THAT ELIMINATES THE NEED FOR BOTH GAUGE BLOCKS AND OPERATOR SKILL. A BROAD DIMENSIONAL RANGE, HIGH-ACCURACY GAUGE WILL BE DEVELOPED IN THIS PROJECT, BASED ON THE USE OF OPTICAL HETERODYNE INTERFEROMETRY TECHNIQUES. WITH AN INHERENT ACCURACY DEPENDENT ON THE WAVELENGTH OF LIGHT, INTERFEROMETRY IS ONE OF THE NEW TECHNIQUES THAT IS CAPABLE OF LARGE GAUGING RANGES (OVER 3 INCHES) WITH A HIGH ACCURACY GAUGING RESPONSE (0.000001 INCH). THE FEASIBILITY OF AN OPTICAL HETERODYNE INTERFEROMETER WILL BE DEMONSTRATED IN A PHASE I TASK WITH A LABORATORY MOCKUP GAUGE. A PROTOTYPE GAUGE WILL THEN BE DEVELOPED IN A PHASE II EFFORT, BASED ON HIGH NEED AND HIGH PAYBACK APPLICATIONS DEFINED FOR A PRECISION BEARING PRODUCTION LINE. THIS PROTOTYPE SYSTEM WILL FORM THE BASIS FOR A COMMERCIAL DIMENSIONAL GAUGE WHICH WOULD HAVE APPLICATION POTENTIAL IN OTHER AREAS WHERE PRECISION DIMENSIONAL MEASUREMENTS ARE PART OF A PRODUCTION OR QA PROCESS.

FLUOROCHEM INC — AF — $ 49,949
680 S AYEN AVE
AZUSA, CA 91702
KURT BAUM
TITLE:
SYNTHESIS OF NEW THERMOOXIDATIVELY STABLE POLYMER SYSTEMS
TOPIC: 50 OFFICE: AFWAL/ML

RESEARCH IS PROPOSED ON NEW POLYMER SYSTEMS, WITH HYDROCARBON BACK BONES, CONTAINING ADAMANTANE GROUPS TO PROVIDE HIGH GLASS TRANSITION TEMPERATURES.

FOSTER ENGINEERING CO — AF — $ 46,500
23241 VENTURA BLVD - STE 309
WOODLAND HILLS, CA 91364
KENNETH FOSTER
TITLE:
EXPLOITATION OF TACTICAL WARFARE TECHNOLOGY FOR STRATEGIC WARFARE
TOPIC: 101 OFFICE: AFBMO/PMX

THE PROPOSED STUDY HAS FOUR OBJECTIVES: 1) FORMULATION OF CANDIDATE APPLICATIONS OF TACTICAL WARFARE TECHNOLOGY TO STRATEGIC WARFARE, 2)

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DOWNSELECTION OF CANDIDATE CONCEPTS TO SEVERAL MOST PROMISING FOR INVESTIGATION IN PHASE II EFFORT, 3) IDENTIFICATION OF RATIONALES FOR USE OF NON-NUCLEAR ICBMs, AND 4) FORMULATION OF CRITERIA FOR SELECTING TARGETS FOR NON-NUCLEAR ICBMs. TACTICAL WARFARE TECHNOLOGY APPLICATION CONCEPTS WILL BE DERIVED IA LITERATURE SEARCHING, POLLING THE DEFENSE COMMUNITY, AND CONCEPT SYNTHESIS, WITH DOWNSELECTION PERFORMED BY EVALUATING POTENTIAL BENEFITS AND TECHNICAL FEASIBILITY. THREE CANDIDATES ALREADY IDENTIFIED ARE TARGET-ACTIVATED FUZES, NON-NUCLEAR WARHEADS FOR USE AGAINST HARDENED TARGETS, AND SPECIAL RVs FOR LASER-DESIGNATING TARGETS FOR PRECISION STRIKES. RATIONALES FOR NON-NUCLEAR ICBMs WILL BE BASED UPON CONSIDERATION OF THE DISADVANTAGES OF NUCLEAR ICBMs AND THE POTENTIAL EXPLOITABLE FEATURES OF NON-NUCLEAR ICBMs. CRITERIA FOR SELECTING TARGETS FOR NON-NUCLEAR ICBMs WILL DERIVE FROM CONSIDERING SEVERAL TARGET CLASSES AND THE POTENTIAL PERFORMANCE OF NON-NUCLEAR ICBMs. IF SUCCESSFUL, THE PROPOSED STUDY COULD LEAD TO INCREASED EFFECTIVENESS OF USAF ICBMs AND THE ADDITION OF A NON-NUCLEAR STRIKE OPTION.

FOSTER-MILLER INC — AF — $ 59,561
350 SECOND AVE
WALTHAM, MA 02254
RICHARD LUSIGNEA
TITLE:
ADVANCED ORDERED POLYMER/GLASS MICROCOMPOSITES
TOPIC: 195 OFFICE: AFOSR/XOT

ORDERED POLYMER MATERIALS PROCESSED FROM LIQUID CRYSTALLINE SOLUTIONS CAN BE USED WITH GLASS PROCESSED BY THE SOL-GEL METHOD TO PRODUCE A COMPOSITE WITH HOMOGENEITY ON A VERY SMALL SCALE. SUCH A "MICROCOMPOSITE" MATERIAL ROD-LIKE POLYMER PBT (POLY PHENYLENE BENZOBISTHIAZOLE) AND GLASS, SUCH AS SILICA, OFFERS SOME POTENTIAL ADVANTAGES. PBT WOULD PROVIDE HIGH TENSILE STRENGTH, STIFFNESS, TOUGHNESS, AND THERMAL RESISTANCE COMMON TO THIS CLASS OF POLYMERS. GLASS WOULD PROVIDE EXCELLENT COMPRESSIVE STRENGTH, LOW PERMEABILITY, CREEP RESISTANCE AND OF COURSE HIGH TEMPERATURE CAPABILITY. BOTH MATERIALS HAVE EXCELLENT DIMENSIONAL STABILITY AND GOOD DIELECTRIC PROPERTIES. PBT FILMS HAVE BEEN PROCESSED FROM SOLUTIONS, LEAVING AN OPEN MICROSTRUCTURE IN THE WET SWOLLEN STATE. GLASS, SUCH AS SILICA, CAN BE PRECIPITATED INTO THE PBT NETWORK BY SOL-GEL METHODS. WE PROPOSE TO FURTHER DEVELOP THESE METHODS TO FORM HIGH STRENGTH, HIGH STIFFNESS

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PBT/GLASS MICROCOMPOSITE FILMS. FURTHER DEVELOPMENT WILL CONCENTRATE ON USING THE PBT/GLASS FILMS AS PREFORMS FOR LARGE STRUCTURES. THE PROPOSED PROGRAM WILL EVALUATE THE FEASIBILITY OF ACHIEVING EXCELLENT MATERIAL PROPERTIES BY SUCH PROCESSES.

FOSTER-MILLER INC — AF — $ 72,831
350 SECOND AVE
WALTHAM, MA 02254
ALLAN T FISK
TITLE:
INTEGRATED DRILL-LOAD-SHOOT EXPLOSIVE EXCAVATION SYSTEM
TOPIC: 106 OFFICE: AFBMO/PMX

AN INTEGRATED DRILL-LOAD-SHOT (IDLS) SYSTEM WILL BE DEVELOPED TO OVERCOME THE CURRENT DISADVANTAGES AND REALIZE THE POTENTIAL OF EXPLOSIVE EXCAVATION SYSTEMS. THE IDLS SYSTEM IS TEAMED WITH A UNIQUE SPIRAL DRILL AND BLAST CONCEPT, THE COMBINATION OF WHICH PERMITS NEARLY CONTINUOUS, RATHER THAN CYCLIC OPERATION. THIS CONCEPT PROVIDES A SIMPLE, REPETITIVE BLAST GEOMETRY, EFFICIENT BLASTING TO A FREE SURFACE, AND MINIMIZES SHIELDING REQUIREMENTS. IT PROVIDES OPERATING FLEXIBILITY RANGING FROM CONVENTIONAL BLAST STRENGTH WHERE GROUND CONDITIONS PERMIT, TO LIGHT BLASTING WHERE POOR GROUND CONDITIONS REQUIRE. THE SYSTEM SHOULD REQUIRE AN ORDER OF MAGNITUDE LESS ENERGY THAN A CONVENTIONAL TUNNEL BORING MACHINE. OBJECTIVES OF PHASE I ARE: 1) DEMONSTRATION OF THE ONLY REMAINING (UNPROVEN) CRITICAL SUBSYSTEM OF THE IDLS CONCEPT; AND 2) PRESENTATION OF A PRELIMINARY OVERALL SYSTEM DESIGN CONCEPT. DELIVERED AT THE END OF PHASE I WILL BE: 1) REPORT ON ALL WORK; 2) SYSTEM PRELIMINARY DESIGN; 3) PHASE II RESEARCH PLAN AND COST ESTIMATE; AND 4) IDLS PROTOTYPE HARDWARE COMPONENTS.

FOSTER-MILLER INC — NAVY — $ 49,264
350 SECOND AVE
WALTHAM, MA 02254
ROBERT C SYKES
TITLE:
SEAWORTHY SYRUP/CUP-TYPE SODA VENDING MACHINE
TOPIC: 42 OFFICE: NSSC

CAN-TYPE SODA VENDING MACHINES WHICH ARE CURRENTLY USED ON BOARD SHIP

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REQUIRE VALUABLE STORAGE SPACE FOR THE CANS. SYRUP/CUP-TYPE MACHINES DO NOT HAVE THIS PROBLEM, BUT THEY DO RESULT IN SPILLAGE WHEN THE SHIP PITCHES OR ROLLS. SPACE IS A VALUABLE COMMODITY ON BOARD SHIPS AND ANY INNOVATION WHICH ADDRESSES THIS PROBLEM AND PRODUCES SODA WITHOUT SPILLAGE WILL BE OF GREAT BENEFIT. FMI'S PROPOSED SOLUTION WILL BE A NEW MACHINE DESIGN THAT CONTAINS A FIXED FILL COMPARTMENT IN A NEW SYRUP/CUP-TYPE MACHINE. THE DESIGN WILL PREVENT SPILLAGE DURING THE FILL CYCLE AND ALSO AFTER THE CUP IS REMOVED. MOST OF THE NEW MACHINES WILL BE DESIGNED WITH PROVEN COMPONENTS. FMI INTENDS TO PROVIDE PROOF OF CONCEPT OF THE FIXED FILL COMPARTMENT BY EXPERIMENTING WITH A BREADBOARD MODEL. THE RESULTS OF THIS WORK WILL BE A DESIGN LAYOUT AND A BREADBOARD OF THE CRITICAL FILL COMPARTMENT. MR. ROBERT SYKES, PRINCIPAL INVESTIGATOR, HAS BEEN DESIGNING MACHINERY FOR COMMERCIAL PRODUCTS WHICH HAVE INCLUDED BEVERAGE DISPENSING MACHINES. COMMERCIALIZATION OF THE PRODUCT FOR USE ON OTHER NONSTABLE PLATFORMS SUCH AS COMMERCIAL SHIPPING IS A VIEW WHICH IS SHARED BY TWO MANUFACTURERS WHO ARE TEAMED WITH FMI FOR THIS PROJECT.

FOSTER-MILLER INC ARMY $ 72,389
350 SECOND AVE
WALTHAM, MA 02254
JOSEPH S BOYCE
TITLE:
FIBER REINFORCED THERMOPLASTIC BRIDGE DECK
TOPIC: 53 OFFICE: BRDC

A HIGH STRENGTH TO WEIGHT, LOW COST BRIDGE DECK IS REQUIRED FOR THE ARMY'S TRI-ARCH BRIDGE. FOSTER-MILLER, INC. IS PROPOSING FIBER REINFORCED THERMOPLASTIC DECK MADE BY A COMBINATION OF ROLL-FORMING AND WELDING. USE OF AN ENGINEERING THERMOPLASTIC MATRIX MATERIAL SUCH AS POLYETHERETHERKEYTONE (PEEK) PROMISES TO OVERCOME MANY OF THE DISADVANTAGES WHICH HAVE PREVENTED THERMOSETTING EPOXIES FROM BEING USED FOR THIS APPLICATION. FLEXURAL STRENGTH EQUIVALENT TO THAT OF FIBER REINFORCED EPOXY CAN BE ACHIEVED IN COMBINATION WITH AN ORDER OF MAGNITUDE IMPROVEMENT IN IMPACT STRENGTH. THE ABILITY TO USE MODIFIED METAL FORMING TECHNIQUES (E.G., ROLL-FORMING AND WELDING) WILL ULTIMATELY RESULT IN HIGH PRODUCTION RATES AND LOW COST. PHASE I FEASIBILITY DEMONSTRATION WILL CONSIST OF: ROLL-FORMING OF 2 IN. FIBER REINFORCED CHANNEL SECTION; SHEAR AND PEEL STRENGTH TESTS ON

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WELDED THERMOPLASTIC CORE-SKIN JOINT, AND FABRICATION OF SMALL (1 IN. X 1 IN.) SAMPLE DECK PANEL.

FOSTER-MILLER INC — AF — $ 51,517
350 SECOND AVE
WALTHAM, MA 02254
RICHARD WIESMAN
TITLE:
CRATER RECOGNITION AND MEASURMENT SYSTEM DEVELOPMENT
TOPIC: 216 OFFICE: AFESC

POST ATTACK AIR BASE RECOVERY OPERATIONS WILL TAKE PLACE IN A VERY HOSTILE ENVIRONMENT. WITH PREMIUMS PLACED ON MINIMIZING BOTH THE TIME AND NUMBER OF PERSONNEL REQUIRED WHILE MAXIMIZING PERSONNEL SAFETY, ADAPTATION OF ROBOTIC TECHNOLOGY TO SOME OR ALL OF THE TASK MAKES SENSE. INSTRUMENTATION CAPABLE OF RECOGNIZING, MEASURING AND QUANTIFYING THE DIMENSIONAL CHARACTERISTICS OF A BOMB CRATER IS A NECESSARY PREREQUISITE TO AUTOMATING THE ACTUAL REPAIR PROCESS. THIS PROPOSAL ADDRESSES THE PROBLEM OF MAPPING CRATER DIMENSIONS. A SYSTEM WILL BE DEVELOPED WHICH WILL BE CAPABLE OF DETERMINING THE NATURE AND EXTENT OF CONCRETE UPHEAVAL AS WELL AS THE VOLUME OF OPEN VOID IN THE CRATER. UPON COMPLETION OF THIS PHASE I EFFORT A SENSOR SYSTEM DESIGN WILL BE GENERATED, FOR INTEGRATION WITH THE RRR EX-CAVATOR, THAT IS CAPABLE OF DETECTING AND MEASURING BOMB DAMAGE CRATERS IN THE POST ATTACK ENVIRONMENT.

FOSTER-MILLER INC — AF — $ 67,420
350 SECOND AVE
WALTHAM, MA 02254
J BOYCE
TITLE:
TRANS-LAMINAR REINFORCEMENT OF ORGANIC MATRIX COMPOSITES
TOPIC: 40 OFFICE: AFWAL/FI

COMPOSITE LAMINATES MADE FROM CONVENTIONAL EPOXY PREPREGS ARE PRONE TO DELAMINATION DUE TO IMPACT OR EDGE EFFECTS. SOME MEANS OF IMPROVING COMPRESSIVE STRENGTH AFTER IMPACT IS DESIRED. STITCHING IS ONE OPTION, BUT CAUSES DAMAGE TO IN-PLANE PROPERTIES (STRENGTH, MODULUS).

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THE PROPOSED TECHNIQUE UTILIZES STAPLES TO CONTROL DELAMINATION. DAMAGE TO IN-PLANE PROPERTIES WILL BE MINIMIZED BY VIBRATION OF THE LAMINATE DURING STAPLE INSERTION. VIBRATION IS EXPECTED TO REDUCE RESIN VISCOSITY AND FIBER DAMAGE. PREVENTING POLYMERIZATION OF THE RESIN FOLLOWING VIBRATION IS CRITICAL. THE PROPOSED PHASE I EFFORT CONSISTS OF DEVELOPMENT OF A PROTOTYPE STAPLING DEVICE, AND DEMONSTRATION OF IMPROVED DELAMINATION RESISTANCE AND REDUCED DAMAGE TO IN-PLANE FIBERS.

FOSTER-MILLER INC AF $ 59,000
350 SECOND AVE
WALTHAM, MA 02254
RICHARD W LUSIGNEA
TITLE:
ORDERED POLYMER FILM FOR ADVANCED PRINTED WIRE BOARD APPLICATIONS
TOPIC: 57 OFFICE: AFWAL/ML

HIGH PERFORMANCE ELECTRONIC CIRCUITS ARE EXCEEDING THE LIMITS OF EXISTING PACKAGING MATERIALS. RECENT DEVELOPMENTS IN SURFACE MOUNTING LEADLESS CHIPS, MULTI-LAYER CONSTRUCTION, AND HIGH SPEED DENSITY PACKED CIRCUITS DEMAND INNOVATIVE NEW MATERIALS. THE OBJECTIVE OF THIS PROGRAM TO DETERMINE THE FEASIBILITY OF NEW MATERIALS. PBT (POLY BENZTHIAZOLE) ORDERED POLYMER FILMS AS A SUBSTRATE MATERIAL IN ADVANCED ELECTRONIC PACKAGING. PBT FILMS PROVIDE THIN HOMOGENEOUS MATERIALS WITH EXCELLENT PROPERTIES, AVOIDING PROBLEMS ASSOCIATED WITH REINFORCED COMPOSITE MATERIALS OR HEAVY METALLIC AND CERAMIC SUBSTRATES. PBT FILMS WILL BE PRODUCED AND TESTED WITH RESPECT TO: EXCELLENT MATERIAL PROPERTIES NAMELY, LOW COEFFICIENT OF THERMAL EXPANSION (MATCHED TO LEADLESS CERAMIC CHIP CARRIERS) AND LOW DIELECTRIC CONSTANT AND DISSIPATION FACTOR; ABILITY TO BOND CONDUCTIVE PATHS, ESPECIALLY FOR ADDITIVE PROCESSES; AND ABILITY TO BE LAMINATED IN MULTI-LAYER CONSTRUCTION. THE MECHANICAL AND DIELECTRIC PROPERTIES WILL BE MEASURED, COMPARED WITH OTHER MATERIALS, AND FEASIBILITY WILL BE EVALUATED AGAINST BENCHMARKS DETERMINED FOR PHASE I. SURFACE TREATMENT AND CONDUCTIVE PATH PRINTING TECHNIQUES WILL BE TESTED AGAINST EXISTING MILITARY SPECIFICATIONS FOR PEEL STRENGTH. TECHNIQUES WILL BE IDENTIFIED FOR LAMINATING PBT FILMS IN MULTI-LAYER FASHION AND SAMPLE WILL BE TESTED FOR ADHESION. THE PHASE I PROGRAM WILL DEMONSTRATE WHETHER OR NOT PBT FILMS ARE FEASIBLE WITH REGARD TO THE MOST CRITICAL REQUIREMENTS FOR ADVANCED

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PRINTED WIRING BOARDS.

FPS INTERNATIONAL INC — NAVY — $ 26,707
6812 LUMSDEN ST
MCLEAN, VA 22101
SIMON P SING
TITLE:
PACKAGE ELECTROSTATIC DISCHARGE (ESD) SUSCEPTIBILITY
TOPIC: 123 OFFICE: NWSC

THIS PROPOSAL DISCUSSES A STATISTICAL METHODOLOGY TO DETERMINE THE SUSCEPTIBILITY OF MICROCIRCUIT PACKAGE TYPES TO DAMAGE CAUSED BY ELECTROSTATIC DISCHARGE (ESD). A COMPARATIVE ANALYSIS OF THE VARIOUS MICROCIRCUIT PACKAGE TYPES IN MILITARY USE IN PROPOSED. EXTENSIVE USE OF EXISTING YIELD, FACTORY TEST, AND FLEET DATA IS PROPOSED. A PHASE I, FOUR-MONTH EFFORT IS PLANNED TO DETERMINE THE FEASIBILITY OF COLLECTING THE APPROPRIATE DATA AND OF APPLYING STATISTICAL TECHNIQUES TO DATA TO OBTAIN CREDIBLE RESULTS. ANTICIPATED PROBLEMS INCLUDE HOMOGENEITY OF DATA; DIVERSITY OF FABRICATION, ASSEMBLY, AND TEST METHODS; AND THE USE OF VARIOUS TYPES OF PROTECTIVE CIRCUITRY.

FREY FEDERAL SYSTEMS CORP — AF — $ 50,000
CHESTNUT HILL RD
AMHEREST, NH 03031
H R MORSE
TITLE:
COMPUTER OPERATING SYSTEM INSTRUCTION SET PRIMITIVES FOR ADA
TOPIC: 23 OFFICE: ASD

THE TASK GOAL IS TO IDENTIFY A COMPLETE SET OF OPERATING SYSTEM PRIMITIVE (OR LOW-LEVEL OPERATING SYSTEM FUNCTIONS) WHICH ARE SUFFICIENT TO SUPPORT REAL-TIME MULTI-TASKING APPLICATIONS, WHICH ARE COMPATIBLE WITH ADA PROGRAMMING ENVIRONMENTS, AND WHICH ARE AMENABLE TO EFFICIENT IMPLEMENTATIONS IN MICROCODE OR HARDWARE. TECHNIQUES TO EVALUATE THE FEASIBILITY OF SUCH IMPLEMENTATIONS IN VARIOUS ENVIRONMENTS AND TO DETERMINE THE POTENTIAL EFFECTS OF PERFORMANCE AND THROUGHPUT WILL BE DEVELOPED.

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FUSION SYSTEMS CORP
7600 STANDISH PL
ROCKVILLE, MD 20855
MICHAEL G URY
TITLE:
UV-ENHANCED OMPVE PROCESS FOR LOW TEMPERATURE HgCdTe EPITAXY
TOPIC: 42 OFFICE: CECOM/NVEO

ARMY $ 49,599

THE AVAILABILITY OF HIGH SENSITIVITY AND RESOLUTION INFRARED DETECTORS FOR THE ARMY IS CURRENTLY LIMITED BY THE PRODUCTION TECHNIQUES NOW USED FOR CREATING EPITAXIAL LAYERS OF MERCURY - CADMIUM - TELLURIDE. IN PARTICULAR, IT IS IMPORTANT TO REDUCE THE TEMPERATURE AT WHICH THE EPITAXY OCCURS, AND THERE IS DATA THAT THIS CAN BE ACCOMPLISHED THROUGH THE USE OF BROAD-BAND ULTRAVIOLET RADIATION. PHASE I OF THIS EFFORT IS AIMED AT DEMONSTRATING THE TECHNICAL FEASIBILITY OF DEPOSITING ACCEPTABLE FILMS OF MERCURY TELLURIDE ON CADMIUM TELLURIDE SUBSTRATES AT HIGH RATES AND AT LOW TEMPERATURES BY PHOTODISSOCIATION OF ORGANOMETALLIC COMPOUNDS, USING PROPRIETARY ELECTRODELESS ULTRAVIOLET SOURCES. A REACTION CHAMBER WILL BE USED WHICH WILL ALLOW US TO PRODUCE BOTH REACTIONS IN THE GAS PHASE AND ON THE SURFACE OF THE SUBSTRATE. THE USE OF TWO UV LAMPS WITH OPTIMIZED SPECTRAL OUTPUTS SHOULD RESULT IN SUITABLY HIGH DEPOSITION RATES AT LOW TEMPERATURES.

GAERTNER W W RESEARCH INC
205 SADDLE HILL RD
STAMFORD, CT 06903
DR W W GAERTNER
TITLE:
ARTIFICIAL INTELLIGENCE (AI2) FOR REAL-TIME PILOT AID APPLICATIONS
TOPIC: 20 OFFICE: AFWAL/AA

AF $ 71,258

REAL-TIME EXECUTION OF AI ALGORITHMS IS NOT POSSIBLE ON CONVENTIONAL AI COMPUTERS. UNDER AN EARLIER CONTRACT W. W. GAERTNER RESEARCH, INC. HAS DEVELOPED THE (AI)2 - ARTIFICIAL INTELLIGENCE AND ARTIFICIAL INSTINCT - ARCHITECTURE WHICH COMBINES TRADITIONAL AI PROCEDURES WITH A VERY FAST AND SOPHISTICATED DATABASE LOOKUP CAPABILITY IN SPECIAL HARDWARE, TO ACHIEVE THE MUCH SHORTER RESPONSE TIME NEEDED FOR "REAL TIME." IT IS PROPOSED TO ADAPT THIS ARCHITECTURE TO THE PILOT AID APPLICATION AND TO INJECT THE HEAVY USE OF STATISTICAL CONCEPTS

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(INITIALLY BAYESIAN DECISION ANALYSIS) TO ADDRESS THE PROBLEM OF INCOMPLETE AND CONTRADICTORY DATA. A DEMONSTRATION ORIENTED TOWARD SIGINT ANALYSIS IS RECOMMENDED UNLESS AFWAL SUGGESTS ANOTHER APPLICATION.

GENERAL OCEANICS INC — NAVY — $ 32,670
1295 NW 163RD ST
MIAMI, FL 33169
GERALD J WILLIAMS
TITLE:
TRANVERSE DOPPLER CURRENT PROFILER DEMONSTRATION
TOPIC: 3 OFFICE: ONR

THE PROPOSAL DEALS WITH TESTING A NEW TYPE OF DOPPLER ACOUSTIC CURRENT PROFILER FOR MEASUREMENT OF PROFILES OF WATER VELOCITY. THIS NEW PROFILER MEASURES VELOCITY TRANSVERSELY TO A MAIN ACOUSTIC BEAM AND FEATURES MEASUREMENTS FROM A SINGLE SCATTERING VOLUME. CONSEQUENTLY, THIS TRANSVERSE DOPPLER PROFILER FEATURES REDUCED SENSITIVITY TO FLOW INHOMOGENEITIES AND IMMUNITY TO DEAD ZONES CAUSED BY SIDE LOBE REFLECTIONS. THE CAPABILITIES OF GENERAL OCEANICS FOR MAKING LIMITED PRODUCTION OCEANOGRAPHIC INSTRUMENTATION WILL BE USED TO CONSTRUCT A TRANSVERSE DOPPLER PROFILER INSTRUMENT THAT WILL BE USED TO INVESTIGATE THE CAPABILITIES OF THIS TYPE OF INSTRUMENT. IN ADDITION TO MEASURING VELOCITY PROFILES, PROPER SIGNAL PROCESSING ALGORITHMS WILL ENABLE A TRANSVERSE DOPPLER INSTRUMENT TO MEASURE PROFILES OF TURBULENT FLUCTUATIONS AND HENCE REYNOLD'S STRESSES. CONTROLLED ELECTRICAL OR MECHANICAL MOTION OF THE TRANSDUCERS WILL ALLOW MEASUREMENT OF TEMPERATURE AND SALINITY PROFILES.

GENERAL PNEUMATICS CORP — DARPA — $ 50,000
7662 E GRAY RD - STE 107
SCOTTSDALE, AZ 85260
DR G WALKER
TITLE:
ARCTIC COMMUNICATIONS TECHNIQUES: REMOTE UNATTENDED POWER SYSTEMS
TOPIC: 8 OFFICE: DARPA

DEVELOPMENT IS PROPOSED OF A SMALL, SELF-CONTAINED POWER UNIT CAPABLE

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OF OPERATING UNATTENDED FOR LONG PERIODS WITH GREAT RELIABILITY. THE UNIT IS INTENDED FOR INCORPORATION AS THE STORAGE BATTERY TRICKLE CHARGER IN A DATA GATHERING AND COMMUNICATIONS SYSTEM FOR THE ARCTIC AND OTHER REMOTE ISOLATED AREAS. THE ENERGY SOURCES ANTICIPATED FOR THE POWER UNIT INCLUDE NUCLEAR (RADIOISOTOPE) AND CHEMICAL (LIQUID METHANE COMBUSTION). THE HEART OF THE POWER UNIT IS A ROSS-STIRLING ENGINE OF 60 CUBIC CENTIMETER ENGINE DISPLACEMENT PRODUCING 100 WATT SHAFT OUTPUT. THE ENGINE OPERATES ON A CLOSED THERMODYNAMIC REGENERATIVE CYCLE WITH COMPRESSION AND EXPANSION OF THE SAME WORKING FLUID (AIR) AT DIFFERENT TEMPERATURE LEVELS. THE ENGINE IS HEATED EXTERNALLY AND IS WATER COOLED. IT HAS SEALED BEARINGS THROUGHOUT THE NOVEL ROSS LINKAGE AND USES DRY RUBBING SEALS ON THE PISTON AND POWER OUTPUT SHAFT.

GENERAL SCIENCES INC — DNA — $ 79,301
PO BOX 185
NORRISTOWN, PA 19401
PETER D ZAVITSANOS
TITLE:
NUCLEAR EFFECTS SIMULATION
TOPIC: 2 OFFICE: OAAM

A NOVEL SET OF HIGHLY EXOTHERMIC AND ESSENTIALLY GASLESS (CONDENSED PHASE) REACTIONS WILL BE INVESTIGATED IN ORDER TO SELECT THE COMPOSITION WHICH PROVIDES THE MOST APPROPRIATE METHOD OF SIMULATING RADIANT FLUXES EQUIVALENT TO THOSE ENCOUNTERED IN NUCLEAR AIR BLASE ENVIRONMENTS. THE PROPOSED CONCEPT IS CAPABLE OF GENERATING PEAK TEMPERATURES IN EXCESS OF 3200 DEG K AND RADIATION FLUXES UP TO 200 CAL/SQ CM SEC OVER A PERIOD OF 1-2 SECONDS. THE CONCEPT ALLOWS FOR CONTROL IN TERMS OF RADIATION LEVEL, DURATION TIME, AND CAN BE SCALED INTO RADIATING PANELS WHOSE AREA THICKNESS AND SHAPE CAN BE CONTROLLED TO MATCH TEST REQUIREMENTS IN EVALUATING COMPONENTS AND/OR MATERIAL TARGETS OF INTEREST. PRELIMINARY EXPERIMENTS WITH "OFF-THE-SHELF" CHEMICAL MIXTURE REFERRED TO AS "HI-THERM" PROVIDE CONVINCING EVIDENCE OF THE USEFULNESS OF THIS CONCEPT. SOME OF THESE RESULTS ARE PRESENTED TOGETHER WITH RECOMMENDATIONS TO PROCEED TOWARDS THE DEVELOPMENT OF THE MOST COST EFFECTIVE THERMO-CHEMICAL HEAT SOURCE WHICH CAN EVENTUALLY PROVIDE THE REQUIRED NUCLEAR SIMULATION FOR (A) TESTING VULNERABLE COMPONENTS/TARGETS, (B) PRODUCING THE SOIL HEATING, THERMAL LAYER AND SUBSEQUENT PRECURSOR WAVE IN A FUTURE "MINOR

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SCALE" SIMULATION EVENT.

GENERAL TECHNOLOGY INC — NAVY — $ 50,000
12903 AUTUMN DR
SILVER SPRING, MD 20904
S C LING
TITLE:
ADVANCED MICROCONDUCTIVITY PROBE FOR OCEANIC USE DEVELOPMENT
TOPIC: 124 OFFICE: NWSC

A NEW HIGH-FREQUENCY, NONFOULING, FOUR-ELECTRODE, OPEN-CELL CONDUCTIVITY SENSOR FOR OCEANIC USE IS PROPOSED. THIS SENSOR IS TO REPLACE THE COMMONLY USED CONDUCTIVITY CELL MADE BY N. BROWN INSTRUMENT SYSTEM. THE NEW SENSOR WILL BE DESIGNED TO MINIMIZE OR ELIMINATE PROBLEMS ASSOCIATED WITH N. BROWN CONDUCTIVITY CELL. SOME STRINGENT DESIGN CRITERIA ARE SET FOR THE NEW CONDUCTIVITY SENSOR: 1. THE SENSOR SHOULD BE NONFOULING FOR OCEANIC USE. 2. IT SHOULD BE COPATIBLE TO THE EXISTING NEIL BROWN ELECTRONICS. 3. AN OPEN-CELL, FOUR-ELECTRODE TYPE IS HIGHLY DESIRABLE. 4. IT SHOULD HAVE A SPATIAL RESOLUTION OF 0.5 cm OR LESS. 5. IT SHOULD POSSESS AN UNBIASED HIGH-FREQUENCY RESPONSE OF AT LEAST 500 HERTZ. 6. IT SHOULD BE FREE FROM CONDUCTIVITY FILM EFFECT OR BOUNDARY-LAYER FLOW EFFECT. A PRELIMINARY INVESTIGATION HAS SHOWN THAT THE ABOVE CRITERIA CAN BE FULFILLED BY THE PROPOSED NEW CONDUCTIVITY SENSOR.

GEO-CENTERS INC — ARMY — $ 49,398
320 NEEDHAM ST
NEWTON UPP FALLS, MA 02164
EDWARD D PETROW
TITLE:
MICRO-MINIATURE ROLL RATE SENSOR
TOPIC: 1 OFFICE: ARDC

WITH THE CURRENT TREND TOWARDS STRAPDOWN GUIDANCE APPROACHES AS ALTERNATIVES TO INERTIAL PLATFORMS GAINING MOMENTUM, THE DEVELOPMENT OF COMPATIBLE ROLL RATE SENSORS IS BECOMING INCREASINGLY IMPORTANT. THE INNOVATIVE DESIGN PROPOSED WILL UTILIZE THE UNIQUE ADVANTAGES AND CAPABILITIES OF FIBER OPTIC SENSORS FOR THIS APPLICATION. FIBER

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OPTIC SENSORS ARE RAPIDLY BECOMING POPULAR ALTERNATIVES TO TRADITIONAL MEASUREMENT APPROACHES DUE TO THEIR INHERENT SOLID-STATE DESIGN, LOW COST, LOW POWER REQUIREMENTS, SMALL PHYSICAL SIZE AND SIGNIFICANT OPERATIONAL BANDWIDTH. RECENT DEVELOPMENTS IN THE DESIGN OF FIBER SENSORS WHICH UTILIZE STRESS-INDUCED BIREFRINGENCE HAVE SUGGESTED AN INNOVATIVE DESIGN FOR USE AS A MINIATURIZED ROLL RATE SENSOR. THIS DESIGN APPROACH FEATURES HIGH SENSITIVITY, MINIMUM PHYSICAL SIZE, LOW POWER REQUIREMENTS AND IMMUNITY TO ENVIRONMENTAL EFFECTS, SUCH AS TEMPERATURE AND RADIATION.

GEO-CENTERS INC — AF — $ 49,265
320 NEEDHAM ST
NEWTON UPP FALLS, MA 02164
BRUCE N NELSON
TITLE:
NON-INVASIVE ELECTROMAGNETIC FIELD SENSOR
TOPIC: 33 OFFICE: AFWAL/FI

THE DEVELOPMENT OF A NON-INTRUSIVE ELECTRIC FIELD SENSOR BASED ON THE ELECTRO-OPTIC EFFECT IS PROPOSED. ELECTRO-OPTIC CRYSTALS ARE SELECTED SUCH THAT A DIFFERENCE IN THE INDEX OF REFRACTION ALONG THE PRINCIPAL OPTICAL AXES, INDUCED BY A CHANGING ELECTRIC FIELD, RESULTS IN A CHANGE IN TRANSMISSION THROUGH THE OPTICAL SYSTEM. THROUGH THE CHOICE OF AN APPROPRIATE CRYSTAL AND CRYSTAL GEOMETRIES, VARIOUS SENSITIVITIES AND AC BANDWIDTHS ARE ATTAINED IN A FIBER OPTIC SENSOR. THE NATURE OF THE ELECTRO-OPTIC EFFECT EXHIBITED IN ELECTRO-OPTIC CRYSTALS SELECTS SENSITIVITIES TO THE ELECTRIC FIELD ONLY IN ONE DIRECTION. THEREFORE, A SENSOR CAN BE DEVELOPED WITH 3 ELECTRO-OPTIC CRYSTALS MOUNTED ORTHOGONALLY SUCH THAT BOTH FIELD STRENGTH AND DIRECTION CAN BE DETERMINED. ALSO, THE ELECTRONICS AND SIGNAL PROCESSING EQUIPMENT ARE LOCATED AT A GREAT DISTANCE FROM THE SENSOR END, ALLOWING FOR REAL TIME ELECTRIC FIELD MEASUREMENTS IN HOSTILE ENVIRONMENTS. PHASE I RESEARCH IS DIRECTED AT THE SELECTION OF SUITABLE ELECTRO-OPTIC CRYSTALS FOR DESIGNING FIBER OPTIC SENSORS AND TOWARDS THE DETERMINATION OF OPTIMUM MEANS OF SIGNAL DETECTION.

GHG CORP — AF — $ 48,120
1100 NASA RD 1 - STE 206
HOUSTON, TX 77058
ROBERT W MCNEENY
TITLE:
AVIONICS SYSTEMS TRAINER DEVELOPMENT INCORPORATING EXPERT SYSTEMS TECHNOLOGY
TOPIC: 73 OFFICE: AMD/KDO

A METHODOLOGY FOR THE APPLICATION OF A RULE INDUCING EXPERT SYSTEM

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BUILDER TO DEVELOP AN EXPERT SYSTEM FOR AIRCREW AVIONICS SYSTEMS MISSION TRAINING WILL BE DEVELOPED AND TESTED. THIS METHODOLOGY WILL PERMIT TRAINING PERSONNEL, RATHER THAN AI RESEARCHERS OR SPECIALISTS, TO DEVELOP SUCH EXPERT SYSTEM APPLICATIONS. THE EXPERT SYSTEM WILL BE INTEGRATED WITH A REAL-TIME AVIONICS SYSTEMS PART-TASK SIMULATOR.

GINER INC ARMY $ 50,000
14 SPRING ST
WALTHAM, MA 02154
DR VINOD JALAN
TITLE:
COMPACT REGENERABLE SULFUR SCRUBBER FOR PHOSPHORIC ACID FUEL CELLS
TOPIC: 54 OFFICE: BRDC

A BENCH SCALE TEST PROGRAM IS PROPOSED TO EVALUATE USE OF CuO/ZnO DESULFURIZATION SORBENTS FOR THE NOT REGENERABLE SULFUR REMOVAL FROM LOGISTIC HYDROCARBON FUELS REFORMED FOR USE IN DISPERSED PHOSPHORIC ACID FUEL CELL POWER PLANTS. AN EFFICIENT REGENERABLE DESULFURIZATION PROCESS OPERATING WITHIN THE TEMPERATURE RANGE OF 450 TO 650 DEG C WOULD PROVIDE CONSIDERABLE FLEXIBILITY FOR INSERTION INTO THE FUEL PROCESSING BETWEEN HYDRODESULFURIZATION AND HYDROCARBON REFORMING STAGES (HIGH TEMPERATURE STEAM REFORMING, AUTOTHERMAL REFORMING OR PARTIAL OXIDATION) OR BETWEEN THE HYDROCARBON REFORMING STAGE AND THE SHIFT CONVERSION STATES. SULFUR REMOVAL FROM THE PROCESS STREAMS TO LOW LEVEL (<<10 PPM H2S) IS ESSENTIAL FOR PROTECTION OF BOTH THE LOW TEMPERATURE SHIFT CORROSION CATALYST AND THE FUEL CELL ANODE. DEMONSTRATION HAS ALREADY BEEN ESTABLISHED THAT SECOND STATE HOT DESULFURIZATION OF COAL GASES WITH AIR AND AIR/STEAM OXIDATION REGENERATION MIXED CuO/ZnO SORBENTS PROVIDE AN EFFICIENT SULFUR REMOVAL STAGE FOR MOLTEN CARBONATE FUEL CELL APPLICATIONS.

GINER INC ARMY $ 50,000
14 SPRING ST
WALTHAM, MA 02154
DR VINOD JALAN
TITLE:
ELECTROCHEMICAL HYDROGEN CONCENTRATOR FOR PHOSPHORIC ACID FUEL CELLS
TOPIC: 55 OFFICE: BRDC

AN ELECTROCHEMICAL METHOD IS PROPOSED FOR THE SEPARATION OF HYDROGEN

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FROM A REFORMED-HYDROCARBON FUEL-GAS STREAM FOR DIRECT FEED INTO A FIELD PORTABLE PHOSPHORIC ACID FUEL CELL USED BY THE U.S. ARMY. THIS ELECTROCHEMICAL HYDROGEN SEPARATOR (EHS) IS BASED ON CURRENT PHOSPHORIC ACID FUEL CELL TECHNOLOGY. IN IT, HYDROGEN WOULD BE REMOVED FROM A GAS STREAM WHICH CONTAINS H2, CO2, CO, AND MINOR CONSTITUENTS SUCH AS H2S AND COS BY OXIDATION AT A GAS DIFFUSION ANODE AND REGENERATION AT AN OPPOSING GAS DIFFUSION CATHODE. THIS DEVICE PROMISES HIGH SEPARATION EFFICIENCY AS WELL AS HIGH PURITY IN THE SEPARATED HYDROGEN STREAM. GINER, INC. PROPOSES TO EVALUATE THE EHS IN LABORATORY TESTS UNDER THE CONDITIONS OF THE STATED APPLICATION. STUDIES WILL BE CONDUCTED WITH DIFFERENT ELECTROCHEMICAL CATALYSTS AND DIFFERENT ELECTRODE FORMULATIONS TO INCREASE THE SEPARATION RATE AND TO INCREASE THE RESISTANCE OF THE ELECTRODES TO POISONING. THE ELECTROLYTE MATRIX WILL BE STUDIES IN AN EFFORT TO DECREASE ITS RESISTANCE AND THEREBY DECREASE THE POWER REQUIRED FOR SEPARATION.

GMS ENGINEERING CORP — ARMY — $ 0
8970-E ROUTE 108
COLUMBIA, MD 21045
DR G M SAMARAS
TITLE:
BIOCYBERNETIC LINK FOR WORKLOAD LEVELING VIA DYNAMIC TASK PARTITIONING CONCEPTUAL DESIGN
TOPIC: 94 OFFICE: MED FT. DET

PROPOSED IS THE CONCEPTUAL DESIGN OF A SYSTEM FOR ACQUIRING AND ANALYZING PHYSIOLOGICAL AND OVERT BEHAVIORAL DATA FROM OPERATORS (OF COMPLEX MAN MACHINE SYSTEMS) SO AS TO IDENTIFY OPERATOR FUNCTIONAL STATUS AND THEREBY ALLOCATE CONTROL FUNCTIONS BETWEEN THE MAN AND THE MACHINE.

GROSS T.A.O. INC — NAVY — $ 49,724
230 CONCORD RD
LINCOLN, MA 01773
T.A.O. GROSS
TITLE:
EDDY CURRENT INSPECTION OF GRAPHITE-EPOXY COMPOSITES
TOPIC: 99 OFFICE: NSWC

THE STRUCTURAL INTEGRITY OF GRAPHITE-EPOXY COMPOSITES CAN BE VALI-

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DATED BY MEASUREMENT OF EDDY-CURRENTS INDUCED IN ELECTRICALLY CONDUCTING FIBERS. EDDY-CURRENTS ARE DIMISHED IN DAMAGE REGIONS OF A COMPOSITE STRUCTURE BECAUSE RUPUTRED FIBERS DO NOT PROVIDE AN ELECTRICALLY CONDUCTING PATH. THE PROGRAM PROPOSED HEREIN SEEKS SOLUTIONS TO PRACTICAL PROBLEMS AND OBSTACLES TO THE REALIZATION OF A PRACTICAL INSTRUMENT FOR INSPECTION IN THE FIELDS.

GT-DEVICES INC SDIO $ 0
5705 GENERAL WASHINGTON DR
ALEXANDRIA, VA 22312
RODNEY L BURTON
TITLE:
CERAMIC INSULATORS FOR PULSED ELECTROTHERMAL DISCHARGES GTD-43
TOPIC: 18 OFFICE: IST

HIGH POWER ELECTROTHERMAL DISCHARGE TECHNOLOGY PROVIDES AN ATTRACTIVE APPROACH FOR ACCELERATING SDI KEW PROJECTILES AND FOR SDI SPACE PROPULSION. STORED ENERGY IS USED TO HEAT SUITABLE PLASMA MATERIALS IN A LARGE L/D TUBE ON MICROSECOND TIME SCALES, CREATING A HIGH PRESSURE, LOW MOLECULAR WEIGHT JET. REPETITIVE OPERATION OF THESE JETS REQUIRES DEVELOPMENT OF A HIGH STRESS INSULATOR, RESISTANT TO THERMAL SHOCK, AND SEVERAL CERAMIC MATERIALS ARE PARTICULARLY WELL SUITED FOR THIS PURPOSE. THIS EFFORT IDENTIFIES APPROPRIATE MATERIALS, DESIGNS INSULATOR ASSEMBLIES OF CERAMICS WITH OUTER COMPRESSIVE JACKETS, AND ASSEMBLES CERAMICS INTO THEIR JACKETS WITHOUT DAMAGE. CANDIDATE MATERIALS ARE ALPHA-SiC, Al2O3, Si3N4 AND HD CAST SiC, AND OTHER CANDIDATES WILL BE IDENTIFIED. THE INSULATOR ASSEMBLY WILL BE DESIGNED TO WITHSTAND 4-8 KILOBARS, A PRESSURE OF INTEREST FOR KEW HYPERVELOCITY GUNS. AN ASSEMBLY TOOL WILL BE FABRICATED TO AID IN SHRINK FIT ASSEMBLY OF COMPRESSIVE JACKETS AND CERAMIC LINERS. CERAMIC LINERS WILL BE ASSEMBLED IN THEIR JACKETS. WITH THESE STEPS COMPLETED, CERAMIC LINER TESTING CAN BE PERFORMED AT A PHASE II LEVEL.

GULF WEATHER CORP ARMY $ 4,000
136 ESPY AVE
PASS CHRISTIAN, MS 39571
F J SCHATZLE
TITLE:
ENVIRONMENTAL HEAT STRESS WEATHER NETWORK
TOPIC: 95 OFFICE: MED FT. DET

THE PROBLEM ADDRESSED IS THE NEED TO STUDY THE FEASIBILITY OF

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IMPLEMENTING A STANDARDIZED WET-GLOBE TEMPERATURE (WGBT) INDEX DATA ACQUISITION AND RETRIEVAL NETWORK TO SUPPORT COMPREHENSIVE COMPUTERIZED MILITARY OPERATIONS WORLDWIDE. THE ESTABLISHMENT OF A WORLDWIDE DATA COLLECTION NETWORK, MOST PROBABLY AS A PART OF THE EXISTING WORLD METEOROLOGICAL ORGANIZATION WEATHER OBSERVING NETWORK, POSES A MYRIAD OF PROBLEMS IN DEALING WITH THE INTERNATIONAL COMMUNITY. WE PROPOSE AN INNOVATIVE SOLUTION TO THE PROBLEM USING EXISTING WEATHER OBSERVATIONAL DATA AND DATA NOW AVAILABLE FROM METEOROLOGICAL SATELLITES.

GUMBS ASSOCS INC — ARMY — $ 92,840
26 AVENUE B
NEWARK, NJ 07114
DR RONALD W GUMBS
TITLE:
THERMOPLASTIC MATRIX FOR COMPOSITE PRIMARY STRUCTURES IMPROVEMENT
TOPIC: 25 OFFICE: AVSCOM

THE USE OF ORGANIC MATRIX COMPOSITES IN HIGH PERFORMANCE AIRCRAFTS REQUIRES A MATRIX MATERIAL *POSSESSING* A *COMBINATION* OF HIGH STIFFNESS AND STRENGTH AT OPERATING CONDITIONS. THIS PROPOSAL OUTLINES A RESEARCH PROGRAM AIMED AT SYNTHESIS, CHARACTERIZATION AND CROSSLINKING OF A NOVEL CRYSTALLIZABLE THERMOPLASTIC MATERIAL. THE CURING PROCESS IS EXPECTED TO RAISE THE GLASS TRANSITION TEMPERATURE AND IMPROVE THE HIGH TEMPERATURE RESPONSE OF THE RESIN CLOSE TO ITS GLASS TRANSITION TEMPERATURE. THE PROPOSED STUDY ON THE DEVELOPMENT OF CROSSLINKABLE TYPES OF CRYSTALLINE THERMOPLASTICS WILL LEAD TO THERMOPLASTIC MATRIX COMPOSITES WITH IMPROVED THERMAL PROPERTIES, DIMENSIONAL STABILITY AND SOLVENT RESISTANCE, WITHOUT SACRIFICING THE UNIQUE FRACTURE TOUGHNESS OF THE THERMOPLASTICS. THE PHYSICAL PROPERTIES OF THE POLYMERS AND SOME PRELIMINARY DATA ON THEIR THERMOFORMING CHARACTERISTICS WILL BE DETERMINED. PHASE II WILL EMPHASIZE MORE DETAILED CHARACTERIZATIONS OF THE SINGLE AND MULTI-PLY COMPOSITES, AS WELL AS DETAILED EVALUATIONS OF THE THERMOFORMING AND RADIATION INDUCED CROSSLINKING AT THE LAMINA AND LAMINATE LEVEL.

GUMBS ASSOCS INC — ARMY — $ 0
26 AVENUE B
NEWARK, NJ 07114
DR RONALD W GUMBS
TITLE:
EYE PROTECTION RESEARCH
TOPIC: 96 OFFICE: MED FT. DET

THE USE OF CONTINUOUS AND PULSED WAVE LASERS IN TARGET DESIGNATION

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AND COMBAT SITUATIONS IS INCREASING. THERE IS THEREFORE A NEED TO PROTECT COMBAT PERSONNEL AND SENSITIVE SENSING EQUIPMENT FROM ACCIDENTAL EXPOSURE TO LASER RADIATION. THE TECHNICAL OBJECTIVES OF THIS PROGRAM ARE TO DEVELOP, CHARACTERIZE AND TEST A LASER FILTER WHICH REMAINS TRANSPARENT AT AMBIENT LIGHT FLUXES, BUT WHICH COULD BE SWITCHED TO A HIGHLY ABSORBING STATE AT FREQUENCIES OF 10 MHz OR BETTER ON SENSING LASER RADIATION. ONE ADVANTAGE OF THE PROPOSED SYSTEM IS THAT IT CAN BE CYCLED BACK AND FORTH MANY TIMES WITHOUT ANY PERMANENT CHANGE. THE PHASE I RESEARCH IS AIMED MAINLY AT CONCEPT FEASIBILITY DEMONSTRATION AND YIELD A SET OF REQUIREMENTS FOR THE ACTIVE MATERIAL. IF PHASE I IS SUCCESSFUL, THE SYNTHESIS PROGRAM WILL BE EXPANDED AND RE-DIRECTED DURING PHASE II IN ORDER TO SYNTHESIZE THE OPTIMUM MATERIAL FOR THIS APPLICATION AND TO DEVELOP THE MOST EFFICIENT SYNTHETIC PROCEDURE FOR LARGE AREA PRODUCTION. MORE DETAILED CHARACTERIZATION OF THE ELECTRICAL, OPTICAL AND INFRA-RED RESPONSE OF THE MATERIAL WILL ALSO BE PERFORMED.

GUPTA P K INC — AF — $ 48,892
117 SOUTHBURY RD
CLIFTON PARK, NY 12065
DR PRADEEP K GUPTA
TITLE:
TRACTION MODELING OF MILITARY LUBRICANTS
TOPIC: 69 OFFICE: AFWAL/PO

A SEMI-EMPERICAL APPROACH TO MODELING THE TRACTION BEHAVIOR OF LUBRICANTS IN CONCENTRATED CONTACTS IS PROPOSED. THE MODELING CONSISTS OF POSTULATING THE FORM OF THE LUBRICANT CONSTITUTIVE EQUATION IN THE HIGH-PRESSURE CONTACT ZONE AND ESTIMATING THE VARIOUS COEFFICIENTS BY CARRYING OUT A NONLINEAR LEAST SQUARES ANALYSIS OF THE AVAILABLE TRACTION DATA. THE EFFECTIVENESS OF THE MODELING APPROACH IS DEMONSTRATED BY INCORPORATING THE LUBRICANT TRACTION MODEL IN A BEARING DYNAMICS COMPUTER CODE AND BY CARRYING OUT BEARING PERFORMANCE SIMULATIONS AS A FUNCTION OF THE COEFFICIENTS OF THE TRACTION MODEL.

GUYER SANTIN INC — AF — $ 45,115
917 - 7TH ST
SACRAMENTO, CA 95814
J PAUL GUYER
TITLE:
DAMAGE CONTROL BY HIGH SPEED GROUTING
TOPIC: 105 OFFICE: AFBMO/PMX

GROUTING IS USED AS A REPAIR METHOD IN DAMS, POWERPLANTS, TUNNELS AND

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SIMILAR STRUCTURES SUBJECT TO GROUND WATER PRESSURE. IN THESE APPLICATIONS SPEED HAS NOT BEEN IMPORTANT BECAUSE IT IS USED IN RESPONSE TO DAMAGE DUE TO LONG TIMEFRAME DISRUPTIONS SUCH AS SOIL CONSOLIDATION, MINOR SEISMIC ACTIVITY, AND WATER TABLE CHANGES. BY ALTERING GROUT SYSTEM DESIGN (COMPONENT MIXING METHODS, GROUT MACHINERY DELIVERY RATES, DISTRIBUTION PIPING, ETC.) IT MAY BE POSSIBLE TO DEVELOP HIGH SPEED METHODS SUITABLE FOR REMEDIAL REPAIRS THAT COULD BE REQUIRED IN A DEEP BASED WEAPON SYSTEM DUE TO SHORT TIMEFRAME DISRUPTION CAUSED BY WEAPON DETONATION. THIS PROPOSAL IS TO INVESTIGATE THE FEASIBILITY OF SUCH AN APPROACH.

GUYER SANTIN INC — AF — $ 40,583
917 - 7TH ST
SACRAMENTO, CA 95814
J PAUL GUYER
TITLE:
GROUND WATER MANAGEMENT TECHNIQUES SURVEY
TOPIC: 105 OFFICE: AFBMO/PMX

MANAGMENT OF GROUND WATER IS MORE EMPIRICAL ART THAN SCIENCE, MUCH OF WHICH HAS BEEN DEVELOPED IN THE BRICK AND MORTAR INDUSTRIES OF MINING, TUNNELING, DAM AND POWER PLANT DESIGN. THIS PROPOSAL IS TO RESEARCH AND DOCUMENT THE STATE OF THE ART IN THE U.S. AND ABROAD, IDENTIFY METHODS HAVING POTENTIAL TO MEET USAF REQUIREMENTS, AND PREPARE A COMPENDIUM AS A BASE FOR FUTURE DEVELOPMENT TO MEET THE NEEDS OF DEEP BASED SYSTEMS.

HAYES & ASSOCS — SDIO — $ 50,000
7980 LINDA VISTA RD #49
SAN DIEGO, CA 92111
DR CLAUDE HAYES
TITLE:
COMPOSITE ENDOTHERMIC FABRIC FOR THERMAL MANAGEMENT
TOPIC: 5 OFFICE: IST

MISSILES AND SPACE LAUNCHED PROJECTILES HAVE SKIN TEMPERATURES WHICH DISFAVOR ELECTRONIC COMPONENT HEAT SINKING. ACTIVE COOLING OFTEN REQUIRES THE STORAGE OF GASES, PUMPS AND CONTROL SYSTEMS WHICH ARE

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/STLY, HAVE HIGH ENTROPY, CONSUME ENERGY, AND REQUIRE LARGE AMOUNTS OF SPACE. SPACE BASED LASERS, RADIATION WEAPONS, RALE ACCELERATORS, AND POP UP DEVICES OFTEN REQUIRE COOLING TO MAINTAIN RELIABILITY. THE PHASE I STUDY WILL IDENTIFY THE COMMON THERMAL REQUIREMENTS ASSOCIATED WITH SPACE BASED ELECTRONICS. IT WILL EVALUATE THE COOLING CAPABILITIES OF A PATENTED PASSIVE THERMALLY CONDUCTIVE COMPOSITE FABRIC HEAT SINK WHICH ABSORBS HEAT BY PHYSICAL CHEMISTRY. THE FABRIC HEAT SINK CAN BE DESIGN SPECIFIED TO ACT AS A TEMPERATURE RISE RETARDANT OR A HEAT PIPE, CIRCUMVENTING THE NEED FOR ACTIVE COOLING SYSTEMS. BASED UPON DATA ANALYSIS OF COMMON NEEDS, GENERALIZED DESIGN AND MATERIAL RECOMMENDATIONS WILL BE MADE WITH THE SELECTION OF A CANDIDATE FOR PHASE II PROTOTYPE DEVELOPMENT. THE NEW COOLING TECHNOLOGY HAS BROAD APPLICATIONS WHEREVER HEAT IMPACTS PERFORMANCE OR RELIABILITY.

HITTITE MICROWAVE CORP AF $ 65,725
5 INGLESIDE RD
LEXINGTON, MA 01730
YALCIN AYASLI
TITLE:
MONOLITHIC FET CONFIGURATION WITH INCREASED VOLTAGE SWITCHING CAPABILITY AND APPLICATION TO HIGH POWER MICROWAVE SIGNAL CONTROL
TOPIC: 168 OFFICE: RADC/DORM

MICROWAVE SIGNAL CONTROL COMPONENTS ARE REQUIRED FOR VARIOUS MILITARY SYSTEMS APPLICATIONS. IMPROVEMENTS IN THE AREAS OF INCREASED POWER HANDLING CAPABILITY, REDUCED INSERTION LOSS, SIMPLIFIED DRIVER REQUIREMENTS, FASTER SWITCHING TIMES, COMPATBILITY WITH MONOLITHIC MICROWAVE INTEGRATED CIRCUIT TECHNOLOGY FOR REDUCED SIZE AND COST ARE HIGHLY DESIRABLE. IN THIS PROPOSAL, FOUR DIFFERENT SWITCHING COMPONENTS, SOME CONVENTIONAL, SOME IN THE VERY EARLY STAGES OF EXPERIMENTAL DEVELOPMENT, ARE EXAMINED AND COMPARED. THIS EXAMINATION LED US TO PROPOSE A NEW MONOLITHIC FET CONFIGURATION WITH INCREASED VOLTAGE SWITCHING CAPABILITY. THE PRELIMINARY ANALYSIS INCLUDED IN THIS PROPOSAL SHOWS THAT THIS CONFIGURATION CAN BE USED TO MONOLITHICALLY IMPLEMENT SIGNIFICANTLY HIGHER POWER SIGNAL CONTROL COMPONENTS MEETING MORE OF THE DESIRABLE SPECIFICATIONS DESCRIBED ABOVE THAN ANY OTHER KNOWN COMPONENT. THIS PROPOSAL CONTAINS BACKGROUND INFORMATION AND THE SPECIFIC TASK DESCRIPTIONS REQUIRED FOR THE INITIAL FEASIBILITY STUDY AND THE THEORETICAL GROUNDWORK FOR THE EVENTUAL DEVELOPMENT OF SUCH COMPONENTS.

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HOKENSON CO — AF — $ 39,104
840 S TREMAINE AVE
LOS ANGELES, CA 90005
DR GUSTAVE J HOKENSON
TITLE:
ABLATIVE MATERIAL SURFACE ROUGHNESS MODELING
TOPIC: 103 OFFICE: AFBMO/PMX

A TWO-DECK BOUNDARY LAYER MODEL OF THE FLOW OVER AN ABLATING (AND/OR TRANSPIRING) SURFACE IS PROPOSED IN ORDER TO COMPUTE THE SURFACE ROUGHNESS AND TEMPERATURE DISTRIBUTION IN THE WALL AND FLOW FOR A GIVEN SET OF WALL AND FREESTREAM CONDITIONS. THE OUTER FLOW OF THE TWO-DECK MODEL RESEMBLES A CONVENTIONAL BOUNDARY LAYER WHICH SLIPS OVER A PERMEABLE SURFACE. THE INNER FLOW IS A ROUGHNESS-DOMINATED FILM-LIKE FLOW WHICH IS MATCHED TO THE OUTER FLOW AT THE LEVEL WHERE LATERAL SPATIAL VARIATIONS DUE TO ROUGHNESS HAVE "MIXED-OUT". THE INNER FLOW IS COMPUTED BY LOCALLY SPATIALLY-AVERAGING (IN HORIZONTAL PLANES AT EACH VERTICAL LOCATION) WITH A SCALE LARGE RELATIVE TO THE ROUGHNESS YET SMALL RELATIVE TO THE BOUNDARY LAYER GROWTH RATE. AS A RESULT, ANALYTICAL PARAMETERS ARE DEVELOPED WHICH CHARACTERIZED THE ROUGHNESS AND THE INNER-OUTER INTERFACE LOCATION. THE SURFACE ROUGHNESS, MASS TRANSFER, SKIN FRICTION AND HEAT TRANSFER ARE MODELED WITH SPATIAL/TEMPORAL NON-EQUILIBRIUM AND NON-LINEARITY FORMULATIONS. THIS ALLOWS THE MODEL TO BE USED TO ASSESS THE OVERALL STABILITY OF THE ABLATION PROCESS TO A LOCALIZED PERTURBATION IN WALL ROUGHNESS.

HOKENSON CO — ARMY — $ 36,194
840 S TREMAINE AVE
LOS ANGELES, CA 90005
DR GUSTAVE J HOKENSON
TITLE:
LIQUID PROPELLANT GUN SYSTEM DESIGN OPTIMIZATION
TOPIC: 6 OFFICE: ARDC

A NUMERICAL SIMULATION OF TRANSIENT TWO-PHASE REACTING FLOW IN LIQUID PROPELLANT GUN SYSTEM IS PROPOSED. SIMULTANEOUS SOLUTION OF THE PROJECTILE POSITION AND INTERNAL FLUID DYNAMICS WILL ALLOW THE OPTIMUM

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SPATIAL/TEMPORAL PROPELLANT AND HEAT RELEASE DISTRIBUTION TO BE DETERMINED. AT THAT OPTIMUM THE PROJECTILE KINETIC ENERGY AT THE MUZZLE EXIT WILL BE A MAXIMUM AND THE MUZZLE FLASH A MINIMUM. A CONTINUOUSLY-VARIABLE PROPELLENT LOAD WILL BE COMPUTED FOR INJECTION AT ANY ELEVATION ANGLE TO EFFECT INFINITE CONTROL OF THE PROJECTILE VELOCITY. THE EFFECT OF SWIRL AS A COMBUSTION CONTROL VARIABLE SHALL BE ASSESSED AND MULTI-DIMENSIONAL FLOW EFECTS SHALL BE INCORPORATED TO REPRESENT, AMONG OTHER THINGS, THE INFLUENCE OF BARREL WALL TEMPERATURE. FINALLY, THE UNIQUE EFFECTS OF SPECIAL FUELS, INCLUDING METALS, SHALL BE ACCOMODATED IN THE SIMULATION.

HORIZON INFORMATION SYSTEMS — NAVY — $ 44,911
1050 GEORGE ST - STE 6F
NEW BRUNSWICK, NJ 08901
DR ABE D LOCKMAN
TITLE:
ANALYSIS DRIVEN SOFTWARE COST ESTIMATION
TOPIC: 35 OFFICE: NESC

THE ABILITY TO ACCURATELY ESTIMATE SOFTWARE DEVELOPMENT COSTS AS EARLY AS POSSIBLE IS CLEARLY OF GREAT IMPORTANCE IN CHOOSING BETWEEN DIFFERENT SYSTEM ALTERNATIVES. UNFORTUNATELY, THE PRESENT STATE OF THE ART LEAVES MUCH TO BE DESIRED, FOR AT LEAST TWO BASIC REASONS: THE ABSENCE OF GOOD SIZE/COMPLEXITY ESTIMATORS WHICH CAN BE USED AT THE FUNCTIONAL SPECIFICATION STAGE; THE INABILITY OF CURRENT COST ESTIMATE MODELS TO ADEQUATELY CAPTURE THE EFFECTS OF DIVERSE SOFTWARE DEVELOPMENT ENVIRONMENTS. THE PROPOSED RESEARCH WILL: A) FORMULATE A MODEL FOR ESTIMATING BOTH THE SIZE AND THE COMPLEXITY OF THE SYSTEM TO BE DEVELOPED, TAKING AS ITS INPUT A FUNCTIONAL SPECIFICATION OF THE SYSTEM DEVELOPED USING A MODERN STRUCTURED ANALYSIS METHODOLOGY; B) ANALYZE THE EFFECTS ON SOFTWARE DEVELOPMENT COSTS OF LIKELY MAJOR CHANGES IN DEVELOPMENT ENVIRONMENTS, NAMELY THE USE OF ADA/APSE AND THE USE OF RAPID DEVELOPMENT METHODOLOGIES.

HOWARD-SCHLUMBERGER — AF — $ 49,296
PO BOX 26490
SAN FRANCISCO, CA 94126
B W MAXFIELD
TITLE:
ECONOMICAL GEOTECHNICAL EXPLORATION USING SKEWED SENSOR ARRAYS
TOPIC: 88 OFFICE: AFBMO/PMX

A NEW METHOD FOR RECONSTRUCTING IMAGES FROM INFORMATION OBTAINED

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USING A VERY DIFFERENT TRANSMITTER AND RECEIVER CONFIGURATION HAS BEEN DEVELOPED. SENSORS (TRANSMITTER AND RECEIVERS) ARE DEPLOYED OR SCANNED ALONG SKEWED NON-INTERSECTING LINES; THAT IS, COVERING OR SCANNING OVER AN AREA IS NOT REQUIRED FOR THIS NEW FORM OF IMAGING. THE OBJECT MUST BE INSIDE A VOLUME DEFINED BY PLANES CONTAINING THE ABOVE REFERENCED NON-INTERSECTING LINES. ALTHOUGH THIS IMAGING METHOD WILL YIELD FASTER, HIGHER QUALITY IMAGES WITH BETTER NOISE DISCRIMINATION, THE GENERALIZED THEORY FOR SUCH IMAGE RECONSTRUCTION IS RATHER COMPLEX. THIS PROPOSAL DESCRIBES WHY THIS NEW APPROACH TO IMAGING IS SUPERIOR IN SOME INSTANCES FOR UNDERWATER AND UNDERGROUND IMAGING. AN EXACT METHOD FOR PREDICTING THE TWO-DIMENSIONAL IMAGE OF A TWO-DIMENSIONAL OBJECT IS PRESENTED. THE PREDICTIONS OF THIS THEORY ARE CONFIRMED IN A QUANTITATIVE WAY USING A SIMPLE EXPERIMENTAL OPTICAL ANALOG OF THIS NEW IMAGING METHOD AS APPLIED TO TWO-DIMENSIONAL IMAGING.

HUGHES ASSOCS — AF — $ 41,082
2730 UNIVERSITY BLVD
WHEATON, MD 20902
PHILIP J DINENNO
TITLE:
SMALL SCALE METHOD FOR EVALUATING FIRE SUPPRESSION OF POOL FIRES
TOPIC: 218 OFFICE: AFESC

A METHOD IS PROPOSED TO SCALE THE SUPPRESSION EFFECTIVENESS OF WATER SPRAYS AND FILM FORMING AGENTS ON HYDROCARBON POOL FIRES. THE METHOD EXPLOITS THE CONSISTENCY OF POOL FIRES > 1m IN DIAMETER WHILE SCALING DROPLET, SPRAY AND FILM CHARACTERISTICS. THIS STUDY EXAMINES THE PENETRATION, EVAPORATION AND TRAJECTORY OF AQUEOUS STREAMS THROUGH A FIRE PLUME. GROSS ENERGY BALANCES THROUGH THE FLAME AND APPLICATION DENSITY TO THE FUEL SURFACE ARE COMPUTED IN ORDER TO DERIVE SCALING RELATIONSHIPS. THIS SIMPLIFIED APPROACH IS TESTED AGAINST EXISTING FULL SCALE SUPPRESSION DATA. THE CONCEPTUAL DESIGN OF A SMALL SCALE TEST APPARATUS IS PREPARED BASED UPON THE ANALYSIS.

HYDROGEN CONSULTANTS INC — ARMY — $ 67,390
PO BOX 10454
DENVER, CO 80210
FRANKLIN E LYNCH
TITLE:
PHASE-CHANGE THERMAL ENERGY STORAGE METHODS FOR COMBAT VEHICLES
TOPIC: 56 OFFICE: BRDC

THREE THERMAL ENERGY STORAGE ALTERNATIVES--METAL HYDRIDES, PLASTIC

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CRYSTALS AND LIQUID AIR, WILL BE EVALUATED UNDER THE UNIQUE CIRCUMSTANCES OF SILENT WATCH OPERATIONS IN A COMBAT VEHICLE. HYDRIDES ARE COMPACT BECAUSE OF LARGE HEATS OF HYDROGEN SORPTION AND HIGH DENSITY. PLASTIC CRYSTALS ARE THE SIMPLEST ALTERNATIVE, WITH THE ADVANTAGES OF HYDRATED SALTS, BUT WITHOUT THE PROBLEMS OF SEPARATION OR CORROSION. LIQUID AIR, PRODUCED ON-BOARD BY A MINIATURE LIQUEFIER, REQUIRES LESS INSIDE SPACE THAN ANY OTHER ALTERNATIVE. LIQUID AIR IS STORED IN A CRYOGENIC VESSEL OUTSIDE AND VAPORIZED BY A COMPACT HEAT EXCHANGER INSIDE. REALISTIC COMPARISONS AMONG THERMAL ENERGY STORAGE ALTERNATIVES WILL CONSIDER THE ENTIRE SYSTEM, NOT JUST THE PHASE CHANGE MATERIALS. THE CONTAINERS FOR VARIOUS MATERIALS ARE SIGNIFICANTLY DIFFERENT--SOME ARE PRESSURE VESSELS, SOME ARE INSULATED, SOME MUST COPE WITH VOLUME CHANGES. HEAT EXCHANGER REQUIREMENTS ARE DEPENDENT ON MATERIALS PROPERTIES, CONTAINER TYPE AND THE TEMPERATURE OF THE PHASE CHANGE. THE RESEARCH TEAM INCLUDES SPECIALISTS FROM EACH OF THE THREE FIELDS. THEIR EXPERIENCE, WITH GUIDANCE FROM THE ARMY,WILL BE USED TO CHARACTERIZE THREE HEAT STORAGE ALTERNATIVES FROM COMBAT VEHICLES.

HYPRES INC — AF — $ 62,800
175 CLEARBROOK RD
ELMSFORD, NY 10523
DR STEPHEN WHITELEY
TITLE:
SUPERCONDUCTING MILLIMETER WAVE COMPONENTS
TOPIC: 196 OFFICE: AFOSR/XOT

EXTREME CURRENT-VOLTAGE (I-V) NONLINEARITY OF A SUPERCONDUCTOR-INSULATOR-SUPERCONDUCTOR (SIS) TUNNEL JUNCTION IMPLIES QUANTUM LIMIT BEHAVIOR AT MILLIMETER WAVELENGTHS. IN PARTICULAR, THEORETICAL CONSIDERATION OF SUCH JUNCTIONS INDICATES THAT ABOVE FREQUENCIES WHERE CURVATURE OF THE I-V CHARACTERISTIC BECOMES APPRECIABLE OVER A PHOTON POTENTIAL K W/E (THE QUANTUM LIMIT), CLASSICAL RESISTIVE MIXER ANALYSIS BECOMES INVALID AND A QUANTUM MECHANICAL TREATMENT MUST BE SUBSTITUTED. THE FULL QUANTUM THEORY OF NONLINEAR HETERODYNE MIXER PREDICTS THE AVAILABILITY OF CONVERSION GAIN THE THE QUANTUM LIMIT, AND THIS PREDICTED GAIN HAS BEEN OBSERVED. IT IS FELT THAT THE EXISTING THEORY ADEQUATELY DESCRIBES THE PERFORMANCE CHARACTERISTICS OF TUNNEL JUNCTION MIXERS, AND THEREFORE IT IS POSSIBLE TO QUANTITATIVELY PREDICT PERFORMANCE LEVELS OF TUNNEL JUNCTION MIXER AND DE-

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TECTOR SYSTEMS ENGINEERED FOR SPECIFIC APPLICATIONS. SYSTEM PERFORMANCE IS DEPENDENT UPON THE QUALITY OF THE SIS DEVICES AVAILABLE, AS WELL AS THE OVERALL COUPLING EFFICIENCY OF THE SIGNAL TO THE JUNCTIONS. WE AT HYPRES PROPOSE TO USE OUR ACQUIRED EXPERTISE TO PRODUCE SIS DEVICES FOR THE BUILDING OF PRIMARY MIXER SYSTEMS. THESE ULTRA WIDEBAND DEVICES WILL HAVE MULTIPLE APPLICATIONS IN SCIENCE AND ENGINEERING.

I K E ASSOCS INC — ARMY — $ 39,076
10815 MAZE RD
INDIANAPOLIS, IN 46259
B I RUPE
TITLE:
MEASUREMENT OF STATIC ELECTRICITY IN FABRICS TEST METHODOLOGY AND APPARATUS
TOPIC: 83 OFFICE: NRDC

THIS IS A PROJECT FOR THE DEVELOPMENT OF TEST METHODS TO DETERMINE THE ELECTROSTATIC PROPERTIES OF TEXTILES WHICH CONTAIN A SMALL PERCENTAGE OF CONDUCTIVE FIBERS. THESE FABRICS ARE INTENDED FOR THE MANUFACTURE OF GARMENTS TC BE WORN IN EXPLOSIVE ENVIRONMENTS AND IN OTHER AREAS WHERE THE ACCUMULATION OF STATIC CHARGES MUST BE MINIMIZED. EXISTING COMMERCIALLY AVAILABLE TEST EQUIPMENT WILL BE MODIFIED TO FACILITATE THE MEASURMENT OF PERCENTAGES OF E-FIELD SUPPRESSION PROVIDED BY THE CONDUCTIVE FIBERS AS WELL AS THE CHARGE DECAY RATES OF THE RELATIVELY NON-CONDUCTIVE CONTENT OF THE TEXTILES. A NEW TEST FIXTURE WILL BE DEVELOPED TO OPERATE WITH THE ABOVE TEST EQUIPMENT TO CHARACTERIZE THE TRIBOELECTRIC CHARGE GENERATING PROPENSITIES OF THESE SAME TEXTILES. APPROPRIATE TEST METHODS CAN THEN BE GENERATED UTILIZING THE COMPLETE TEST SYSTEM AS A BASIS.

II-VI INC — AF — $ 75,000
SAXONBURG BLVD
SAXONBURG, PA 16056
DAVID G RYDING
TITLE:
PREPARING HETEROSTRUCTURE EPITAXIES FOR TEM/HREM (HIGH RESOLUTION ELECTRON MICROSCOPY) MICROANALYSIS - INNOVATIVE METHODS
TOPIC: 21 OFFICE: AFWAL/AA

THIN LAYER SEMICONDUCTING DEVICES HAVE LARGE POTENTIAL IN BOTH DE-

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FENSE AND COMMERICAL APPLICATIONS. STRUCTURES BUILT IN THE HgCdTe/ CdTe, AlGaAS AND InGaAsP/InP SYSTEMS ARE IN NEED OF INTENSIVE MATERIALS INVESTIGATION. TRANSMISSION ELECTRON MICROSCOPY (TEM) AND ITS RELATED TECHNIQUES ARE POWERFUL TOOLS TO REVEAL CRITICAL INTERFACE CHARACTERISTICS, IMPURITY CONCENTRATIONS AND DISTRIBUTIONS, AND VARIOUS LATTICE DEFECTS. THE PRIMARY OBJECTIVE OF PHASE I IS TO INVESTIGATE NEW AND INNOVATIVE METHODS OF PREPARING ELECTRON TRANSPARENT CROSS-SECTIONS IN EPITAXIALLY LAYERED, RELATIVELY DELICATE HgCdTe, AlGaAs AND InGaAsP STRUCTURES. WE WILL THEN SURVEY CAREFULLY PREPARED SAMPLES WITH PARTICULAR FOCUS ON REVEALING DIFFICULT TO LOCATE INTERFACE FEATURES. PHASE I WILL INCLUDE: 1. INVESTIGATION OF EPOXY SANDWICH TECHNIQUES. 2. INVESTIGATION OF SOLDER BASED TECHNIQUES. 3. CRITICAL SELECTION OF BEST TECHNIQUE. 4. DEVELOPMENT OF TECHNIQUE AND APPARATUS. 5. APPLICATION OF TECHNIQUE TO LPE, MBE AND MOCVD SAMPLES AND TEM SURVEY OF FEATURES.

ILLIANA AVIATION SCIENCES LTD AF $ 50,000
2090 WYOMING AVE
LAS CRUCES, NM 88001
ROBERT J RANDLE
TITLE:
ENHANCEMENT OF OPERATIONAL AIRCREW CAPABILITY: UNIQUE TRAINING TECHNIQUES
TOPIC: 73 OFFICE: AMD/RDO

THE OBJECTIVE OF THE PROPOSED RESEARCH IS TO DEMONSTRATE THE FEASIBILITY OF TEACHING GOOD EYES TO SEE BETTER, PARTICULARLY AT GREAT DISTANCES, USING A UNIQUELY INNOVATIVE BIOFEEDBACK CONDITIONING TECHNIQUE DEVELOPED BY THE PRINCIPLE INVESTIGATOR. INITIALLY VOLITIONAL FOCUS CONTROL IS ACQUIRED BY LISTENING TO A TONE, PRESENTED TO ONE EAR ONLY, THAT GOES UP AND DOWN IN PITCH WITH INWARD AND OUTWARD EYE ACCOMMODATION (MEASURED BY AN AUTOMATIC INFRARED TRACKING OPTOMETER). GRADUALLY THE SUBJECT ASSOCIATES PITCH WITH THE "FEEL" OF FOCUSING. IN THE FINAL PHASE, THE SUBJECT CAN CONTROL FOCUS VOLITIONALLY TO MATCH THE ACTUAL FOCUS TONE TO DIFFERENT DESIRES OR "COMMAND" TONES PRESENTED TO THE OTHER EAR, EITHER IN THE ABSCENCE OF VISUAL STIMULI, OR IN THE PRESENCE OF CONFLICTING VISUAL STIMULI. THE RESEARCH WILL LEAD TO AN AUTOMATED, COMPUTER-BASED ADAPTATION OF A LARGELY MANUAL SYSTEM CURRENTLY BEING USED TO ELICIT REMISSIONS OF FUNCTIONAL MYOPIA IN CHILDREN AND YOUNG ADULTS. BY PROGRAMMING THE SYSTEM TO PRESENT VISUAL STIMULI, MEASURE FOCUS RESPONSES, AND ADJUST

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THE BRANCHING TRAINING SCENARIO IN ACCORDANCE WITH INDIVIDUAL SUBJECT RESPONSES, THE NEED FOR COSTLY INSTRUCTOR TRAINING WILL BE AVERTED. PAST EXPERIENCE AND CURRENT SUCCESS IN EXTENDED FOCUS FAR POINTS SUGGEST THAT THE TOP 20 PERCENT OF PILOT'S EYES CAN BE TRAINED TO PERFORM AT THE PRESENT 99TH PERCENTILE.

IMI-TECH CORP — NAVY — $ 47,261
701 FARGO AVE
ELK GROVE VILLAGE, IL 60007
RAYMOND LEE
TITLE:
POLYURETHANE/POLYIMIDE FLOTATION FOAM DEVELOPMENT
TOPIC: 39 OFFICE: NSSC

IMI-TECH CORPORATION PROPOSES TO DETERMINE THE FEASIBILITY OF MEETING THE NAVY'S NEED FOR A POURED-IN-PLACE, LIGHTWEIGHT FLOTATION FOAM THAT WILL NOT SUSTAIN COMBUSTION, DOES NOT RELEASE HAZARDOUS AMOUNTS OF TOXIC GASES WHEN EXPOSED TO FLAMES, AND HAS LOW WATER ABSORPTION. THE TECHNOLOGY TO MEET THIS REQUIREMENT, WITHOUT THE USE OF TOXIC GAS-PRODUCING FLAME RETARDANTS, EXISTS AT IMI-TECH TODAY. THIS PROPRIETARY TECHNOLOGY IS A BLEND OF POLYURETHANE AND POLYIMIDE CHEMISTRY WHICH RESULTS IN A NONBURNING POUR-IN-PLACE CLOSED CELL FOAM AT A DENSITY OF 3 POUNDS PER CUBIC FOOT. AS THE NAVY DESIRES A FOAM WITH A DENSITY OF 1 POUND PER CUBIC FOOT, THE EFFORT OUTLINED IN THIS PROPOSAL IS DIRECTED AT REDUCING THE DENSITY OF IMI-TECH'S UNIQUE HYBRID POLYURETHANE/POLYIMIDE FOAM TO MEET THIS GOAL.

INDUSTRIAL QUALITY INC — ARMY — $ 49,186
PO BOX 2397 - 9832 CANAL RD
GAITHERSBURG, MD 20879
HAROLD BERGER
TITLE:
REAL-TIME STERO-MICRORADIOGRAPHY
TOPIC: 80 OFFICE: AMMRC

A REAL-TIME STEREO MICRORADIOGRAPHIC INSPECTION SYSTEM IS PROPOSED WITH PARTICULAR EMPHASIS ON THE INSPECTION OF CERAMICS. THE PERFORMANCE OF CERAMIC COMPONENTS REQUIRES THAT SMALL DISCONTINUITIES BE

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DETECTED AND EVALUATED. MICRORADIOGRAPHY BY PROJECTION MAGNIFICATION OFFERS THE PROMISE OF DETECTING SMALL DISCONTINUITIES IN A PRACTICAL INSPECTION SYSTEM. IMAGE MAGNIFICATIONS OF 100X OR MORE MAKE IT POSSIBLE TO DETECT DISCONTINUITIES IN THE 20 TO 50 MICROMETER SIZE RANGE. THIS CAN BE DONE WITH REAL-TIME DETECTORS THEREBY OFFERING THE POSSIBILITY FOR A FAST SCANNING INSPECTION. WHEN INDICATIONS ARE FOUND, A STEREO IMAGING SYSTEM WILL PROVIDE MUCH CHARACTERIZATION INFORMATION IN TERMS OF SIZE, SHAPE, LOCATION AND TYPE. WE PROPOSE TO DEVELOP THIS CAPABILITY AND DEMONSTRATE ITS EFFECTIVENESS FOR THE INSPECTION OF CERAMICS. THE DEMONSTRATION OF THE STEREO CAPABILITY WILL INVOLVE RECORDING AND PROCESSING OF TELEVISION IMAGES. IT WILL ALSO PROVIDE MOTION CAPABILITY TO AID IN INTERPRETATION AND STEREO VIEWING.

INDUSTRIAL QUALITY INC — AF — $ 49,939
PO BOX 2397 - 9832 CANAL RD
GAITHERSBURG, MD 20879
HAROLD BERGER
TITLE:
COMBINED HOLOGRAPHIC-INFRARED INSPECTION
TOPIC: 41 OFFICE: AFWAL/ML

A COMBINED HOLOGRAPHIC-INFRARED INSPECTION METHOD IS PROPOSED. THE COMBINATION TECHNIQUE WILL PROVIDE MORE VALUABLE INTERPRETATION INFORMATION AND MORE QUANTITATIVE INSPECTION RESULTS THAN EITHER METHOD USED ALONE. A POWERFUL NEW INSPECTION APPROACH FOR BONDED ASSEMBLIES SUCH AS COMPOSITE STRUCTURE IS ANTICIPATED. THE TECHNICAL OBJECTIVES OF THE PROJECT ARE TO OPTIMIZE THE HEATING PROCEDURE AND IMAGING GEOMETRY TO GENERATE USEFUL SIGNALS FROM BOTH HOLOGRAPHIC INTERFEROMETRY AND INFRARED IMAGING. ALSO THE PROJECT WILL PROVIDE INSIGHT INTO INTERPRETATION INFORMATION AVAILABLE FROM TESTS OF COMPOSITE MATERIAL WITH VARIOUS TYPES OF DISCONTINUITIES. IT IS EXPECTED THAT EACH METHOD WILL PROVIDE USEFUL INFORMATION FOR MANY TYPES OF DISCONTINUITIES IN COMPOSITES SUCH AS DELAMINATIONS, INTERNAL DAMAGE/ MICROCRACKING, EXCESS RESIN, FIBER UNIFORMITY, ETC. THE INFORMATION PROVIDED BY EACH METHOD WILL BE COMPLEMENTARY AND THE COMBINED RESULT WILL YIELD USEFUL, QUANTITATIVE INFORMATION IN THE FORM OF FRINGE COUNTS AND BREADTH OF INDICATION FROM HOLOGRAPHY AND IMAGE SIZE, TEMPERATURE DIFFERENCE AND TIME TO GENERATE SIGNAL FROM THE INFRARED RESULT. A BROADLY USEFUL, EASILY APPLIED INSPECTION

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TECHNIQUE WILL RESULT.

INTEGRATED CHEMICAL SENSORS — ARMY — $ 50,000
44 MECHANIC ST
NEWTON, MA 02164
DR GLENN BASTIAANS
TITLE:
BIOMICROSENSOR TECHNOLOGY: DEVELOPMENT OF SAW MASS DETECTOR DEVICES
TOPIC: 19 OFFICE: CRDC

THE OBJECTIVES OF THIS PROGRAM WILL BE TO IMPROVE THE PERFORMANCE OF THE SAW-BASED CHEMICAL SENSORS (BIONS) PROPRIETARY TO ICS BY DEVELOPMENTS IN SURFACE AREA ENHANCEMENT, SURFACE COATING, RECEPTOR MOLECULE BINDING, INTERFACE ELECTRONICS AND EXPERIENCE WITH SAMPLES OF KNOWN UTILITY. WE WILL ALSO BRING THE SENSOR/INTERFACE UNITS CLOSER TO A COMMERCIALLY USEFUL DESIGN. THE EFFORT WILL INCLUDE A COMBINATION OF CHEMICAL AND ELECTRONIC SKILLS TO MODIFY THE SYSTEMS IN SUCH A WAY AS TO REDUCE NOISE AND IMPROVE GENERAL PERFORMANCE. PROTOTYPE SAW TRANSDUCERS HAVE BEEN BUILT THAT ARE CAPABLE OF SENSING AND QUANTITATING VARIOUS CHEMICALS IN LIQUIDS. THEY ARE IN THE PROCESS OF BEING PATENTED. THE DEVICES ARE CURRENTLY ABLE TO QUANTITATIVELY MEASURE ANTIGEN-ANTIBODY INTERACTIONS AND OTHER RECEPTOR-LIKE STRUCTURES USING THE MASS CHANGES ASSOCIATED WITH MODULATIONS OF SURFACE ACOUSTIC WAVES. A PROPRIETARY METHODOLOGY FOR TREATING THE SURFACES OF PIEZOELECTRIC CRYSTALS THAT ENABLES THE CRYSTALS TO BE USED FOR DIRECT ANALYSIS OF SPECIFIC LIGANDS IN LIQUID ENVIRONMENTS WILL BE IMPROVED AND EXTENDED.

INTEGRATED SOFTWARE INC — AF — $ 45,574
PO BOX 323
COCOA BEACH, FL 32931
SAMUEL S HARBAUGH
TITLE:
COMPUTER OPERATING SYSTEM INSTRUCTION SET PRIMITIVES FOR ADA
TOPIC: 23 OFFICE: AFWAL/AA

A PROJECT IS PROPOSED TO DEFINE SPECIFIC RUN-TIME ENVIRONMENT FUNCTIONS REQUIRED BY AN EXECUTING ADA PROGRAM. IT IS PROPOSED TO

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DEFINE THE SIMILARITIES/DIFFERENCES BETWEEN THESE AND TRADITIONAL OPERATING SYSTEM SERVICES. THE PROJECT PROPOSES TO EVALUATE CONVERSION OF THESE FUNCTIONS INTO ACTUAL PROCESSOR INSTRUCTIONS ON TRADITIONAL COMPUTERS. IT FURTHER PROPOSES TO EVALUATE THE TECHNICAL FEASIBILITY AND COMMERCIAL POTENTIAL OF COMBINING THESE FUNCTIONS WITH TRADITIONAL COMPUTER ARCHITECTURE INTO A "SILICON ADA MACHINE" (SAM).

INTEGRATED SYSTEMS INC — ARMY — $ 79,784
101 UNIVERSITY AVE
PALO ALTO, CA 94301
ROBERT A WALKER
TITLE:
ARTIFICIAL INTELLIGENCE AND ADVANCED CONTROL FOR ROBOTICS
TOPIC: 13 OFFICE: ARDC

TRADITIONAL APPROACHES TO THE FEEDBACK CONTROL OF ROBOTS HAVE DEPENDED EXCLUSIVELY ON OPEN LOOP TRAJECTORY COMMANDS. HIGHER LEVEL DECISION MAKING FUNCTIONS WILL BE NECESSARY REQUIRING THE APPLICATION OF ARTIFICIAL INTELLIGENCE (AI) TECHNIQUES. THE PROPOSED RESEARCH AIMS AT THE INTERFACE BETWEEN ROBOT CONTROL DESIGN BY ANALYTICAL OPTIMIZATION AND AI SO THAT BOTH ARE USED MOST EFFECTIVELY. THE KEY CAE TOOLS TO SPECIFY THE INTERFACE BETWEEN THE TWO DIFFERENT METHODOLOGIES FOR THEIR EFFECTIVE INTEGRATION WILL BE DESIGNED. THE PROPOSED RESEARCH WILL DEVELOP A NEW METHODOLOGY IN WHICH AI METHODS ARE USED IN PARALLEL WITH OPTIMIZATION ALGORITHMS FOR MACHINE LEARNING, ADAPTIVE CONTROL, AND MACHINE VISION. A SIMPLE ROBOT SIMULATION TEST-BED WILL BE USED TO TEST THE CONCEPTS. PHASE I RESEARCH WILL OUTLINE FUTURE RESEARCH DIRECTIONS AND POTENTIAL BENEFITS.

INTEGRATED SYSTEMS INC — AF — $ 75,000
101 UNIVERSITY AVE
PALO ALTO, CA 94301
ROBERT A WALKER
TITLE:
SECOND GENERATION INTERACTIVE CAE SYSTEM FOR CONTROL DESIGN AND ANALYSIS
TOPIC: 17 OFFICE: ASD/XR

AUTOMATIC CONTROL DESIGN AND ANALYSIS, MODELING, SIMULATION, AND

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OPTIMIZATION TASKS CAN BE GREATLY ENHANCED THROUGH INTERACTIVE, COMPUTER-AIDED ENGINEERING (CAE) TOOLS. SUCH TOOLS HAVE BEEN LARGELY UNAVAILABLE IN AEROSPACE, MECHANICAL, PROCESS CONTROL AND VEHICLE DESIGN INDUSTRIES, WHERE LARGE RESOURCES ARE EXPENDED TO DEVELOP SPECIALIZED SOFTWARE WITH CUMBERSOME ARCHITECTURE AND USER SYNTAX. INTEGRATED SYSTEMS, INC. HAS DEVELOPED AN INTERACTIVE COMPUTER AIDED CONTROL SYSTEM DESIGN AND MODELING PACKAGE, CALLED MATRIX(x). MATRIX(x) IS USED BY OVER THIRTY COMPANIES, UNIVERSITIES AND LABORATORIES. PHASE I PROPOSES TO DEVELOP A SECOND GENERATION CONTOL SYSTEM CAE AND EXPERT SYSTEM CONCEPTS. THE SOFTWARE WILL BE BASED ON ANSI 77 FORTRAN AND LISP TO ALLOW WIDESPREAD ENGINEERING USE.

INTERNATIONAL SUPERTECH LABS INC — NAVY — $ 49,920
2442 33RD ST
SANTA MONICA, CA 90405
TRIEU-KIEN TRUONG
TITLE:
VHSIC DESIGN FOR COMPUTING THE DISCRETE FOURIER TRANSFORM USING RESIDUE FERMAT NUMBER SYSTEM
TOPIC: 125 OFFICE: NWSC

THE DEVELOPMENT OF VHSIC DEVICES PRESENTS MANY NEW AND CHALLENGING AREAS OF RESEARCH. BY USING THE RESIDUE FERMAT NUMBER SYSTEM TO IMPLEMENT A VHSIC DISCRETE FOURIER TRANSORM (DFT) IN CMOS CHIP, REQUIRED ONLY A SMALL NUMBER OF MULTIPLICATIONS. THE TRADITIONAL DFT DESIGN REQUIRED VERY LARGE NUMBER OF MULTIPLICATIONS, VERY COMPLICATED CIRCUIT, AND LARGE AREAS. THE PROPOSED NEW DESIGN DFT WOULD RESULT IN A VERY COMPACT VLSI CHIP, VERY HIGH PERFORMANCE, AND VERY LOW POWER CONSUMPTION. THE OBJECTIVE OF THIS PROPOSAL IS TO DESIGN, DEVELOP, AND IMPLEMENT A STATE-OF-THE-ART DFT CHIP FOR ANY APPLICATIONS RELATED TO DIGITAL SIGNAL PROCESSING. THE FIRST PHASE OF THIS PROPOSAL, ATTENTION IS FOCUSED ON THE THEORETICAL BACKGROUND OF USING RESIDUE FERMAT NUMBER SYSTEM TO IMPLEMENT A DFT, AND THEN FOCUSED ON THE POSSIBLE CONFIGURATION OF LOGIC STRUCTURES. THE PHYSICAL IMPLEMENTATION OF THE DFT WILL BE A 16-POINT DFT.

IRT CORP — ARMY — $ 0
1364 BEVERLY RD
MCLEAN, VA 22101
J KLEBERS
TITLE:
PROTECTION OF MEDICAL EQUIPMENT AGAINST ELECTROMAGNETIC PULSE (EMP)
TOPIC: 93 OFFICE: MED FT. DET

THE VULNERABILITY OF MANY TYPES OF ELECTRONIC EQUIPMENT TO THE NU-

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CLEAR ELECTROMAGNETIC PULSE (EMP) HAS CLEARLY BEEN ESTABLISHED. THE DOD HAS ADDRESSED THIS PROBLEM FOR NUMEROUS MILITARY SYSTEMS FOR MORE THAN A DECADE. NOT ONLY WEAPONS SYSTEMS, BUT VITAL SUPPORT SYSTEMS MUST ALSO BE PROTECTED FROM DAMAGE TO ELECTRONICS AND CRITICAL FUNCTION UPSET. THE DOD DEPLOYABLE HOSPITAL SYSTEM IS ONE SUCH SYSTEM WHICH DEPENDS ON MULTIPLES OF SENSITIVE ELECTRONIC EQUIPMENT TO PERFORM ITS CRITICAL FUNCTIONS. EMP-SUSCEPTIBLE COMPONENTS OF THE MILITARY HOSPITAL UNIT INCLUDE THE POWER GENERATION AND DISTRIBUTION SYTTEM, COMMUNICATIONS AND DATA LINKS, ENVIRONMENT CONTROL EQUIPMENT, AND LIFE-SUPPORT, MONITORING, DIAGNOSTIC AND COMPUTER EQUIPMENTS. CRITICAL UNITS OR SUBSYSTEMS OF THESE COMPONENTS MUST SURVIVE EXPOSURE TO THREAT-LEVEL EMP IN ORDER TO MAINTAIN A VIABLE HOSPITAL UNIT. THE PHASE I WORK DESCRIBED IN THIS PROPOSAL ADDRSSES THE PROBLEM OF DEFINING COST-EFFECTIVE METHODS FOR PROTECTING MEDICAL EQUIPMENT AGAINST EMP. LIKELY VULNERABILITY MODES ARE FIRST ASSESSED TO FORM A TECHNICAL BASIS FOR DEFINITION OF HARDENING OPTIONS. THE FEASIBILITY OF AVAILABLE HARDENING OPTIONS ARE EXAMINED. RECOMMENDATIONS ARE SUMMARIZED FOR PHASE II DETAILED ANALYSES AND IMPLEMENTATIONS.

JAYCOR AF $ 57,000
PO BOX 85154
SAN DIEGO, CA 92138
B C PASSENHEIM
TITLE:
RADIATION HARD PHOTODETECTORS FOR RING LASER GYROSCOPES
TOPIC: 85 OFFICE: AFBMOPMX

THIS PROPOSAL OFFERS TO MARRY TWO EXISTING DEVICES; A SPECIAL RADIATION TOLERANT SILICON PHOTODIODE DEVELOPED FOR LASER GYRO APPLICATIONS WITH A DIGICON PHOTOMULTIPLIER, TO CREATE A PHOTODETECTOR WITH UNPRECIDENTED OPTICAL RESPONSIVITY AND INSENSITIVITY TO BACKGROUND RADIATION. THIS WILL ALSO RELAX THE REQUIREMENTS ON THE PHOTODETECTOR PREAMPLIFIER. WE EXPECT THE NET RESULT TO BE THE RADIATION INDUCED RLG INTERRUPT TIME WILL BE REDUCED BY A FACTOR OF 300. SUCH A DETECTOR IS USEFUL IN OTHER LOW LIGHT LEVEL AND HOSTILE ENVIRONMENTS, AND WOULD BE ALMOST IMMUNE TO NEUTRAL PARTICLE BEAMS.

JAYCOR AF $ 53,250
PO BOX 85154 - 11011 TORREYANA RD
SAN DIEGO, CA 92138
ROBERT A POLL
TITLE:
DIRECTED ENERGY WEAPONS EFFECTS PHENOMENOLOGY
TOPIC: 109 OFFICE: AFBMO/PMX

THE OBJECTIVES OF THIS PHASE I PROGRAM ARE TO PROVIDE A FIRST ORDER

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DETERMINATION OF THE UNCERTAINTIES IN DEW PHENOMENOLOGY, BOTH FOR ELECTRONICS AND STRUCTURE, THAT PREVENT ACCURATE PREDICTIONS OF STRATEGIC BALLISTIC MISSILE SYSTEM SURVIVABILITY TO DEW EFFECTS AND THAT PREVENT THE DEVELOPMENT OF COST EFFECTIVE HARDENING MEASURES AND TO PROVIDE A PRELIMINARY IDENTIFICATION OF ANALYTIC AND EXPERIMENTAL PROGRAMS TO ADDRESS AND MINIMIZE THE UNCERTAINTIES.

JAYCOR — AF — $ 48,150
PO BOX 85154
SAN DIEGO, CA 92138
B C PASSENHEIM
TITLE:
FIBER OPTIC TECHNOLOGY
TOPIC: 115 OFFICE: AFBMO/PMX

THIS PROPOSAL IS TO DETERMINE THE OPTIMUM FIBER OPTIC LINK (FOL) DESIGN BASED ON THE APPLICATION REQUIREMENTS IN AN ICBM, AND TO DEVISE WAYS OF INCREASING THE RADIATION TOLERANCE OF THIS SYSTEM. OUR TENTATIVE CONCLUSION IS THAT FOL SYSTEM HARDNESS IS PRESENTLY LIMITED BY THE PHOTODETECTOR AND RECEIVER AMPLIFIER. A SPECIFIC SUGGESTION IS THAT REDUCING THE FOL OPERATING WAVELENGTH FROM NEAR IR TO ABOUT 550 + OR - 50 NM WILL PERMIT THE USE OF THINNER PHOTODETECTORS AND HENCE INCREASE THE DOSE RATE AT WHICH RADIATION INDUCED PHOTOCURRENTS OBSCURE THE OPTICAL PHOTOCURRENTS. THIS RESEARCH WILL RESULT IN SPECIFIC FOL DESIGNS, ESTIMATES OF RADIATION TOLERANCE, EXPLANATIONS FOR THESE DESIGNS, AND LIST OF DESIGN GUIDELINES FOR RADIATION HARD FOL's.

JAYCOR — AF — $ 46,600
PO BOX 85154 - 11011 TERREYANA RD
SAN DIEGO, CA 92138
DR S ERIC WHEATLEY
TITLE:
OPTICAL HIGH PRESSURE SENSOR
TOPIC: 117 OFFICE: AFBMO/PMX

PRESSURE SENSORS WHICH ARE CURRENTLY AVAILABLE FOR MECHANICAL RESPONSE MEASUREMENTS OF PROTECTIVE STRUCTURES EXPOSED TO SEVERE BLAST

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AND SHOCK ENVIRONMENT HAVE LIMITED BANDWIDTH, ARE SUSCEPTIBLE TO EMI, AND MAY FAIL TO SURVIVE. DIRECT OPTICAL PRESSURE MEASUREMENT COMBINED WITH FIBER OPTIC SIGNAL TRANSMISSION OFFERS THE POSSIBILITY OF AN IMPROVED PRESSURE SENSOR WITH INCREASED BANDWIDTH, EMI IMMUNITY, AND ENHANCED SURVIVABILITY. THE RUBY PRESSURE SENSOR HAS LONG BEEN USED FOR STATIC HIGH PRESSURE MEASUREMENT. IN THIS WORK, WE SEEK TO DEMONSTRATE THE FEASIBILITY OF DYNAMIC HIGH PRESSURE MEASUREMENTS IN RUBY USING THE PRESSURE DEPENDENT SPECTRAL SHIFT OF THE R LINE FLUORESCENCE EVEN THOUGH RUBY MAY NOT BE THE BEST MATERIAL TO USE. THE SENSOR IS INTENDED TO MEASURE DYNAMIC PRESSURE TO 10 KBAR WITH A 1 MHZ BANDWIDTH. THE MAJOR PROBLEM IS TO FIND A WAY TO ACCOUNT FOR TEMPERATURE CHANGES IN THE SENSOR WHICH ALSO AFFECT THE FLUORESCENCE SPECTRUM. THE APPROACH IS TO MEASURE THE FLUORESCENCE AT SEVERAL WAVELENGTHS SIMULTANEOUSLY SO THAT ENOUGH INFORMATION ABOUT THE LINESHAPE IS OBTAINED TO DETERMINE THE PRESSURE AND TEMPERATURE.

JAYCOR DNA $ 49,454
PO BOX 85154
SAN DIEGO, CA 92138
DR SEISHI HAMASAKI
TITLE:
THREE-DIMENSIONAL NUMERICAL SIMULATION OF STRIATION EVOLUTION IN LATER-TIME HANE PLASMAS
TOPIC: 2 OFFICE: OAAM

STRIATIONS WITHIN NUCLEAR PLUMES CAN BE EXPECTED TO HAVE VERY NEGATIVE EFFECTS UPON COMMUNICATIONS, BECAUSE OF THEIR ENORMOUS SIZE, PERSISTENCE, AND RELATIVELY HIGH DENSITY. WE PROPOSE THE DEVELOPMENT OF A THREE-DIMENSIONAL NUMERICAL SIMULATION CODE TO STUDY THE EFFECTS OF FINITE PARALLEL RESISTIVITY, ELECTROMAGNETIC FIELDS, ION-NEUTRAL COLLISIONS, ION INERTIA, AND ION VISCOSITY UPON THE EVOLUTION OF STRIATIONS. IN PHASE I, THE FEASIBILITY AND METHODOLOGY OF THE CODE DEVELOPMENT WOULD BE DETERMINED. IF SUCCESSFUL, THE THREE-DIMENSIONAL SIMULATION COULD PERMIT PRECISE DETERMINATION OF THE PHYSICS CONTROLLING THE MICROSTRUCTURE PROBLEM, ADDRESSING QUESTIONS, WHICH PRESENTLY AVAILABLE CODES CANNOT ANSWER, RELATING TO THE TENDENCY OF STRIATIONS TO DEVELOP WITH PREFERENTIAL TRANSVERSE SCALE SIZES AND TO THE LONG-TERM PRESISTENCE OF STRIATION AS SEEMINGLY FIELD-ALIGNED ENTITIES. THIS COULD CRUCIALLY ASSIST IN THE DEVELOPMENT AND EVENTUAL IMPLEMENTATION OF MORE REALISTIC MICROSTRUCTURE ALGORITHMS IN NUCLEAR-EFFECTS SIMULATION CODES LIKE SCENARIO.

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JAYCOR
PO BOX 85154
SAN DIEGO, CA 92138
DR FRANKLIN S FELBER
DNA $ 49,914
TITLE:
USING LASERS IN NUCLEAR EFFECTS SIMULATIONS - FEASIBILITY STUDY
TOPIC: 2 OFFICE: OAAM

JAYCOR HAS PERFORMED PRELIMINARY IR&D EXPERIMENTS AND NUMERICAL SIMULATION OF THE INTERACTION OF LASERS WITH SOLID TARGETS. THE RESULTS SUGGEST THAT A CERTAIN CLASS OF LASERS MAY BE USEFUL IN SIMULATING AT LEAST TWO IMPORTANT NUCLEAR WEAPON EFFECTS: (1) THE SCALED ELECTROMAGNETIC RESPONSE OF A CONDUCTING BODY, AND (2) THE SOFT ELECTRON EMISSION SPECTRUM. THIS PROGRAM IS A JOINT EXPERIMENTAL AND THEORETICAL EFFORT TO DETERMINE THE FEASIBILITY OF USING LASERS FOR NUCLEAR WEAPON SIMULATIONS, TO GENERATE APPROPRIATE DATA ON LASER EFFECTS, AND TO COMPARE THE LASER EFFECTS DATA WITH CORRESPONDING NUCLEAR EFFECTS DATA.

JAYCOR
PO BOX 85154
SAN DIEGO, CA 92138
DR J L SPERLING
DNA $ 49,992
TITLE:
PLASMA STRUCTURE IN LATER-TIME HANE PLASMAS - LABORATORY SIMULATION
TOPIC: 2 OFFICE: OAAM

BECAUSE INTERNATION TREATIES PRECLUDE HIGH-ALTITUDE NUCLEAR TESTS, THERE IS LITTLE RELEVANT DATA FROM NUCLEAR BURSTS REGARDING THE SIZE AND DYNAMICS OF STRIATIONS IN NUCLEAR PLUMES OR EVEN THE BASIC PHYSICAL CONDITIONS WHICH PERMIT THE EVOLUTION OF STRIATIONS. THE UNDERSTANDING OF STRIATION BEHAVIOR IS IMPORTANT, AS STRIATIONS GENERATED WHEN THE IONOSPHERE IS DISTURBED BY NATURAL OR NONNUCLEAR MANMADE PROCESSES HAVE BEEN CLEARLY DEMONSTRATED TO HAVE ADVERSE EFFECTS ON COMMUNICATIONS LINKS. WE PROPOSE TO USE A LARGE PLASMA CHAMBER PRESENTLY AT JAYCOR TO CONDUCT AN EXPERIMENTAL STUDY OF THE SIZE AND DYNAMICS OF STRIATIONS IN A CONTROLLED AND HIGHLY DIAGNOSED

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LABORATORY ENVIRONMENT. IN PHASE I WE WOULD DEMONSTRATE THE FEASIBILITY AND METHODOLOGY OF SUCH A STUDY. IF SUCCESSFUL, SUCH A LABORATORY SIMULATION OF PLUME STRIATIONS COULD ISOLATE THE RELEVANT PHYSICS CONTROLLING THE PROBLEM OF MICROSTRUCTURES IN NUCLEAR PLUMES. BY ITERATION AND CLOSE COORDINATION WITH THE THEORETICAL EFFORT PRESENTLY FUNDED BY THE DEFENSE NUCLEAR AGENCY, THE LABORATORY SIMULATION SHOULD ALLOW THE DEVELOPMENT OF PRECISE MICROSTRUCTURE ALGORITHMS FOR USE IN NUCLEAR-EFFECTS SIMULATIONS LIKE SCENARIO.

JAYCOR ARMY $ 0
PO BOX 85154
SAN DIEGO, CA 92138
RALPH WHEELER
TITLE:
PROTECTION OF MEDICAL EQUIPMENT AGAINST ELECTROMAGNETIC PULSE
TOPIC: 93 OFFICE: MED FT. DET

THE OBJECTIVE OF THIS PROPOSED EFFORT IS TO DEVELOP AN INEXPENSIVE EMP PROTECTION TECHNIQUE FOR MEDICAL EQUIPMENT TO PREVENT EMP BURNOUT OR UPSET RESULTING FROM HIGH ALTITUDE NUCLEAR EXPLOSIONS. THE BASIC APPROACH IS TO USE A NEW JAYCOR ISOLATION TRANSFORMER CONCEPT TO ADDRESS THE MAJOR PROBLEM OF ISOLATING THE POWER LINE FROM THE EQUIPMENT POWER SUPPLY, AND PROVIDE PENETRATION CONTROL FOR OTHER CONDUCTED AND APERTURE PENETRATIONS TO THE EQUIPMENT, IF AND WHEN REQUIRED. THE NEW EMP ISOLATION TRANSFORMER CONCEPT CAN PROVIDE 80 TO 100 DB ISOLATION ON POWER LINES IN THE FREQUENCY RANGE OF 10 KHz TO 500 MHz, COVERING THE ENTIRE EMP FREQUENCY BAND. CONDUCTED PENETRATIONS SUCH AS PROBES AND WIRES CAN BE TREATED BY USING SHIELDED CABLES AND/OR FERRITE BEADS, WHILE APERTURE PENETRATIONS ON SUCH OSCILLOSCOPE SCREENS CAN BE TREATED WITH SNAP-ON WIRE MESHES WHICH HAVE BEEN DEVELOPED FOR TEMPEST AND OTHER APPLICATIONS. SUCH AN APPROACH DOES NOT REQUIRE MODIFICATION OR REDESIGN OF ANY OF THE ELECTRONIC CIRCUITS.

JAYCOR AF $ 54,246
PO BOX 85154
SAN DIEGO, CA 92138
DR PAUL I NAKAYAMA
TITLE:
SEARCH ALGORITHM FOR INTELLIGENT REENTRY VEHICLES
TOPIC: 91 OFFICE: AFBMO/PMX

THE PROBLEM OF LOCATING AND STRIKING TARGETS IN A PREVIOUSLY SELECTED

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AREA OF INTEREST IN ALL WEATHER DAY OR NIGHT OPERATION AND WITH AN OVERALL FOOTPRINT COVERAGE LIMITED TO MOBILE TARGET DEPLOYMENT AREAS HAS BEEN THE ACHILLES' HEEL OF THE CRT CONCEPT SINCE ITS INCEPTION. THE KEY ISSUE IS THAT THERE EXISTS NO SMART ALGORITHM AND INHERENT AI PROCEDURE FOR RELIABLY IDENTIFYING THE MOBILE TARGETS WHICH CAN BE HANDLED BY AN "ON-BOARD" COMPUTER AT THE RESPONSE TIMES REQUIRED IN FLIGHT. THE FOLLOWING PROPOSAL OUTLINES A CANDIDATE ALGORITHM WHICH IS INNOVATIVE BUT HAS NOT BEEN APPLIED TO THESE TYPES OF PROBLEMS.

JAYCOR AF $ 49,200
PO BOX 85154
SAN DIEGO, CA 92138
DR JOHN L WILSON
TITLE:
TARGET ASSESSMENT DAMAGE BY BALLISTICALLY DELIVERED SENSORS
TOPIC: 102 OFFICE: AFBMO/PMX

A LIBRARY OF INFORMATION NEEDS TO BE ASSEMBLED IN ONE PLACE WHICH PERMITS ANALYSIS OF THE OPERATIONAL AND TECHNOLOGY PROBLEMS ASSOCIATED WITH ACCURATE DAMAGE ASSESSMENT. IN THIS PROPOSAL WE DESCRIBE THE TECHNICAL CONSIDERATIONS REQUIRED FOR THE ASSEMBLY OF THE LIBRARY ELEMENTS AND ALSO A METHODOLOGY WHICH COULD BE CODED TO QUANTITATIVELY ASSESS THE TRADE-OFFS OF THE OPERATIONAL AND TECHNOLOGY REQUIREMENTS AS THEY RELATE TO THE ENTIRE CRT PROCESS IN AN INTEGRATED FASHION.

JAYCOR SDIO $ 0
PO BOX 85154
SAN DIEGO, CA 92138
DR FRANKLIN S FELBER
TITLE:
MODE-LOCKED LASERS FOR DISCRIMINATION FEASIBILILTY
TOPIC: 1 OFFICE: IST

THIS PROGRAM EXAMINES THE FEASIBILITY OF USING MODE-LOCKED LASERS FOR DISCRIMINATING RVs FROM DECOYS. ABLATION OF TARGET SURFACES BY MODE-LOCKED LASERS PRODUCES RADIATION SIGNATURES CHARACTERISTIC OF THE SIZE, SHAPE, AND SURFACE MATERIAL OF THE TARGET. JAYCOR HAS PERFORMED PRELIMINARY IR&D EXPERIMENTS AND NUMERICAL SIMULATIONS OF THE

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RADIATION SIGNATURES PRODUCED BY MODE-LOCKED LASERS. THE RESULTS SUGGEST THAT AT LASER FLUENCES FAR BELOW THOSE REQUIRED FOR IMPULSE KILL, THE RADIATION SIGNATURES PRODUCED BY MODE-LOCKED LASERS ARE EASILY DETECTABLE AT SEVERAL MEGAMETERS. THIS PROGRAM IS A JOINT EXPERIMENTAL AND THEORETICAL EFFORT TO PROVIDE A FIRST-ORDER DETERMINATION OF THE PHENOMENOLOGY OF RADIATION PRODUCTION AT THE TARGET SURFACE FOR USE IN ASSESSING THE FEASIBILITY OF MODE-LOCKED LASERS FOR TARGET IDENTIFICATION.

JAYCOR SDIO $ 0
PO BOX 85154
SAN DIEGO, CA 92138
DR FRANKLIN S FELBER
TITLE:
SURVIVABILITY AGAINST LASER-GENERATED ELECTROMAGNETIC PULSE
TOPIC: 3 OFFICE: IST

THERMAL KILL AND IMPULSE KILL BY HIGH ENERGY LASERS (HEL's) ARE RECOGNIZED AS FUTURE THREATS TO INTERCONTINENTAL BALLISTIC MISSILES (ICBM's). THIS PROGRAM EXAMINES A THIRD GENERAL HEL LETHALITY MECHANISM TO WHICH MUCH LESS ATTENTION HAS BEEN DEVOTED. LASER-GENERATED ELECTROMAGNETIC PULSE (LGEMP) IS THE ELECTROMAGNEITC PULSE GENERATED BY THE ABLATION OF A TARGET SURFACE BY A LASER. JAYCOR HAS PERFORMED PRELIMINARY IR&D EXPERIMENTS AND NUMERICAL SIMULATIONS OF THE LGEMP PRODUCED BY A CERTAIN CLASS OF LASERS. THE RESULTS SUGGEST THAT AT LASER FLUENCES FAR BELOW THOSE REQUIRED FOR HARD KILL, THE LGEMP PRODUCED BY THIS CLASS OF LASERS HAS AN AMPLITUDE IN THE RANGE IN WHICH ELECTRONICS ARE SUSCEPTIBLE TO SOFT KILL BY FRONT DOOR COUPLING. THIS PROGRAM IS A JOINT EXPERIMENTAL AND THEORETICAL EFFORT TO PROVIDE A FIRST-ORDER DETERMINATION OF THE LGEMP PHENOMENOLOGY FOR USE IN ASSESSING ICBM SURVIVABILITY AGAINST SOFT KILL BY THE LGEMP OF HIGH ENERGY LASERS.

JAYCOR SDIO $ 0
PO BOX 85154 - 11011 TORREYANA RD
SAN DIEGO, CA 92138
KENNETH G MOSES
TITLE:
OPTIMIZED VOLUMETRIC NEGATIVE HYDROGEN ION SOURCE
TOPIC: 16 OFFICE: IST

THIS PROPOSAL IS FOR JAYCOR TO DEVELOP AN UNIQUE MICROWAVE-DRIVEN

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VOLUMETRIC NEGATIVE HYDROGEN ION SOURCE AS CONCEIVED BY JAYCOR SCIENTISTS FOR THE SDIO. THIS SOURCE OFFERS THE PROMISE OF ENHANCED BEAM CURRENT DENSITY AND LOW BEAM DIVERGENCE. THE ENHANCEMENT IS ACCOMPLISHED UNDER NONEQUILIBRIUM CONDITIONS BY CONTROLLING THE ENERGY DISTRIBUTION OF THE ELECTRONS WITHIN THE SOURCE PLASMA THROUGH ELECRON CYCLOTRON HEATING (ECH) WHILE MAINTAINING THE SPATIAL DISTRIBUTION OF ELECTRONS BY A SPECIAL CONFIGURATION OF THE MAGNETIC FIELD IN THE SOURCE REGION. THE PHASE I WORK INCLUDES THE ANALYTICAL DETERMINATION OF THE OPTIMAL SOURCE PLASMA PARAMETERS FOR MAXIMIZING THE NEGATIVE ION PRODUCTION RATE. ALSO, A CONCEPTUAL DESIGN OF THE PHASE II TEST FACILITY WILL BE PERFORMED. THE TECHNIQUE WE PROPOSE, USING NONEQUILIBRIUM ELECTRON ENERGY DISTRIBUTION, OFFERS THE ADVANTAGES OF CIRCULAR CROSS-SECTIONAL GEOMETRY, POWER-EFFICIENT PLASMA FORMATION WITHOUT ELECTRON-EMITTING HOT FILAMENTS IN THE DISCHARGE, AND INCREASED RELIABILITY AND STRUCTURAL SIMPLICITY OF SPACE APPLICATIONS.

JP LABS INC — DARPA — $ 50,000
PO BOX 636 - 212 DURHAM AVE
METUCHEN, NJ 08840
DR G N PATEL
TITLE:
MONITORING RADIATION WITH CONDUCTIVE POLYMERS
TOPIC: 2 OFFICE: DARPA

A NOVEL CONCEPT IS PROPOSED FOR THE DEVELOPMENT OF A PERSONNEL DOSIMETER FOR IONIZING RADIATION, SUCH AS, GAMMA RAY. THE DOSIMETER USES A SPECIALTY CLASS OF RADIATION SENSITIVE CONDUCTIVE POLYMERIC COMPOSITIONS. WHEN EXPOSED TO LOW DOSAGE OF IONIZING RADIATION, THE POLYMERIC COMPOSITIONS WOULD UNDERGO A SUBSTANTIAL CHANGE IN ELECTRICAL CONDUCTIVITY. AS A SLIGHT CHANGE IN CONDUCTIVITY CAN BE DETERMINED ACCURATELY, THE DOSIMETER IS EXPECTED TO BE HIGHLY SENSITIVE, AND SMALL IN SIZE. THE DOSIMETER CAN BE AUTOMATED, MINIATURIZED AND CAN BE DESIGNED TO PROVIDE AN EARLY WARNING FOR THE OVER EXPOSURE.

JP LABS INC — ARMY — $ 49,677
PO BOX 636 - 212 DURHAM AVE
METUCHEN, NJ 08840
DR G N PATEL
TITLE:
DETERMINATION OF SORPTION PARAMETERS - A NOVEL DEVICE
TOPIC: 82 OFFICE: NRDC

A NOVEL DEVICE IS PROPOSED FOR DETERMINATION OF THE SORPTION OF THE

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SIMULANTS AND THE CHEMICAL AGENTS BY THE PROTECTIVE OVERGARMENTS. A NOVEL CLASS OF SIMULANT-SENSITIVE COMPOSITIONS ARE USED IN THE DEVICE. THE SORPTION, THE ACTIVATION ENERGY OF SORPTION AND THE PROTECTION TIME OF THE OVERGARMENTS CAN BE DETERMINED IN THE FIELD. THE DEVICE DOES NOT REQUIRE EXPENSIVE AND BULKY ANALYTICAL EQUIPMENT. IT WILL BE SIMPLE, FAST, INEXPENSIVE, RUGGED, AND ACCURATE DEVICE.

JSH OPTICS — AF — $ 74,995
1495 BIMNI DR
DAYTON, OH 45459
DR JAMES HARRIS
TITLE:
DIFFERENTIAL COMMON PATH INTERFEROMETRIC TEMPERATURE SENSOR
TOPIC: 63 OFFICE: AFWAL/PO

A RESEARCH AND DEVELOPMENT PROGRAM WILL BE DONE TO DEVELOP A DIFFERENTIAL COMMON PATH INTERFEROMETRIC TEMPERATURE SENSOR. AN ANALYTICAL STUDY WILL BE DONE IN ORDER TO OBTAIN A PARAMETRIC STUDY OF THE INTERFEROMETRIC SYSTEM AND TO PERMIT A SELECTION OF A DESIGN SUITABLE FOR A TECHNOLOGY DEMONSTRATION OF A TEMPERATURE SENSOR SUITABLE FOR NONCONTACT MEASUREMENTS IN A HOSTILE ENVIRONMENT. THE APPROACH SELECTED WILL BE DEVELOPED AND EXPERIMENTALLY EVALUATED TO SHOW ITS POTENTIAL FOR IN-SITU TEMPERATURE MEASUREMENTS OF RAPIDLY CHANGING OR RAPIDLY MOVING HOT SURFACES SUCH AS LASER IRRADIATED TARGETS, LASER NOZZLES, OR TURBINE BLADES.

KEMP CORP — NAVY — $ 49,942
710 S ILLINOIS AVE - STE F104
OAKRIDGE, TN 37830
DR FRANCIS E LEVERT
TITLE:
FAST RESPONDING THERMIONIC THERMOMETER
TOPIC: 126 OFFICE: NWSC

A NEW DEVICE FOR MEASURING EXTREMELY RAPID TEMPERATURE CHANGES IN HIGH TEMPERATURE COMBUSTION AND OTHER PROCESSES IS PROPOSED. THE OBJECTIVE OF THIS RESEARCH IS TO EXAMINE THE FEASIBILITY OF DEVELOPING A THERMOMETER BASED ON THE WELL KNOWN PHENOMENA OF THERMIONIC

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EMISSION OF ELECTRONS FROM METALLIC SURFACES AT ELEVATED TEMPERATURES. TWO DIFFERENT DESIGNS FOR THERMIONIC THERMOMETERS WILL BE FABRICATED AND TESTED DURING THIS RESEARCH. THE THERMIONIC DEVICES WILL CONSIST OF A CATHODE - ANODE PAIR ENCAPSULATED IN METALLIC SHEATH. THE CATHODE AND ANODE WILL BE ELECTRICALLY SEPARATED BY A GAS OR BY A VACUUM. THE ELECTRONS EMITTED BY THE CATHODE MATERIAL WILL BE COLLECTED BY THE ANODE. THE COLLECTED CHARGE WILL VARY WITH THE CATHODE TEMPERATURE WHICH IS DIRECTLY PROPORTIONAL TO THE PROCESS TEMPERATURE. SINCE THE TRANSIT TIME OF ELECTRONS FROM THE CATHODE TO THE ANODE WILL BE ESSENTIALLY INSTANTEOUS, THE RESPONSE TIME OF THE THERMIONIC THERMOMETER WILL BE PRIMARILY GOVERNED BY THE MASS OF THE CATHODE. THE CATHODE WILL BE MADE EXTREMELY SMALL.

KFO ASSOCS INC — ARMY — $ 55,055
54 W ALLENDALE AVE
ALLENDALE, NJ 07401
JERRY T LEWIS
TITLE:
HELICAL SCAN AND COMPUTER GENERATED IMAGERY FOR ROBOTIC VISION
TOPIC: 81 OFFICE: HEL

DETERMINE THE FEASIBILITY AND SYSTEM METHODOLOGY OF USING HELICAL SCAN IN STEREOSCOPIC ROBOT VISION TO REPLICATE HUMAN VISION WITH HIGH ACUITY IN THE FOVEAL CENTRALIS. THE RESULTING VIDEO FROM EACH ROBOTIC CAMERA "EYE" HAS THE HIGHEST PICK-UP TUBE RESOLUTION POSSIBLE AT THE CENTER AND A FALLING OFF IN ACUITY TO THE PERIPHERY OF THE FIELD-OF-VIEW. A TWO-COLOR FIELD SEQUENTIAL SYSTEM IS PROPOSED. THE VIDEO IS DIGITAL AND PLACED IN A FRAME BUFFER, SUPERIMPOSED ON THE HELICAL FORMAT OF COMPUTER GENERATED IMAGERY (CGI). THE DIFFERENCE IMAGE IS PROCESSED TO DRIVE THE ROBOT. THE CGI IS THE SCENARIO OF THE TASK THE ROBOT IS TO PERFORM, AND THE SYSTEM KEEPS THE ROBOT "ON-COURSE" WITH THE TASK. THE DATA BASE MODEL FOR THE CGI CAN BE ALTERED ON-LINE FROM OPERATOR OR OUTPUT OF ARTIFICIAL INTELLIGENCE IF THE TASK IS TO DEVIATE FROM A PRE-ORDAINED OR "CANNED" PROGRAM. THE SYNERGY OF HELICAL SCAN AND CGI IS A TECHNICAL ADVANTAGE BY CONCENTRATING THE PERCEIVED INFORMATION IN THE ROBOT PICK-UP RASTER AND ALSO CONCENTRATING THE IMAGE PROCESSING OF THE COMPUTER IN THE "BUSY" AREAS OF THE SCENE. A HIGH EFFICIENCY IS GAINED IN AN INTELLIGENT MACHINE BY THIS MIMICRY OF HUMAN VISUAL SENSING.

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KIMBALL PHYSICS INC
KIMBALL HILL RD
WILTON, NH 03086
DR GLENN DYER
TITLE:
HIGH-CURRENT DENSITY ELECTRON GUN FOR SPACE FLIGHT
TOPIC: 158 OFFICE: AFGL/XOP

AF $ 43,290

A FLIGHT MODULE WILL BE DESIGNED AND CONSTRUCTED THAT WILL LEAD TO THE CONSTRUCTION OF AN ELECTRON GUN SUITABLE FOR ROCKET, SPACE SHUTTLE, AND SATELLITE FLIGHT. AN ELECTRON GUN MODULE WITH A WIDE DYNAMIC RANGE IN CURRENT, ENERGY, AND DENSITY WILL BE CONSTRUCTED, CAPABLE OF AT LEAST 100 MILLIAMPERES AND ABOVE 10 KILOVOLTS BEAM ENERGY. A CATHODE WILL BE DESIGNED TO MEET THE ABOVE SPECIFICATIONS AND A MODULE DESIGNED AND CONSTRUCTED TO MEET THE REQUIREMENTS OF SPACE FLIGHT. THE TESTED MODULE AND A REPORT SUMMARIZING THE MODULE CAPABILITIES INCLUDING A PERFORMANCE PROJECTION FOR THE COMPLETE ELECTRON GUN WILL BE DELIVERED AT THE END OF THE CONTRACT PERIOD.

KIMBALL PHYSICS INC
KIMBALL HILL RD
WILTON, NH 03086
DR GLENN DYER
TITLE:
MODULATED HIGH-CURRENT ELECTRON GUN
TOPIC: 174 OFFICE: RADC/DORM

AF $ 43,301

A CATHODE WILL BE DEVELOPED WHICH MINIMIZES THE HEATING POWER REQUIRED PER AMPERE OF ELECTRON GUN BEAM CURRENT, IS OF STUDY CONSTRUCTION TO WITHSTAND ROCKET FLIGHT, DOES NOT DETERIORATE DURING EXPOSURE TO ATMOSPHERIC GASSES WHILE COLD AND PRODUCES AT LEAST TENS OF AMPERES CURRENT. AN ELECTRON GUN WILL BE DESIGNED WHICH WILL BE CAPABLE OF TENS OF AMPERES BEAM CURRENT AT ENERGIES UP TO TENS OF KILOVOLTS, IS RUGGED, LIGHT WEIGHT, SMALL ENOUGH TO BE SUITABLE FOR OPERATION ON A ROCKET OR SPACE SHUTTLE, AND CAPABLE OF BEING MODULATED FROM 0 TO 100 kHz.

KLEIN ASSOCS
740 WRIGHT ST
YELLOW SPRINGS, OH 45387
GARY A KLEIN
TITLE:
COMPARISON BASED METHOD FOR STRUCTURING EXPERT JUDGMENT IN S/V ANALYSIS
TOPIC: 148 OFFICE: AFWL/PRP

AF $ 46,975

THE OBJECTIVE OF THIS PROJECT IS TO DEVELOP A METHOD FOR THE PREDIC-

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TION OF SURVIVABILITY/VULNERABILITY (S/V) TO NUCLEAR BLAST AND SHOCK OF PROTECTIVE STRUCTURAL FACILITIES. THE PARTICULAR PROBLEM IS THE CHARACTERIZATION OF EXPERT JUDGMENT AND TECHNICAL INTUITION AS ELEMENTS IN THE ASSESSMENT PROCESS. THE APPROACH WILL BE TO APPLY COMPARISON-BASED PREDICTION (CBP) METHODS, WHICH HAVE BEEN DEMONSTRATED TO STRUCTURE EXPERT JUDGMENT SO AS TO GENERATE PREDICTIONS UNDER CONDITIONS OF HIGH UNCERTAINTY FOR DEFENSE SYSTEM RELIABILITY AND EFFECTIVENESS, TO S/V ASSESSMENT. THE RESEARCH WILL CONSIST OF A FEASIBILITY STUDY AND TRIAL APPLICATION OF THE METHOD TO A PROBLEM SELECTED WITH AFWL, PREFERABLY ONE THAT IS ALSO THE SUBJECT OF EXPERIMENT. THE CBP METHODOLOGY PROVIDES A STRUCTURE FOR THE EXPERT JUDGMENT BY USING ANALOGOUS CASES AS A BASIS FOR THE ESTIMATION. EXPERTS WILL PRODUCE ASSESSMENTS BOTH BY THEIR USUAL METHODS AND BY CBP PROCEDURES, AND THE TWO WILL BE COMPARED; CBP RESULTS WILL ALSO BE COMPARED WITH THE RESULTS OF ANY RESEARCH FINDINGS, IF SUCH A PROBLEM WAS CHOSEN. THE STRATEGY WILL PROVIDE AN EXPLICIT AUDIT TRAIL OF HOW THE PREDICTIONS ARE DERIVED. THE PREDICTION DATA WILL BE EXAMINED TO DETERMINE THE VALUE OF CBP AS A METHOD TO AID IN S/V ASSESSMENT.

KMS FUSION AF $ 75,000
PO BOX 1567 - 3621 S STATE RD
ANN ARBOR, MI 48106
GEORGE E BUSCH
TITLE:
RED SOX LASER: A CHEMICALLY-PUMPED 0.76 SINGLET OXYGEN LASER
TOPIC: 200 OFFICE: AFOSR/XOT

WE PROPOSE TO INVESTIGATE THE FEASIBILITY OF A NEW CHEMICAL LASER BASED ON THE (RED) 0.76 MICROMETERS O2 1SIGMA YIELDS O2 3SIGMA TRANSITION. THE O2 1SIGMA STATE IS PRODUCED BY AN ENERGY-POOLING REACTION (O2 1DELTA + O2 1DELTA YIELDS O2 1SIGMA + 3SIGMA(1)). THE O2 1DELTA ELECTRONIC EXCITED STATE IS PRODUCED BY PRIOR CHEMICAL REACTION. THE SINGLET OXYGEN (SOX) LASER IS AN ALTERNATIVE TO THE CHEMICAL OXYGEN-IODINE LASER (COIL), WHICH HAS DEMONSTRATED LASING AT 1.3 MICROMETERS FROM AN ATOMIC IODINE STATE COLLISIONALLY EXCITED BY O2 1DELTA. THE SOX LASER OFFERS THE POTENTIAL OF COMPARABLY HIGH ENERGY DENSITY, REASONABLE GAIN AND GOOD EFFICIENCY. THE MOST IMPORTANT FACTORS INFLUENCING THE EFFICIENCY OF THE PROPOSED LASER ARE THE RATE CONSTANT FOR ENERGY POOLING (Eq. 1) AND THE QUENCHING CON-

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STANT THAT REPRESENTS THE SUM OF ALL PROCESSES THAT DEACTIVATE O2 1SIGMA. THE OBJECTIVES OF THE PHASE I EFFORT ARE TO MEASURE THE RATE CONSTANT FOR QUENCHING OF O2 1SIGMA BY O2 1DELTA AND TO CONFIRM ACCEPTED VALUES FOR SEVERAL OTHER RATE CONSTANTS, INCLUDING THE POOLING REACTION (Eq. 1) AND QUENCHING OF BOTH O2 1SIGMA AND O2 1DELTA BY GROUND STATE OXYGEN. IF THE VALUES FOR RATE CONSTANTS OBTAINED IN PHASE I ARE FAVORABLE, WE EXPECT TO DEMONSTRATE THE SOX LASER IN PHASE II.

KMS FUSION INC — AF — $ 91,879
PO BOX 1567 - 3621 S STATE RD
ANN ARBOR, MI 48106
CHARLES J HAILEY
TITLE:
TIME-RESOLVING ULTRA-SOFT X-RAY SPECTROGRAPH
TOPIC: 149 OFFICE: AFWL/PRP

WE PROPOSE TO DEVELOP, CONSTRUCT, AND TEST A PROTOTYPE X-RAY SPECTROGRAPH FOR THE 0.1 - 1 KeV ENERGY RANGE WITH TIME RESOLUTION OF ABOUT ONE NANOSECOND. THE PROPOSED INSTRUMENT WILL PROVIDE FLEXIBILITY IN CHOICE OF OPERATING WAVELENGTH, WILL BE SUBSTANTIALLY MORE SENSITIVE THAN X-RAY FILMS, AND WILL BE LESS EXPENSIVE THAN CONVENTIONAL X-RAY STREAK CAMERAS. THE TIME-RESOLVING, ULTRASOFT X-RAY SPECTROGRAPH WILL USE ONE OR MORE LAYERED SYNTHETIC MICROSTRUCTURES AS THE WAVELENGTH-DISPERSING ELEMENT. THE PHOTON DETECTING ELEMENT WILL BE A GATED INTENSIFIED CAMERA INCORPORATING A CUSTOM DESIGNED MICROCHANNEL PLATE COUPLED TO A HIGH-QUALITY PHOSPHOR SCREENT. THE OPTICAL EMISSION WILL BE RECORDED ON A FAST PHOTOGRAPHIC FILM. TIME RESOLUTION WILL BE OBTAINED BY SEQUENTIALLY GATING INDEPENDENT STRIP ELECTRODES ON THE MICROCHANNEL PLATE. ONE-DIMENSIONAL IMAGING CAN BE OBTAINED BY AN ENTRANCE SLIT, WITH SOME LOSS OF SENSITIVITY. THE PROTOTYPE DEVICE WILL BE CALIBRATED USING A SOFT X-RAY CALIBRATION FACILITY SO THAT ITS SENSITIVITY CAN BE COMPARED DIRECTLY TO STANDARD X-RAY FILM. THE DEVICE WILL ALSO BE TESTED USING BURSTS OF LASER-PRODUCED X-RAYS TO MEASURE ITS TEMPORAL RESOLUTION.

KMS FUSION INC — DNA — $ 90,030
PO BOX 1567 - 3621 S STATE RD
ANN ARBOR, MI 48106
CHARLES J HAILEY
TITLE:
X-RAY FLASH CRYSTALLOGRAPHY TO CHARACTERIZE DIRECTED ENERGY TRANSFER IN MATERIALS
TOPIC: 4 OFFICE: OAAM

UTILIZING TECHNIQUES DEVELOPED EXTENSIVELY IN THE NATIONAL LASER

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FUSION PROGRAM, WE PROPOSE TO MEASURE THE TIME DEPENDENT CHANGE IN CRYSTAL X-RAY REFLECTIVITY BROUGHT ABOUT WHEN A CRYSTAL IS HEATED TO THE MELTING POINT ON A PICOSECOND TIME SCALE. THIS EXPERIMENT WILL OBTAIN DATA ON RADIATION-LATTICE DYNAMICS ON A TIME SCALE 2-3 ORDERS OF MAGNITUDE FASTER THAN PREVIOUSLY OBTAINED WITH X-RAY TECHNIQUES. WE WILL PROBE DIRECTLY THROUGH THE USE OF X-RAYS THE TRANSFER OF ENERGY BETWEEN THE LASER EXCITED ELECTRON-HOLE PLASMA OF A CRYSTAL AND THE PHONON EXCITATIONS OF THE LATTICE; THE POORLY UNDERSTOOD MECHANISMS BY WHICH HIGH ENERGY DENSITY LASERS TRANSFER THEIR ENERGY TO THE CRYSTALLINE TARGET LATTICE ON EXTREMELY SHORT TIME SCALES (APPROX < 100 PS) WILL BE STUDIED BY ANALYSIS AND MODELING OF THE EXPERIMENTAL RESULTS.

KMS FUSION INC — ARMY — $ 84,169
PO BOX 1567 - 3941 RESEARCH PARK DR
ANN ARBOR, MI 48106
WILLIAM J POLLARD
TITLE:
ARTIFICIAL INTELLIGENCE (AI) ENHANCED ROUTE PLANNING FOR ROBOTIC VEHICLES
TOPIC: 67 OFFICE: TACOM

ROUTE PLANNING IS AN IMPORTANT ASPECT IN THE UTILIZATION OF ROBOTIC VEHICLES WHETHER COMPLETELY AUTONOMOUS OR TELEOPERATED. THIS PROPOSED RESEARCH WILL INVESTIGATE THE PROBLEMS ASSOCIATED WITH LONG RANGE ROUTE PLANNING FOR LAND VEHICLES BY TRANSVERSING CROSS COUNTRY PATHS CREATED BY BOTH A COMPUTER GENERATED DYNAMIC PROGRAMMING MODEL AND BY A MILITARY EXPERT. ADVANTAGES, IF ANY, OF THE EXPERT PLANNED ROUTE WILL BE ANALYZED WITH THE OBJECTIVE OF FORMULATING ARTIFICIAL INTELLIGENCE (AI) RULES FOR INCORPORATION INTO THE COMPUTER ROUTE PLANNING MODEL. PROBLEMS COMMON TO BOTH ROUTES, SUCH AS OBSTACLE AVOIDANCE AND CHECKPOINT LOCATION, WILL BE IDENTIFIED FOR FUTURE STUDY.

KMS FUSION INC — SDIO — $ 0
3621 S STATE RD
ANN ARBOR, MI 48106
THOMAS SPEZIALE
TITLE:
RANGE ENHANCEMENT OF CHARGED PARTICLE BEAMS PROPAGATING IN AIR
TOPIC: 17 OFFICE: IST

WE PROPOSE A METHOD TO EXTEND THE RANGE OF CHARGED PARTICLE BEAMS

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PROPAGATING IN AIR THAT EMPLOYS THE BEAT WAVE ACCELERATOR CONCEPT. THE METHOD IS A SIMPLE EXTENSION OF THE CONCEPTS THAT USE LASER RADIATION TO STABILIZE BEAM PROPAGATION. A BEAT WAVE IS SET UP IN THE BEAM CHANNEL BY EMPLOYING TWO LASERS AT DIFFERENT FREQUENCIES. FREQUENCY MATCHING TO COLLECTIVE MODES IN THE CHANNEL SETS UP LONGITUDINAL ELECTRIC FIELDS. THESE FIELDS ARE EMPLOYED TO EITHER BALANCE THE DRAG FORCE ON THE CHARGED PARTICLE BEAM OR TO FURTHER ACCELERATE IT. THE OBJECTIVES OF THIS PROPOSAL ARE TO IDENTIFY LASER, ATMOSPHERIC, AND BEAM PARAMETERS THAT WILL MAXIMIZE THE CHARGED PARTICLE BEAM RANGE.

KOHLI S ASSOCS — AF — $ 49,957
2856 INSTONE CT
WESTLAKE, CA 91361
SANJAI KOHLI
TITLE:
EXTERNAL AID FOR RAPID TRANSFER/ALIGNMENT DEVELOPMENT
TOPIC: 187 OFFICE: AD/PMR

IN THIS PROPOSAL A RESEARCH PROGRAM IS DESCRIBED FOR DETERMINING THE FEASIBILITY OF USING INTERFEROMETRIC TECHNIQUES FOR DETERMINING ATTITUDE AND ATTITUDE RATE OF A MISSILE WITH RESPECT TO AIRCRAFT. PERFORMANCE OF DIFFERENT INTERFEROMETRIC TECHNIQUES ARE EVALUATED FOR BOTH RF AND OPTICAL SYSTEMS. A SIMULATOR WILL BE DEVELOPED TO SUPPORT ANALYSIS, IMPLEMENTATION AND TEST EFFORTS. THIS SIMULATOR WILL PROVIDE A PRECISE REPRESENTATION OF THE TRANSMITTER AND RECEIVER ERRORS, AND MOTION OF MISSILE. COVARIANCE ANALYSES WILL BE THE MAJOR STUDY TOOL.

KSE INC — ARMY — $ 93,855
PO BOX 368
AMHERST, MA 01004
DR J R KITTRELL
TITLE:
SYNTHESIS OF UNIQUE ENERGETIC POLYMERS IN ONE-STEP PROCESS
TOPIC: 65 OFFICE: MICOM

TO DATE, PREPARATION OF ENERGETIC POLYMERS HAS EMPHASIZED DOUBLE BASE

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PROPELLANTS, CURED PROPELLANTS, OR POLYMERIZATION OF ENERGETIC MONOMERS. THESE ROUTES OFTEN PRODUCE A RELATIVELY LOW ENERGY DENSITY PROPELLANT, MARGINAL MECHANICAL PROPERTIES, OR COMPLEX AND COSTLY SYNTHESIS TECHNIQUES. IN THIS PROGRAM, KSE WILL UTILIZE NITRATION CHEMISTRY PREVIOUSLY DEVELOPED TO IMPROVE THE COMBUSTION QUALITY OF CERTAIN PETROLEUM FUELS, WHEREIN SELECTIVITY CAN BE CONTROLLED IN A SIMPLE ONE-STEP REACTION PROCESS. THIS TECHNOLOGY WILL BE COMBINED WITH ALLIED WORK IN SYNTHESIS OF ENERGETICPOLYMERS AT THE POLYMER SCIENCE DEPARTMENT OF THE UNIVERSITY OF MASSACHUSETTS. THE OBJECTIVE IS TO EXPLORE THE FEASIBILITY OF USE OF A ONE-STEP PROCESS TO CONVERT COMMERCIALLY AVAILABLE POLYMERS DIRECTLY INTO THE DESIRED ENERGETIC POLYMERS. POLYMERS SUCH AS POLYBUTADIENE WILL BE ENERGIZED BY REACTION. SEVERAL POLYMERS WILL BE INVESTIGATED AT A VARIETY OF REACTION CONDITIONS. INFRARED, RAMA, AND NMR SPECTROSCOPY WILL BE USED TO INVESTIGATE POLYMER STABILITY. THE FEASIBILITY OF THE PROCESS TO PRODUCE POLYMERS WITH THE DESIRED FUNCTIONAL GROUPS AND WITH SUPERIOR MECHANICAL PROPERTIES WILL THUS BE ASSESSED.

KTECH CORP — AF — $ 49,938
901 PENNSYLVANIA NE
ALBUQUERQUE, NM 87110
DAVID J FOGELSON
TITLE:
SELF-CONTAINED INSTRUMENTATION SYSTEM
TOPIC: 147 OFFICE: AFWL/PRP

THE PROPOSED DEVELOPMENT OF A SELF-CONTAINED INSTRUMENTATION SYSTEM IS PRESENTED IN THIS DOCUMENT. THE SYSTEM WOULD BE CAPABLE OF MAKING ACCELERATION, PRESSURE OR SOIL STRESS MEASUREMENTS IN SEVERE ENVIRONMENTS. DESIGN GOALS FOR THE PROGRAM INCLUDE A HARDENED ELECTRONICS PACKAGE CAPABLE OF WITHSTANDING THE 3,000G AND 5 KBAR MEASURANDS AND PROVIDE A DATA RECORD RATE OF 2 MICROSECONDS PER POINT WITH A DATA WINDOW OF 0.1 SECOND. THE SYSTEM WILL NOT RELY ON CABLE INTERFACE WITH REMOTE INSTRUMENTATION OR CONTROL DURING THE DATA RECORD PERIOD OF A HIGH EXPLOSIVE TEST EVENT. DATA RECOVERY WOULD BE ACCOMPLISHED AFTER POSTTEST RETRIEVAL OF THE INSTRUMENTATION SYSTEM.

L N K CORP INC — NAVY — $ 80,334
302 NOTLEY COURT
SILVER SPRING, MD 20740
DAVID LAVINE
TITLE:
AUTOMATIC FEATURE EXTRACTION FOR DIGITAL SIMULATOR DATA BASES
TOPIC: 133 OFFICE: NTEC

THE AMOUNT OF HUMAN EFFORT CURRENTLY REQUIRED TO ASSEMBLE DATBASES

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FOR SIMULATORS IS FORMIDABLE. ADVANCES IN AUTOMATIC SCENE ANALYSIS GIVE RISE TO THE POSSIBILITY OF DEVELOPING A SYSTEM THAT COULD AUTOMATICALLY GENERATE AN IMAGE DATABASE FROM HIGH ALTITUDE IMAGERY. IN PHASE I L.N.K. CORPORATION PLANS TO DESIGN A SYSTEM THAT WILL INCORPORATE ELEMENTS OF ARTIFICIAL INTELLIGENCE, CARTOGRAPHY AND IMAGE PROCESSING. WE PLAN TO DEMONSTRATE THE FEASIBILITY OF THE STUDY WITH A PARTIAL IMPLEMENTATION ON DATA, IF AVAILABLE.

L'GARDE INC — AF — $ 69,000
1555 PLACENTIA AVE
NEWPORT BEACH, CA 92663
MITCHELL THOMAS
TITLE:
STRATEGIC FLARE (LTP-216)
TOPIC: 79 OFFICE: AFBMO/PMX

FEASIBILITY OF A GAS-EMITTING FLARE FOR USE AS AN OPTICAL COUNTERMEASURE DURING THE REENTRY FLIGHT OF AN ICBM IS TO BE EXAMINED. THE WEIGHT AND VOLUME REQUIREMENTS FOR SUCH A FLARE ARE TO BE CALCULATED BASED UPON THE REQUIRED IR ENERGY AS A FUNCTION OF ALTITUDE AND VELOCITY. TO DO THIS, AN EXPANDED LOOK WILL BE TAKEN OF THE INTERACTIONS OF THE GAS FROM THE FLARE WITH THE ATMOSPHERE DURING THE REENTRY FLIGHT. A DETAILED PLAN FOR DEVELOPING THE REQUIRED TECHNOLOGIES LEADING TO AN OPERATIONAL SYSTEM WILL BE CONSTRUCTED.

LB&M ASSOCS — AF — $ 40,866
4411 W GORE BLVD - BLDG B STE 9
LAWTON, OK 73505
EDWARD FOSKEY
TITLE:
PHYSICAL SECURITY THREATS TO SMALL ICBM BASING SYSTEMS DEFINITION AND ASSESSMENT
TOPIC: 120 OFFICE: AFBMO/PMX

BECAUSE OF ITS POLITICALLY SENSITIVE NATURE AS A NUCLEAR WEAPON AND ITS DEPLOYMENT WITHIN THE CONTINENTAL UNITED STATES, THE SMALL INTERCONTINENTAL BALLISTIC MISSILE IS LIKELY TO BE TARGETED FOR ATTACK BY A VARIETY OF UNCONVENTIONAL THREATS TO INCLUDE TERRORISTS, DISSIDENTS AND ANTI-NUCLEAR ACTIVISTS. THIS ANALYSIS WILL DEFINE THE PHYSICAL

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SECURITY THREAT POSED TO THE SMALL ICBM TO INCLUDE AS ASSESSMENT OF THAT THREAT. THE GOALS, TACTICS AND CAPABILITIES OF POTENTIAL THREATS WILL BE EXAMINED AND POTENTIAL VULNERABILITIES IN THE SMALL ICBM OPERATIONAL AND DESIGN CONCEPTS WILL BE IDENTIFIED. GIVEN A DEFINITION AND ASSESSMENT OF THE THREAT AND VULNERABILITIES, OPERATIONAL AND TECHNICAL DESIGN SOLUTIONS TO THESE DEFICIENCIES WILL BE PRESENTED AND ASSESSED FOR FEASIBILITY AND COST-EFFECTIVENESS.

LICA SYSTEMS INC — AF — $ 50,000
10400 EATON PLACE - STE 100
FAIRFAX, VA 22030
ROBERT K COFOD
TITLE:
VULNERABILITY ASSESSMENT FOR SMALL MOBILE MISSILE SYSTEMS
TOPIC: 124 OFFICE: AFBMO/PMX

THIS PROJECT WILL ASSESS ENEMY INFORMATION-ATTACK CYCLE TIMES FOR THE SMALL MOBILE MISSILE SYSTEM. ANALYSIS WILL FOCUS ON DISCERNIBLE SIGNATURES OF THE MISSILE SYSTEM, INTERRELATIONSHIPS BETWEEN SIGNATURES, AND THE RELATIONSHIP OF SIGNATURES TO OPERATIONAL FACTORS. SIGNATURES WHICH ARE VULNERABLE TO ENEMY CY 1990-2000 DETECTION, TECHNOLOGIES WILL BE ANALYZED FOR DETECTION-IDENTIFICATION PROBABILITIES AND CYCLE TIMES FOR AN INFORMATION ATTACK SEQUENCE. WHILE PROVIDING A BASIS FOR SYSTEM MOVEMENT CRITERIA, THE ANALYSIS WILL ALSO DETERMINE THE FEASIBILITY OF AN ARTIFICIAL INTELLIGENCE (AI) VULNERABILITY ASSESSMENT MODEL. THIS INNOVATIVE MODEL WOULD, DURING THE DESIGN-DEVELOPMENT PHASE OF SYSTEM ACQUISITION, PROVIDE AN ASSESSMENT OF THE IMPACTS OF DESIGN ALTERNATIVES AND TRADE-OFFS ON SURVIVABILITY. THROUGH THE SELF-LEARNING ATTRIBUTES OF AI, THE MODEL COULD BE "GROWN" INTO A "VULNERABILITY MONITOR" TO CONTINUALLY SENSE FIELDED SYSTEM VULNERABILITY TO DETECTION-IDENTIFICATION.

LICA SYSTEMS INC — AF — $ 61,886
10400 EATON PL - STE 100
FAIRFAX, VA 22030
DR JOHN G ALLEN
TITLE:
INTEGRATED PROCESS FOR LOB CORRELATION AND CLASSIFICATION OF BATTLEFIELD TARGETS
TOPIC: 176 OFFICE: ESD/XRCT

THIS PROPOSAL SUGGESTS AN UNCONVENTIONAL TECHNIQUE FOR CORRELATING

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LINES OF BEARING OBTAINED FROM INDEPENDENT MEASUREMENTS OF EMITTER CHARACTERISTICS. THE TECHNIQUE WILL EMPLOY SPECIFIC EMITTER IDENTIFICATION IN THE BROADEST SENSE USING ALL INFORMATION WHICH IS AVAILABLE TO CORRELATE LINES OF BEARING: SIGNAL NUANCES, GEOMETRY, FEATURE-EMITTER ASSOCIATIONS, EMITTER-EMITTER ASSOCIATIONS, EMITTER-TARGET ASSOCIATIONS, AND COMMUNICATIONS-ELECTRONICS OPERATION INSTRUCTIONS. BY UTILIZING A VARIETY OF FEATURES AND EMITTER CHARACTERISTICS THE RESULTING PROCESS WILL BE ROBUST. CONVENTIONAL TECHNIQUES RELY ONLY ON ONE OR A FEW FINGERPRINT FEATURES (ALBEIT, PRECISE) AND ARE UNABLE TO ADAPT TO THE LOSS OR MODIFICATION OF THE FEATURE OR FINGERPRINT. THE METHOD PROPOSED HERE WILL NOT SUFFER THIS WEAKNESS.

LICA SYSTEMS INC — AF — $ 53,419
10400 EATON PL - STE 100
FAIRFAX, VA 22030
ROBERT K COFOD
TITLE:
COVER CONCEALMENT AND DECEPTION (CC&D) PENETRATION ADVANCED TECHNIQUES
TOPIC: 179 OFFICE: RADC

AN ENEMY WILL ATTEMPT TO COVER, CONCEAL AND APPLY DECEPTION TO PREVENT DISCOVERY OF HIS CAPABILITIES, ACTIVITIES AND INTENTIONS. THE PROBLEM OF COUNTERING CC&D IS ANALOGOUS TO SEEING THROUGH THE SLEIGHT-OF-HAND TRICKS OF A MAGICIAN. IF ONLY ONE SENSOR WITH ONE PERSPECTIVE IS USED TO OBSERVE AN OBJECT OR ACTION, THE OPTIONS OF A DECEIVER ARE MANY AND SIMPLE. THE OBJECTIVE OF THIS PROJECT IS TO ANALYZE VARIED TECHNIQUES FOR COUNTERING CC&D ON THE BATTLEFIELD. THE THRUST OF THE EFFORT WILL BE TO ESTABLISH THE ADVANTAGES OF MULTISENSOR, INTERACTIVE RECONNAISSANCE AGAINST SPECIFIC BATTLEFIELD TARGETS. THE PROJECT WILL SELECT SEVERAL CRITICAL TARGETS, ANALYZE THEIR SIGNATURES, DETERMINE THE MOST EFFECTIVE SENSOR TECHNOLOGIES AGAINST EACH SIGNATURE, AND ASSESS COLLECTION MANAGEMENT/ANALYTICAL TECHNIQUES WHICH CAN DETECT CC&D. ANALYSIS WILL INCLUDE THE MERITS OF SAR, AND TECHNIQUES SUCH AS CHANGE DETECTION, IMAGE UNDERSTANDING AND SIGNAL/PATTERN RECOGNITION.

LICA SYSTEMS INC — ARMY — $ 50,000
10400 EATON PLACE - STE 100
FAIRFAX, VA 22030
KENNETH M IRISH JR
TITLE:
DISTRIBUTED COMBAT INTELLIGENCE SYSTEM
TOPIC: 26 OFFICE: CECOM

COMBAT INTELLIGENCE DEVELOPMENT AND DISTRIBUTION IS AN ECHELONED,

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CENTRALIZED PROCESS. WHILE THE OTHER FUNCTIONAL ELEMENTS OF THE ARMY'S COMMAND AND CONTROL SYSTEM (ACCS) UNDER DEVELOPMENT ARE DISTRIBUTED AND DECENTRALIZED, THE INTELLIGENCE AND ELECTRONIC WARFARE SYSTEM IS STILL CENTRALIZED. THIS PROGRAM ADDRESSES THE CONCEPT OF A DISTRIBUTED, DECENTRALIZED COMBAT INTELLIGENCE DEVELOPMENT AND DISTRIBUTION SYSTEM. THE ATTRIBUTES OF THE PROPOSED SYSTEM ARE: 1) REDUCED LOADS ON SUPPORTING COMMUNICATIONS NETWORKS, 2) NEAR REAL TIME PROCESSING AND DISTRIBUTION OF COMBAT INTELLIGENCE TO ALL USERS INDEPENDENT OF ECHELON, 3) ELIMINATION OF "CRITICAL NODE" PROCESSING AND ANALYSIS CENTERS, 4) REDUCED MANPOWER REQUIREMENTS, AND 5) IMPROVED OVERALL SYSTEM SURVIVABILITY-"GRACEFUL DEGRADATION/FAIL SOFT". THE PROGRAM WILL DEFINE THE FUNCTIONAL REQUIREMENTS OF THE DISTRIBUTED INTELLIGENCE DEVELOPMENT AND DISTRIBUTION SYSTEM IN TERMS OF SYSTEM CONTROL SOFTWARE, APPLICATIONS ALGORITHMS FOR DATA PROCESSING AND DISTRIBUTION, AND COMMUNICATIONS NETWORK REQUIREMENTS.

LIGHT SPEED TECHNOLOGIES CORP — AF — $ 49,950
12021 S MEMORIAL PKWY
HUNTSVILLE, AL 35803
LARRY FULLERTON
TITLE:
RADAR CONCEPT FOR COVER CONCEALMENT AND DECEPTION (CC&D) PENETRATION ADVANCEMENT
TOPIC: 179 OFFICE: ESD/XRCT

LIGHT SPEED TECHNOLOGIES CORPORATION, HUNTSVILLE ALABAMA, HAS DEVELOPED THE FUNDAMENTAL TECHNOLOGY FOR AN ADVANCED RADAR CONCEPT WHICH OFFERS QUANTUM INCREASES IN RADAR PERFORMANCE OVER THE TRADITIONAL RADAR APPROACHES. THE BASIC CONCEPT HAS BROAD APPLICATION AND PROVIDES POTENTIAL SOLUTIONS TO MANY PRESENT AND FUTURE RADAR REQUIREMENTS. THIS TECHNOLOGY OFFERS SUBSTANTIAL IMPROVEMENTS IN THE AREAS OF ENHANCED RADAR RESOLUTION (RANGE, DOPPLER, AND ANGLE), REDUCED SIGNATURE, CLUTTER PENETRATION, AND ALL WEATHER PERFORMANCE. THE BASIC TRANSMITTER CONCEPT HAS BEEN DEVELOPED AND DEMONSTRATED BY LIGHT SPEED TECHNOLOGIES. THE PROPOSED PHASE ONE EFFORT WILL ADDRESS COVER, CONCEALMENT, AND DECEPTION (CC&D) PENETRATION CONCEPTS USING TIME DOMAIN SPREAD SPECTRUM SYNTHETIC APERATURE RADAR (TDSSSAR) FOR THE IDENTIFICATION OF THE SIGNATURE OF A C3 HEADQUARTERS.

LIGHTWAVE ELECTRONICS CORP — AF — $ 43,481
897-4A INDEPENDENCE AVE
MOUNTAIN VIEW, CA 94043
ROBERT L MORTENSEN
TITLE:
RESEARCH AND DEVELOPMENT LEADING TO A MMIC NONINVASIVE VOLTAGE MEASUREMENT INSTRUMENT TO 100 GIGAHERTZ
TOPIC: 196 OFFICE: RADC

RESEARCH INVESTIGATORS HAVE REPORTED EXPERIMENTAL RESULTS WHEREIN

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THEY HAVE SUCCESSFULLY MEASURED HIGH SPEED VOLTAGES IN ELECTRO-OPTIC MATERIALS. THEY USED PICOSECOND LASER PULSES TO SAMPLE THE ELECTRIC FIELD PRODUCED BY THE VOLTAGE. THIS TECHNIQUE IS NONINVASIVE - THE VOLTAGE IS MEASURED WITHOUT CHANGING THE CIRCUIT IMPEDANCE. LIGHT-WAVE PROPOSES TO USE THE GENERAL TECHNOLOGY OF THIS EXISTING RESEARCH BASE AS A STARTING POINT TO DEVELOP A COMMERCIAL INSTRUMENT USEFUL FOR MONOLITHIC MICROWAVE INTEGRATED CIRCUIT (MMIC) CHARACTERIZATION, MODELING AND DEBUGGING. THIS PHASE I PROPOSAL DESCRIBES A SERIES OF EXPERIMENTS THAT WILL HELP DETERMINE THE FEASIBILITY AND DEFINE THE POTENTIAL CONFIGURATION OF A MMIC VOLTAGE TEST INSTRUMENT WHICH COULD OPERATE TO 100 GIGAHERTZ.

LNR COMMUNICATIONS INC — AF — $ 49,824
180 MARCUS BLVD
HAUPPAUGE, NY 11788
JOHANNES A DEGRUYL
TITLE:
CHARACTERIZATION OF GaAs IMPATT DIODES FOR ACTIVE APERTURE APPLICATIONS
TOPIC: 25 OFFICE: AFWAL/AA

UNDER A PREVIOUS AFWAL CONTRACT, AND UNDER INTERNAL SPONSORSHIP, LNR COMMUNICATIONS, INC. HAS DEVELOPED FOR ULTIMATE SPACEBORNE DOWNLINK USAGE AND DEMONSTRATED BRASSBOARD 10W AND 20W, 20GHz IMPATT SOLID STATE POWER AMPLIFIERS (SSPA's) WITH 1GHz BANDWIDTH AND IN 4 AND 8-WAY COMBINATORIAL CONFIGURATIONS, RESPECTIVELY. EACH OF THESE SSPA's UTILIZE A MULTIPLICITY OF IDENTICAL 2.5W IMPATT AMPLIFIER "BUILDING BLOCKS" IN A BINARY CORPORATE COMBINATIONAL CONFIGURATION INCORPORTING A LOW LOSS OUTPUT POWER COMBINER. BY VIRTUE OF THE FOREGOING TOPOLOGY, THIS SSPA DESIGN (OR ITS 16,32,...WAY COUNTERPARTS, CAN BE ADAPTED TO ACTIVE-APERTURE "PHASED ARRAY" TRANSMIT ANTENNA USAGE BY REPLACING THE OUTPUT POWER COMBINER WITH A MULTIPLE-RADIATING ELEMENT ANTENNA FEED ARRAY. ACCORDINGLY, IT IS THE PURPOSE OF THIS STUDY TO THEORETICALLY AND, WHERE POSSIBLE, EXPERIMENTALLY, INVESTIGATE THE SUITABILITY OF SUCH IMPATT "BUILDING BLOCKS" FOR SPATIALLY COMBINED ACTIVE APERTURE 20GHz SATCOM DOWNLINK TRANSMITTER USAGE UNDER TYPICAL SPACECRAFT/ENVIRONMENTAL AND ACTIVE APERTURE SYSTEM DESIGN CONSTRAINTS. THE PROPOSED STUDY WILL CULMINATE IN A FINAL REPORT PRESENTING AN OPTIMIZED 20 GHz SPATIALLY COMBINED IMPATT ACTIVE APERTURE SSPA DESIGN APPLICABLE TO THE SUBSEQUENT IMPLEMENTATION OF A BRASSBOARD FEASIBILITY MODEL.

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LOKERSYSTEMS INC
50/50 POWDER MILL RD
BELTSVILLE, MD 20705
REUEL O LAUNEY III
TITLE:
A SPEAKER-INDEPENDENT SPEECH RECOGNITION SYSTEM DEVELOPMENT
TOPIC: 73 OFFICE: AMD/RDO

AF $ 68,101

LOKERSYSTEM'S INNOVATION IS A REVOLUTIONARY, SPEAKER-INDEPENDENT, SPEECH RECOGNITION TECHNOLOGY THAT MIMICS THE HUMAN AUDITORY PROCESS. BASED ON A NASA PATENT FOR WHICH LOKERSYSTEMS HAS THE LICENSE, THE NEW SPEECH PROCESSING METHOD EXTRACTS SPEAKER-INDEPENDENT FORMANT-LIKE PARAMETERS FOR SPEECH IN REAL-TIME. THE TECHNIQUE ALSO LESSENS THE EFFECTS OF BACKGROUND NOISE AND SHOWS IMMUNITY TO COARTICULATION PROBLEMS. THIS PHASE I SBIR RESEARCH EFFORT IS DESIGN TO ENHANCE THE EXISTING ALGORITHMS BY INCORPORATING A TMS320 DIGITAL SIGNAL PROCESSOR TO IMPROVE DIGITAL FILTERING. AFTER ADDING THE TMS320, THE SYSTEM WILL BE TESTED FOR SPEAKER-INDEPENDENT RECOGNITION OF THE DIGITS WITH A DATA BASE OF DIFFERENT SPEAKERS. RECOGNITION ACCURACITES OF BETTER THAN 90% ARE EXPECTED. ULTIMATE RECOGNITION LEVELS CAN BE MUCH HIGHER AND WILL BE THE SUBJECT OF PHASE II WORK. USAF APPLICATIONS OF THIS TECHNOLOGY INCLUDE COCKPIT CONTROL AND A WIDE RANGE OF HUMAN FACTOR IMPROVEMENTS TO THE GENERAL MAN-MACHINE INTERFACE. THERE ARE MANY INDUSTRIAL AND CONSUMER APPLICATIONS.

LSI INC
PO BOX 3116
HUNTSVILLE, AL 35810
VIRGIL V VAUGHN
TITLE:
DYNAMIC BORESIGHT MENSURATION
TOPIC: 63 OFFICE: MICOM

ARMY $ 49,850

A TECHNIQUE IS PROPOSED WHEREBY THE BORESIGHT ALIGNMENT BETWEEN A HELICOPTER MISSILE OR ROCKET LAUNCH SUPPORT STRUCTURE AND THE REFE-RENCE SYSTEM CAN BED DETERMINED IN THREE AXES. THE TECHNIQUE EMPLOYS NEWLY-DEVELOPED FAST SCANNING ELECTRO-OPTICAL SENSORS AND FAST SPECIAL

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MICROPROCESSOR SUBSYSTEMS. THE WORKPLAN INCLUDES DESIGN AND EVALUATION OF THE APPROPRIATE ALGORITHMS, SCALED EXPERIMENTS USING A FAST VIDEO SIMULATOR AND PROGRAMMBLE GIMBAL ANGLES AND FREQUENCIES, SENSOR FABRICATION, MICROPROCESSOR FABRICATION, AND PEROFORMANCE OF BOTH LOW FRAME RATE AND HIGH FRAME RATE BRASSBOARD DEMONSTRATION EXPERIMENTS.

LUMINESCENT ELECTRONICS INC — AF — $ 45,920
3600 SALEM AVE
DAYTON, OH 45406
GEORGE N SIMOPOULOS
TITLE:
ELECTRO-OPTICAL POWER SUPPLY INVESTIGATION
TOPIC: 1 OFFICE: ASE/AE

THE OBJECTIVES OF THIS EFFORT WILL BE TO INVESTIGATE THE USE OF ELECTROLUMINESCENT (EL) PANELS AND PHOTOVOLTAIC CELLS TO OBTAIN ELECTRO-OPTICAL LOW VOLTAGE POWER SUPPLIES THAT ARE STABLE, RELIABLE SOURCES. STACKING OF OUR DOUBLE SIDED EL PANELS WITH INTERLEAVED PHOTOVOLTAIC CELLS WILL PROVIDE VARIABLE STABLE VOLTAGE LEVELS FOR MILITARY FIELD MAINTAINANCE APPLICATIONS. IN ADDITION OPTIMIZATION, OF EL PANEL-PHOTOVOLTAIC CELL PARAMETERS WILL BE INVESTIGATED TO OBTAIN THE MOST EFFICIENT SYSTEM DESIGN.

MACAULAY-BROWN INC — ARMY — $ 0
3989 COLONEL GLENN HWY
FAIRBORN, OH 45324
DEBRA A WARNER
TITLE:
OPERATOR STATUS AND FUNCTIONAL CAPABILITY ASSESSMENT
TOPIC: 94 OFFICE: MED FT. DET

THE ARMY IS DEDICATED TO UPGRADING ITS VEHICLES TO INCLUDE ADVANCED TECHNOLOGICAL SYSTEMS FOR PERFORMING SOPHISTICATED MISSIONS. THE OPERATORS OF THESE VEHICLES MAY, IN NBC ENVIRONMENTS, BE TEMPORARILY RENDERED INCAPABLE OF MISSION CONTINUATION. UNDER THESE CIRCUMSTANCES, TO AVOID LOSS OF EQUIPMENT AND PERSONNEL TO THE ENEMY, THE ARMY WANTS TO DETERMINE THE FEASIBILITY OF MONITORING/EVALUATING THE

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OPERATOR'S PHYSIOLOGICAL AND BEHAVIORAL FUNCTIONING TO DETECT OPERATOR INABILITY TO CONTINUE THE MISSIONS, THEN TRANSFER CONTROL TO THE VEHICLE'S AUTOMATIC GUIDANCE AND CONTROL SYSTEM. IN SUPPORT OF THIS FEASIBILITY STUDY (PHASE 1), MACAULAY-BROWN, INC. PROPOSES TO PERFORM A TASK ANALYSIS ON A CANDIDATE MISSION AND VEHICLE FOR PERFORMANCE PARAMETERS, TO CONDUCT A LITERATURE SEARCH TO DETERMINE PHYSIOLOGICAL INDICATORS OF FUNCTIONALITY, AND TO CONDUCT A SURVEY AMONG LEADING MANUFACTURERS OF EQUIPMENT USED TO MEASURE PHYSIOLOGICAL RESPONSES. ANALYSIS OF THE MISSION AND ENVIRONMENTAL/OPERATING CONDITIONS WILL IDENTIFY THOSE ELEMENTS WHICH MUST BE ADDRESSED IN A DATA BANK FOR APPROPRIATE DECISION-MAKING FOR TRANSFERENCE OF FLIGHT CONTROL TO THE SYSTEM

MACHINE DESIGN ENGINEERS INC — AF — $ 48,857
19226 66TH AVE SO - STE L-109
KENT, WA 98032
DENNIS MARTIN
TITLE:
CONTINUOUS EXPLOSIVE TUNNELING SYSTEM
TOPIC: 106 OFFICE: AFBMO/PMX

THE NEED EXISTS FOR AN ADVANCEMENT IN EXPLOSIVE EXCAVATION METHODS TO IMPROVE THE EXISTING CYCLIC PROCESS. PHASE I OF THIS PROJECT WILL PROVE FEASIBILITY OF AN INNOVATIVE EXPLOSIVES EXCAVATION SYSTEM WHICH WILL COMBINE THE AUTOMATION OF TUNNEL BORING MACHINES WITH THE LOW ENERGY AND FLEXIBILITY OF EXPLOSIVES. THE SYSTEM WILL INCLUDE A CONTINUOUS, CONCURRENT CYCLE OF DRILLING LOADING, BLASTING AND MUCK REMOVAL. THE PHASE I WORK INCLUDES AN INNOVATIVE SOLUTION TO THE PROBLEM OF EXPLOSIVE DETONATION IN AUTOMATED SYSTEMS. THE CROSS-SECTION AND DIRECTION OF THE TUNNEL OR SHAFT WILL BE VARIABLE. THE SYSTEM WILL BE ESPECIALLY SUITED TO THE LOW MECHANICAL POWER NEEDS OF A DEEP BASE. THE PHASE I WORK WILL INCLUDE ANALYTIC AND DESIGN RESEARCH AND A FIELD DEMONSTRATION OF THE EXPLOSIVE TECHNIQUE.

MADISON ENGINEERING — ARMY — $ 66,568
608 HILL ST
REYNOLDSVILLE, PA 15851
FRANK J MADISON II
TITLE:
FOLDING WING MECHANISM
TOPIC: 60 OFFICE: MICOM

COMPOSITE MATERIALS OFFER AN OPPORTUNITY TO PROVIDE THE DESIGN OF A

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NOVEL FOLDING WING FOR GUIDED MISSILES. THE PROPOSED EFFORT WILL UTILIZE HIGH-STRENGTH COMPOSITES IN THE DEVELOPMENT OF WINGS WHICH, IN THE STOWED POSITION, CAN FLATTEN AND WRAP AROUND THE MISSILE'S FUSELAGE. THE WINGS MUST DEPLOY INTO AN ACCURATELY ALIGNED AND AERODYNAMICALLY EFFICIENT CONFIGURATION. MATHEMATICAL AND PHYSICAL MODELING WILL PROVIDE THE STRUCTURAL ANALYSIS ENSURING THE DESIGN OF A WING THAT HAS THE STRENGTH AND STIFFNESS TO WITHSTAND AERODYNAMIC AND MANEUVERING LOADS. THE OUTCOME OF THIS EFFORT WILL BE THE BASIS FOR FURTHER DEVELOPMENT WHICH WOULD INCLUDE WIND TUNNEL AND FLIGHT TESTING OF THE PROPOSED FOLDING WING CONCEPT.

MANAGEMENT CONSULTING & RESEARCH INC ARMY $ 0
5113 LEESBURG PIKE-STE 509/4 SKYLINE PL
FALLS CHURCH, VA 22041
DR GERALD R MCNICHOLS
TITLE:
PROJECTING MANPOWER AND SKILL LEVEL REQUIREMENTS EARLY IN WEAPON SYSTEM DEVELOPMENT
TOPIC: 106 OFFICE: ARI

ESTIMATING THE HUMAN RESOURCE REQUIREMENTS OF NEW WEAPON SYSTEMS EARLY IN THE DEVELOPMENT CYCLE REQUIRES THE USE OF EXPERT JUDGMENT IN THE EXTRAPOLATION OF FUTURE SYSTEM DESIGN, OPERATING ENVIRONMENT AND MAINTENANCE CONCEPTS FROM CURRENT SYSTEMS AND PROPOSED CONCEPTS. THAT JUDGMENT INEVITABLY INTRODUCES UNCERTAINTIES AND RISK INTO THE ESTIMATES. FORMAL DECISION-ANALYTICAL TECHNIQUES HAVE BEEN DEVELOPED IN OTHER CONTEXTS TO ADDRESS THESE PROBLEMS. THE PROPOSED EFFORT WOULD DEVELOP AN INNOVATIVE INTEGRATION OF THESE TECHNIQUES WITH THE EARLY-ON MANPOWER REQUIREMENTS ESTIMATING METHODOLOGY (EMREM). THE ENHANCED MODEL WOULD STRENGTHEN THE COMPARABILITY JUDGMENTS AND ESTIMATES, BY INTRODUCTING FORMAL METHODS OF ELICITING AND EVALUATING EXPERT JUDGMENT, BY EXPLICITLY INCORPORATING ESTIMATES OF RISK AND UNCERTAINTY INTO THE PROCESS, AND BY DEVELOPING METHODS FOR EVALUATING TRADE-OFFS OF MANPOWER, COST, AND PERFORMANCE AT THE CONCEPT DEVELOPMENT PHASE.

MASSACHUSETTS TECHNOLOGICAL LAB INC AF $ 65,623
312 AUSTIN ST
W NEWTON, MA 02165
DICKSON FANG
TITLE:
RAIN EFFECTS ON RADIO FREQUENCY PROPAGATION
TOPIC: 127 OFFICE: AFBMO/PMX

RAIN IS THE PRINCIPAL CAUSE OF SIGNAL DEGRADATIONS IN THE TERRESTRIAL

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AND SATELLITE COMMUNICATIONS SYSTEMS OPERATING AT CENTIMETER AND MILLIMETER WAVELENGTHS. A WIDE RANGE OF UNCERTAINTY ON THE SUBJECT EXISTS AND THE COMMUNICATIONS SYSTEM DESIGNERS ARE CONFRONTED WITH CONFLICTING DATA. THE PROPOSED STUDY HAS THREE OBJECTIVE: (i) THE COLLECTION, COMPILATION, EVALUATION AND CORRELATION OF EXISTING OBTAINABLE DATS; (ii) AN INDEPTH REVIEW OF EACH OF THE LEADING MODELS CURRENTLY AVAILABLE TO SYSTEM ENGINEERS FOR MICROWAVE COMMUNICATIONS APPLICATIONS; (iii) A CRITICAL ASSESSMENT OF THE VALIDITIES AND LIMITATIONS OF EACH MODEL IN REFERENCE TO THE OVERALL DATA BASE, AND CONSEQUENTLY THE ESTABLISHMENT OF A DESIGN HANDBOOK TO AID COMMUNI-CATIONS SYSTEM DESIGNS.

MATERIAL CONCEPTS INC — ARMY — $ 49,132
666 N HAGUE AVE
COLUMBUS, OH 43204
RALPH F ORBAN
TITLE:
HIGH FREQUENCY ELECTROMAGNETIC SHIELDING EFFECTIVENESS OF SPECIALIZED CONDUCTIVE BOUNDARIES
TOPIC: 38 OFFICE: LABCOM

TO EXTEND THE ELECTROMAGNETIC SHIELDING EFFECTIVENESS DATA TO AN UPPER LIMIT OF 2 GHz, WOVEN AND BRAIDED FIBERS WHICH HAVE BEEN MADE CONDUCTIVE WILL BE DEVELOPED AND TESTED. FABRICS WILL BE MADE FROM SUCH MATERIALS AS KEVLAR, FIBERGLASS, DACRON, GRAPHITE, AND HYBRIDS OF THESE MATERIALS. METAL COATINGS WILL CONSIST OF COPPER WITH A NICKEL OVERCOAT TO PROTECT AGAINST OXIDATION. WOVEN FABRIC WILL BE TESTED TO DETERMINE THE MOST EFFECTIVE COMBINATION OF FIBER AND METAL THICKNESS. FINALLY, A PILOT PRODUCTION QUANTITY OF THE SELECTED MATERIAL WILL BE PRODUCED.

MATERIAL CONCEPTS INC — AF — $ 49,979
666 N HAGUE AVE
COLUMBUS, OH 43204
JOSEPH A MOORE
TITLE:
ELECTRONIC PACKAGING
TOPIC: 57 OFFICE: AFWAL/ML

THE OBJECTIVE OF THIS EFFORT IS TO UTILIZE A UNIQUE IN-HOUSE QUARTZ

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FIBER PRODUCTION FACILITY TO PRODUCE FINE-DENIER (800/1/0 TO 900/1/0) QUARTZ FIBER SUITABLE FOR USE IN PRINTED WIRING BOARDS. THE USE OF THIS FIBER IN HIGH DENSITY, MULTILAMINATE PRINTED WIRING BOARDS WOULD ALLOW INCREASED PACKAGE DENSITY, THUS IMPROVING ELECTRONIC EFFICIENCY.

MATERIALS SCIENCES CORP — ARMY — $ 49,300
GWYNEDD PLAZA II - BETHLEHEM PIKE
SPRING HOUSE, PA 19477
V RAMNATH/S N CHATTERJEE
TITLE:
COMPOSITE SPECIMEN DESIGN ANALYSIS
TOPIC: 79 OFFICE: AMMRC

TEST SPECIMEN DESIGNS FOR DETERMINING IN-PLANE SHEAR PROPERTIES OF FIBER REINFORCED COMPOSITES WILL BE REVIEWED AND A FEW WILL BE SELECTED FOR DETAILED ELASTIC STRESS ANALYSES BASED ON THIS REVIEW. 2-D ANALYSES WILL BE PERFORMED FOR A NUMBER OF MATERIAL CONFIGURATIONS AND TYPES WITH DUE CONSIDERATION TO ANISOTROPY AND GEOMETRY OF THE TEST SPECIMENS. EFFECTS OF SECONDARY DAMAGE GROWTH MECHANISMS AND MONLINEAR SHEER STRESS-STRAIN RESPONSE ON PERFORMANCE OF THESE SPECIMENS WILL ALSO BE STUDIES. BASED ON RESULTS OF THIS STUDY, AN ATTEMPT WILL BE MADE TO EXPLAIN INCONSISTENCIES IN AVAILABLE TEST DATA. SPECIMEN SHAPES AND SIZES WILL BE OPTIMIZED AND APPROPRIATE TEST PROCEDURES AND DATA INTERPRETATION METHODS WILL BE SUGGESTED.

MATRIX TECHNOLOGIES INC — NAVY — $ 49,700
2025 NASA ROAD 1
SEABROOK, TX 77586
DR MICHAEL C TRACHTENBERG
TITLE:
BROAD SPECTRUM ANTIVIRALS
TOPIC: 6 OFFICE: ONR

THE LONG TERM OBJECTIVE OF THIS LINE OF INVESTIGATION IS TO DEVELOP A NEW CLASS OF ANTIVIRALS WHICH ARE EFFECTIVE AGAINST A WIDE VARIETY OF INFECTIONS, ARE SAFE FOR HUMAN USE, ECONOMICAL TO PRODUCE AND ENHANCE RESISTANCE TO OR RECOVERY FROM VIRAL INFECTIOUS AGENTS. THE AGENTS MAY HAVE APPLICATION IN CONJUNCTION WITH KNOWN IMMUNOPOTENTIA-

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TORS RECENT EXPERIMENTAL DATA INDICATE THAT A VARIETY OF COMMON ORGANIC AND INORGANIC COMPOUNDS POSSESS DECIDED ANTIVIRAL PROPERTIES AND CONSTITUTE A POTENTIALLY IMPORTANT CLASS OF ANTIVIRAL AGENTS. THE DATA INDICATE THAT THESE AGENTS ARE EFFECTIVE BOTH IN VITRO AND IN VIVO. DURING PHASE I, MATRIX WILL CONDUCT TISSUE CULTURE AND PRELIMINARY INTACT ANIMAL STUDIES OF THE PROPHYLACTIC AND THERAPEUTIC EFFICACY OF FOUR OF THE MOST PROMISING COMPOUNDS AGAINST RESPIRATORY, INFLUENZA AND ENCEPHALITIS VIRUSES.

MCR TECHNOLOGY CORP — SDIO — $ 0
237 E DELAWARE PL - #10A
CHICAGO, IL 60611
DR CHARLES K RHODES
TITLE:
SMALL RUGGED HIGH BRIGHTNESS AIMING BEAM GENERATOR FOR LASER SYSTEMS IN VACUUM ULTRAVIOLET EXTREME ULTRAVIOLET AND X-RAY RANGES
TOPIC: 17 OFFICE: IST

A GENERAL METHOD FOR THE CONSTRUTION OF A RELIABLE HIGH BRIGHTNESS AIMING BEAMS GENERATOR FOR SHORT WAVELENGTH LASERS IS EVALUATED. THE GOAL IS A TECHNOLOGY THAT WOULD SERVE FOR WAVELENGTHS SPANNING THE VACUUM ULTRAVIOLET TO X-RAY REGIONS. THIS INVOLVES AN APPRAISAL OF THE CAPABILITY OF EXISTING TECHNOLOGY, THE GENERATION OF A SPECIFIC DESIGN, THE IDENTIFICATION OF TECHNOLOGICALLY LIMITING FACTORS, AND CREATION OF A WORK PLAN TO EXTEND AND IMPLEMENT THE SELECTED TECHNOLOGICAL APPROACH. IF THE GOALS OF THE PROPOSED EFFORT ARE ACHIEVED, A MAJOR ADVANCE TOWARD A REVOLUTIONARY NEW ULTRAHIGH BRIGHTNESS SHORT WAVELENGTH INSTRUMENTATION WOULD BE MADE.

MCR TECHNOLOGY INC — NAVY — $ 49,200
55 DEPOT ROAD
GOLETA, CA 93117
DR LAWRENCE A KLIMKO
TITLE:
DEVELOPMENT OF A LANGUAGE ORIENTED EDITOR FOR THLL
TOPIC: 70 OFFICE: NSWC

THE OBJECTIVE OF THIS EFFORT IS TO DEVELOP A LANGUAGE ORIENTED EDITOR FOR THE THLL LANGUAGE, THAT IS, AN EDITOR WHICH HAS "KNOWLEDGE" OF

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THE LANGUAGE AND WHICH USES THIS KNOWLEDGE TO HELP THE USER TO ENTER SYNTACTICALLY CORRECT PROGRAMS. PHASE I OF THIS EFFORT WILL DEVELOP A PROTOTYPE LANGUAGE ORIENTED EDITOR FOR THLL TO DEMONSTRATE ITS FEASIBILITY.

MEMBRANE TECHNOLOGY & RESEARCH INC — ARMY — $ 65,000
1030 HAMILTON COURT
MENLO PARK, CA 94025
H WIJMANS
TITLE:
PURIFICATION OF HYDROGEN GAS STREAMS
TOPIC: 55 OFFICE: BRDC

HYDROGEN PRODUCED FROM HYDROCARBON FUELS MUST BE PURIFIED BEFORE IT CAN BE USED TO POWER PHOSPHORIC ACID OR CARBONATE FUEL CELLS. TYPICALLY, THESE HYDROGEN STREAMS CONTAIN LESS THAN 80% HYDROGEN TOGETHER WITH CARBON MONOXIDE, METHANE, CARBON DIOXIDE, AND VARIOUS SULFUR GASES. FOR EFFICIENT FUEL CELL OPERATION, A STREAM CONTAINING >99% HYDROGEN AND ESSENTIALLY FREE OF HYDROGEN SULFIDE IS REQUIRED. WE PROPOSE TO USE A NOVEL COMPOSITE PALLADIUM MEMBRANE TO ACHIEVE THIS SEPARATION. PALLADIUM MEMBRANES ARE KNOWN TO HAVE THE REQUIRED PERMSELECTIVITY FOR HYDROGEN OVER THE OTHER GASES AND ARE CAPABLE OF OPERATION AT THE HIGH TEMPERATURES REQUIRED FOR AN ATTRACTIVE FUEL CELL GAS SEPARATION DEVICE. DURING PHASE I A NUMBER OF THESE PALLADIUM MEMBRANES WOULD BE PREPARED, AND THE FEASIBILITY OF THE CONCEPT WOULD BE DEMONSTRATED IN SMALL LABORATORY PERMEABILITY CELLS. IN PHASE II THE MEMBRANE PREPARATION PROCEDURE WOULD BE SCALED UP TO A CONTINUOUS PROCESS AND MEMBRANE MODULES PRODUCED AND EVALUATED.

MERIDIAN CORP — AF — $ 49,538
5113 LEESBURGH PIKE - STE 700
FALLS CHURCH, VA 22041
DR KENNETH L HAMILTON
TITLE:
MULTIPLE FORMS OF KNOWLEDGE REPRESENTATION WITHIN A SINGLE EXPERT SYSTEM
TOPIC: 205 OFFICE: AMD/RDO

THERE ARE SEVEN PRINCIPAL METHODS OF REPRESENTING KNOWLEDGE IN AN

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EXPERT OR OTHERWISE INTELLIGENT COMPUTER SYSTEM, EACH METHOD BEST SUITED TO A DIFFERENT KIND OF KNOWLEDGE. THEY ARE: LOGIC, PROCEDURAL REPRESENTATIONS, SEMANTIC NETWORKS, PRODUCTION SYSTEMS, DIRECT (ANALOGICAL) REPRESENTATION, SEMANTIC PRIMITIVES, AND FRAMES AND SCRIPTS. THESE HAVE MAINLY BEEN USED INDIVIDUALLY. HOWEVER, PROBLEM-SOLVING (A MAJOR GOAL OF INTELLIGENT SYSTEMS) OFTEN REQUIRES THE USE OF MORE THAN ONE KNOWLEDGE. IS IT POSSIBLE FOR AN INTELLIGENT SYSTEM TO EMPLOY MORE THAN ONE KNOWLEDGE REPRESENTATION SCHEME AND TO USE KNOWLEDGE FROM MORE THAN ONE SCHEME IN ITS REASONING OR PROBLEM-SOLVING? PHASE I PROPOSAL IS TO SELECT TWO REPRESENTATION SCHEMES AND TO DESIGN RESEARCH PROCEDURES TO USE THEM COOPERATIVELY IN PROBLEM-SOLVING. EVAULATIONS WILL BE EXPLORED BOTH OF REPRESENTING DIFFERENT KNOWLEDGE IN DIFFERENT KNOWLEDGE REPRESENTATION SCHEMES AND OF REPRESENTING THE SAME KNOWLEDGE IN TWO DIFFERENT KNOWLEDGE REPRESENTATION SCHEMES.

MERIX CORP — ARMY — $ 75,000
192 WORCESTER ST
WELLESLEY, MA 02181
THOMAS W MIX
TITLE:
COLORIMETRIC CONCEPTS FOR RESIDUAL LIFE INDICATOR
TOPIC: 21 OFFICE: CRDC

U.S. MILITARY FORCES NEED PROTECTION AGAINST CHEMICAL WARFARE AGENTS SHOULD THESE BE DEPLOYED AGAINST THEM IN SOME FUTURE CONFLICT. TO THIS END, AN EFFECTIVE GAS MASK HAS BEEN DEVELOPED WHICH PROVIDES RESPIRATORY PROTECTION AGAINST ALL KNOWN MILITARY TOXIC CHEMICAL AGENTS. THE MASK USES WHETLERITE, A FINELY GROUND ACTIVATED CARBON, TO ADSORB THE ACTIVE AGENTS FROM THE AIR PRIOR TO ITS INHALATION. FOR LARGE SHELTERS, AIR IS FORCED BY A FAN THROUGH A MECHANICAL COLLECTIVE PROTECTOR WHICH IS ESSENTIALLY A GREATLY ENLARGED VERSION OF A MASK CANISTER. A CURRENT NEED IS FOR A METHOD TO DETERMINE THE RESIDUAL SORPTIVE CAPACITY OF THESE AGENT FILTERS, AFTER THEY HAVE BEEN IN USE FOR SOME TIME. SUCH AN INDICATOR METHOD WILL INSURE PROPER PROTECTION OF PERSONNEL, AND WILL INCREASE THEIR MOBILITY AND DECREASE THEIR LOGISTICS REQUIREMENTS BY ENABLING THEM TO MAKE FULL USE OF THE CANISTERS AND FILTERS. PREVIOUS EFFORTS TO DEVELOP A RESIDUAL LIFE INDICATOR FOR GAS FILTERS HAVE BEEN BASED ON SOPHISTICATED ELECTRONIC CHEMICAL DETECTORS WHICH HAVE PROVED UNRELIABLE. TWO METHODS BASED

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UPON COLORIMETRIC CHEMICAL REACTIONS ARE PROPOSED FOR DEVELOPMENT.

MERIX CORP — SDIO — $ 0
192 WORCESTER ST
WELLESLEY, MA 02181
THOMAS W MIX
TITLE:
IMPROVED SiC AND OTHER NON-OXIDE CERAMICS VIA A NOVEL POLYMER PYROLYSIS PROCESS
TOPIC: 5 OFFICE: IST

CERAMIC COMPOSITE MATERIALS HAVE SIGNIFICANT POTENTIAL FOR APPLICATION TO SPACE STRUCTURES NEEDED FOR STRATEGIC DEFENSE MISSIONS. SPACE POWER SYSTEMS, FOR EXAMPLE, WILL REQUIRE IMPACT-RESISTANT, LIGHT-WEIGHT MATERIALS THAT ARE CAPABLE OF WITHSTANDING 1000 DEG C-2000 DEG TEMPERATURES IN A HIGHLY REACTIVE ENVIRONMENT FOR SEVERAL YEARS. ALTHOUGH SUCH MATERIALS ARE NOT PRESENTLY AVAILABLE ON A RELIABLE, COST-EFFECTIVE BASIS, CERAMIC MATERIALS MEET THESE REQUIREMENTS, WERE IT NOT FOR THE INABILITY OF PRESENT PROCESSING TECHNIQUES PRODUCE ECONOMICALLY THE MICROSTRUTURES NECESSARY TO MAXIMIZE POTENTIAL CERAMIC PROPERTIES. IN ORDER TO TAKE ADVANTAGE OF THE HIGH TEMPERTURE STRENGTH, FRACTURE TOUGHNESS, AND CORROSION-RESISTANCE OF CERAMICS AND CERAMIC ALLOYS, FULY-DENSE, HOMOGENEOUS, FINE-GRAINED, FLAW-FREE MICROSTRUCTURES ARE REQUIRED. IF COMPONENTS USING THESE DESIRABLE INTRINSIC PROPERTIES OF CERAMICS AND EXHIBITING LONG-TERM RELIABILITY CAN BE ECONOMICALLY PRODUCED, SPACE STRUCTURE GOALS WOULD BE GREATLY BENEFITED. A NUMER OF NON-OXIDE CERAMICS SUCH AS SILICON CARBIDE AND SILICON NITRIDE ARE OF CONSIDERBLE INTEREST BECAUSE OF THEIR HIGH TEMPERATURE, HIGH STRENGTH, LOW WEIGHT POTENTIAL. A NOVEL POLYMER PYROLYSIS PROCESS IS PROPOSED, THE DEVELOPMENT OF WHICH WILL ENABLE THE FABRICATION OF SUPERIOR NON-OXIDE CERAMIC STRUCTURES CAPABLE OF MEETING SPACE STRUCTURE REQUIREMENTS.

MERRITT CASES INC — AF — $ 49,523
PO BOX 1206
REDLANDS, CA 92373
JOEL SWEET
TITLE:
SUBTERRANEAN WATER MANAGEMENT STUDY
TOPIC: 105 OFFICE: AFBMO/PMX

THE OVERALL STUDY OBJECTIVE IS TO DEFINE THE PRACTICAL COST-EFFECTIVE

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LIMITS OF WATER MANAGEMENT CAPABILITY IN A DEEP BASED SYSTEM. THE PHASE I EFFORT WILL USE THE SATURN PROGRAM, A "STATE-OF-THE-ART" TWO-PHASE FINITE ELEMENT PROGRAM TO DEFINE ANALYTICALLY THE HYDROGEOLOGIC BEHAVIOR OF SATURATED TUFF IN RESPONSE TO STRESS LOADING. THE MODEL PREDICTIONS WILL BE COMPARED TO OBSERVED RESULTS FROM REPRESENTATIVE UNDERGROUND NUCLEAR TESTS AT THE NEVADA TEST SITE (NTS) TO VALIDATE THE TECHNIQUE. ONCE VALIDATED IN PHASE I, THE MODEL CAN BE SUB-SEQUENTLY EXTENDED TO PREDICT HYDROGEOLOGIC BEHAVIOR (I.E., FLOW RATES AND FLUID PRESSURES) OVER A RANGE OF REPRESENTATIVE DEEP BASING GEOLOGIES AND OVERSTRESS CONDITIONS. THE SATURN PROGRAM IS THE DEVE-LOPMENT OF DR. JOEL SWEET, THE PRINCIPAL INVESTIGATOR, WHO IS KNOWN AS ONE OF THE FOREMOST INNOVATORS IN DEVELOPING COMPLEX ANALYTICAL MODELS.

METADYNE INC SDIO $ 0
PO BOX 242 - HOME ST
ELMIRA, NY 14902
DR RAMAN L DAGA
TITLE:
ADVANCED P/M TECHNIQUES TO DEVELOP HIGH STRENGTH MATERIALS FOR ELEVATED TEMPERATURE APPLICATIONS
TOPIC: 5 OFFICE: IST

AN APPROACH TO MANUFACTURE HIGH STRENGTH COMPONENTS FOR ELEVATED TEMPERATURE APPLICATIONS INCORPORATING RECENT DEVELOPMENTS IN POWDER METALLURGY TECHNOLOGY WILL BE DEMONSTRATED. METHODS TO PRODUCE PRE-ALLOYED POWDER AND TO SINTER THE COMPONENTS MADE FROM PREALLOYED POWDER WILL BE DEVELOPED. THE PROPOSED METHOD INCORPORATING PLASMA TO PRODUCE PRE-ALLOYED FINE POWDERS WILL YIELD MATERIALS WITH SUPERIOR POWDER CHARACTERISTICS. SINTERING METHODS INCORPORATING CONTROLLED ENVIRONMENT AND PRESSURE ASSISTED SINTERING WILL BE DE-VELOPED TO RETAIN THE IMPROVED POWDER CHARACTERISTICS. THE PROPOSED TECHNOLOGY WILL BE APPLIED TO DEVELOP REFRACTORY METAL ALLOYS OF TUNGSTEN AND MOLYBDENUM.

METCUT RESEARCH ASSOCS INC AF $ 50,000
3980 ROSSLYN DR
CINCINNATI, OH 45209
R RAJ AGGARWAL
TITLE:
UNATTENDED PRECISION GRINDING PROCESS DEVELOPMENT
TOPIC: 18 OFFICE: ASD/YZ

THE UNATTENDED PRECISION GRINDING STATION ADDRESSES A NEED FOR HIGH

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VOLUME, HIGH PRECISION GRINDING OF PROPULSION SYSTEM PARTS. REALIZATION OF THE UNATTENDED GRINDING STATION IS DEPENDENT UPON THE DEVELOPMENT AND IMPLEMENTATION OF THE RELATIONSHIPS FOR ADAPTIVE CONTROL OF WHEEL-AND-WORKPIECE STIFFNESS, DAMPING, AND COMPLIANCE IN THE GRINDING PROCESS. THE MEASUREMENT AND CONTROL OF THESE PARAMETERS HAS NOT BEEN PRACTICAL TO DATE. THE PROPOSED RESEARCH GOES BEYOND FORCE-ADAPTIVE AND ENERGY-ADAPTIVE GRINDING. USING MOTION SENSORS AND REAL-TIME ANALYSIS OF WHEEL-WORKPIECE MACHINE DYNAMICS, THE RESEARCH SEEKS TO EFFECT ACTIVE CONTROL OF THE SPINDLE. SUCH A CONTROL CAN BE ACHIEVED IN A MAGNETIC BEARING BY ALTERING THE MAGNETIC FIELDS WHICH SUSPEND IT. THE PROPOSED RESEARCH (PHASE I) WILL IDENTIFY WHAT CONTROL ALGORITHMS AND RULES FOR THE APPLICATION OF ARTIFICAL INTELLIGENCE ARE APPROPRIATE FOR THE CREATION OF A HIGH PRECISION UNATTENDED GRINDING STATION. FURTHERMORE, THE SUITABILITY OF THE MAGNETIC BEARING SPINDLE WILL ALSO BE DETERMINED. A SELECTED MACHINE-TOOL BUILDER AND MAGNETIC BEARINGS INC. WILL BECOME PART OF THE TEAM.

METECH INC — DARPA — $ 45,395
RT 401 BOX 360
ELVERSON, PA 19529
AL ZELINSKI
TITLE:
APPLICATION OF CONDUCTIVE POLYMER TECHNOLOGY TO THE PRODUCTION OF A NOVEL MULTILAYER CAPACITOR
TOPIC: 2 OFFICE: DARPA

ONE OF THE FASTEST GROWING TECHNOLOGIES IN THE FIELD OF PASSIVE COMPONENTS IS THE MULTILAYTER CERAMIC CAPACITOR. THIS CAPACITOR IS CURRENTLY PRODUCED BY THE PROCESSING OF ALTERNATE LAYERS OF BARIUM TITANATE CERAMIC DIELECTRIC AND PALLADIUM SILVER, PLATINUM, OR GOLD THICK FILM ELECTRODES. IT IS THE INTENT OF THIS INVESTIGATION TO EVALUATE THE FEASIBILITY OF USING POLYMER BASED AND/OR "CEMENT" TYPE DIELECTRIC AREAS AND SYNTHETIC METAL OR POLYMER THICK FILM METAL ELECTRODES. THE ENTIRE SYSTEM COULD THEN BE PROCESSED WITH LITTLE OR NONE OF THE CLASSICAL FIRING TECHNIQUES NECESSARY FOR PROCESSING STANDARD CERAMIC CAPACITORS. IN ADDITION, THE USE OF PALLADIUM, GOLD. AND PLATINUM COULD BE REDUCED OR ELIMINATED FROM MOST SYSTEMS.

MICRILOR — AF — $ 61,016
PO BOX 624
SWAMPSCOTT, MA 01907
DR J H CAFARELLA
TITLE:
REMOTE COMMUNICATIONS TRANSMITTERS
TOPIC: 177 OFFICE: ESD/XRCT

THE PROPOSED WORK WOULD PROVIDE MEANS FOR REMOTING THE TRANSMITTER

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PORTION OF GROUND-NETWORK RADIOS. FUTURE ENEMY SENSOR SYSTEMS WILL PROVIDE RAPID ACQUISITION AND TARGETING, ESPECIALLY AGAINST COMMAND CENTERS. TRANSMITTERS LOCATED FAR FROM ASSOCIATED RECEIVERS, EQUIPMENT AND PERSONNEL WOULD REDUCE THIS PROBLEM. THE DIRECT CONVERSION OF RF WAVEFORMS TO OPTICAL SIGNALS AND USE OF FIBER-OPTIC CABLE FOR CONNECTION TO THE REMOTE SITE WOULD REQUIRE MINIMUM MODIFICATION OF EXISTING RADIOS AND INEXPENSIVE, HENCE EXPENDABLE, REMOTE TRANSMITTERS. RF COAXIAL CABLE IS BULKY, DIFFICULT TO LAY, AND SUFFERS FROM EXCESSIVE PROPAGATION LOSS FOR FREQUENCIES USED IN SYSTEMS SUCH AS JTIDS, WHILE FIBER-OPTIC CABLE IS IDEAL FOR THIS APPLICATION. USE OF SEVERAL REMOTE TRANSMITTERS SELECTED BY OPTICAL SWITCHES COULD ENABLE FURTHER CONFUSION OF THE ENEMY BY "SPACE HOPPING". COMMAND-CENTERS COULD GIVE THE APPEARANCE OF SEVERAL SUBORDINATE UNITS.

MICRO-DESIGN INC — ARMY — $ 0
PO BOX 251
ARGYLE, TX 76226
E R PERRY
TITLE:
OPERATOR STATUS-AND-FUNCTIONAL-CAPABILITY MONITOR (ERGONOMIC MICROCLUSTER)
TOPIC: 94 OFFICE: MED FT. DET

INTEGRATION OF COMPACT, HIGH-SPEED MICROPROCESSOR INSTRUMENTATION WITH BOTH VOLUNTARY AND INVOLUNTARY OPERATOR INTERACTIONS TO DETERMINE PERFORMANCE OF MAN AND MACHINE. THE SYSTEM TO BE DESIGNED FOR ON-SITE, IN-FIELD PROGRAMMING TO ACHIEVE THE MAXIMUM MISSION ORIENTED, ERGONOMIC PERFORMANCE. SYSTEM SOFTWARE CAPABLE OF PROVIDING ARTIFICIAL INTELLIGENCE, CAUSAL ACT AND REACT EVALUATION, AND ASSESSMENT OF OPERATOR/MACHINE STATE VARIABLES. DECISION MAKING MAY INVOLVE THE HUMAN-IN-THE-LOOP OR MAY BE FULLY AUTOMATED.

MICROCIRC ASSOCS — AF — $ 48,792
102 SCHOLZ PLASA 238
NEWPORT BEACH, CA 92663
DR TEGZE P HARASZTI
TITLE:
INTELLIGENT FAULT-TOLERANT MEMORIES FOR MASS STORAGE DEVICES
TOPIC: 131 OFFICE: AFSTC

NOVEL INTELLIGENT FAULT-TOLERANT SEMICONDUCTOR MEMORY CIRCUITS FOR

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FUTURE MASS DATA STORAGE DEVICES ARE PROPOSED FOR RESEARCH AND DEVELOPMENT. THE INTELLIGENT FEATURES WILL INCLUDE SELF-TEST, SELF-REPAIR, INTERNAL BOOKKEEPING, SELF-ORGANIZATION AND SECURITY KEYED OPERATION. THE FAULT-TOLERANCY WILL USE A THREE-LEVEL CORRECTION SYSTEM: HARD ERROR CORRECTION BY AN ELECTRICALLY PROGRAMMED SUBSTITUTION SYSTEM, SOFT ERROR CORRECTION BY ERROR CHECKING AND CORRECTING CODES AND YIELD IMPROVEMENT BY LASER PROGRAMMABLE ASSOCIATIVE REPAIR CIRCUITS. THE OBJECTIVE OF THIS PROJECT IS TO PROVIDE CMOS MEMORIES WHICH COMBINE VERY HIGH RELIABILITY, DENSITY, RADIATION HARDNESS, PERFORMANCE, VERY LOW POWER DISSIPATION AND HIGH YIELD. THE PRIMARY AIM IS TO DEVELOP A 1.7 X 10 TO THE 9TH POWER BIT MASS STORAGE DEVICES FOR A MINIMUM OF 7 YEARS MAINTENANCE-FREE SPACE OPERATION AS REPLACEMENTS FOR MECHANICAL MAGNETIC TAPE RECORDERS. NEVERTHELESS, THE FAULT-TOLERANCY AND A NOVEL NON-VOLATILE MEMORY CELL WILL ALLOW ALSO FOR APPLICATIONS IN EXTREME ENVIRONMENTS, E.G. NUCLEAR WEAPONS AND NUCLEAR REACTORS. THUS THE OUTCOME OF THIS EFFORT WILL BE KEY ELEMENTS OF SPACE DEFENSE SYSTEMS, AIRBORNE ROBOTS AND CONTROLS. THE INCREASED PERFORMANCE WILL FILL A GAP OF COMMERCIAL MEMORY APPLICATIONS IN FUTURE 5TH GENERATION COMPUTING SYSTEMS.

MICROCOM CORP — NAVY — $ 47,864
965 THOMAS DR
WARMINSTER, PA 18794
MICHAEL DOHERTY
TITLE:
ENGINEERING STUDY SECURE VIDEO DOPPLER
TOPIC: 132 OFFICE: PMTC

VIDEO DOPPLER INFORMATION IS A MAJOR REQUIREMENT TO EVALUATE THE PERFORMANCE OF MANY AIRCRAFTS AND GROUND LAUNCHED MISSILES. IT IS THE PARAMETER WHICH IS MOST GUARDED IN MISSILE TESTING BECAUSE IT PROVIDES THE ULTIMATE ANSWER TO THE SUCCESS OF THE FIRING. UNDER THE PRESENT CLIMATE, THE AIRCRAFT AND MISSILE INDUSTRIES WILL BE REQUIRED TO SECURE THEIR TELEMETRY DATA. THIS FEASIBILITY STUDY WILL PROVIDE THE TECHNICAL INFORMATION AS TO THE BEST APPROACH TO THE SOLUTION OF VIDEO DOPPLER DATA WITH RESPECT TO THE SECURE TM REQUIREMENTS.

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MICROGENESYS INC
400 FRONTAGE RD
W HAVEN, CT 06516
DR MARK A COCHRAN
DEPT: ARMY
AWARDED AMOUNT: $ 0
TITLE:
BACULOVIRUS RECOMBINANTS THAT EXPRESS HEPATITIS B VIRUS SURFACE ANTIGEN: DEMONSTRATION FOR PRODUCTION OF SUBUNIT VACCINES
TOPIC: 97 OFFICE: MED FT. DET

RECENTLY IT HAS BEEN DEMONSTRATED THAT BACULOVIRUSES CAN BE USED AS HIGH EFFICIENCY EUKARYOTIC CLONING AND EXPRESSION VECTORS FOR THE PRODUCTION OF FOREIGN PROTEINS. WE PROPOSE TO DEMONSTRATE THE FEASIBILITY AND BENEFITS OF USING THE BACULOVIRUS EXPRESSION SYSTEM FOR PRODUCTION OF SUBUNIT VACCINES. THIS DEMONSTRATION WILL BE EXEMPLIFIED BY THE EXPRESSION OF THE HBsAG-GENE IN INSECT CELLS INFECTED WITH RECOMBINANT BACULOVIRUS. SPECIAL ATTENTION WILL BE PAID TO THE TIME INVOLVED AND COST-EFFECTIVENESS OF OBTAINING THE FINAL PRODUCT. THIS DEMONSTRATION WILL INVOLVE THE FOLLOWING TASKS: CONSTRUCTION OF A RECOMBINANT BACULOVIRUS WHICH CONTAINS THE CODING SEQUENCE FOR HEPATITIS B VIRUS SURFACE ANTIGEN (HGsAG) UNDER THE CONTROL OF A BACULOVIRUS POLYHEDRIN-GENE PROMOTER. BIOCHEMICAL AND IMMUNOLOGICAL CHARACTERIZATION OF THE HBsAG GENERATED BY RECOMBINANT VIRUS IN INFECTED INVERTEBRATE TISSUE CULTURE CELLS AND CELL MEDIA. ANALYSIS OF STABILITY OF RECOMBINANT VIRUS DURING SEVERAL VIRUS GENEREATIONS. PILOT STUDY OF SCALED UP PRODUCTION IN SPINNER FLASKS.

MICROWAVE MONOLITHICS INC
465 E EASY ST
SIMI VALLEY, CA 93065
DANIEL P SIU
DEPT: AF
AWARDED AMOUNT: $ 74,072
TITLE:
ADVANCED GaAs FET FOR LOW NOISE MICROWAVE AND MILLIMETER-WAVE MMIC FREQUENCY SOURCES
TOPIC: 196 OFFICE: AFOSR/XOT

FREQUENCY SOURCES (OSCILLATORS) ARE IMPORTANT COMPONENTS IN MICROWAVE AND MILLIMETER-WAVE SYSTEMS. GaAs MESFET TECHNOLOGY, IN SPITE OF ITS SUCCESS IN A VARIETY OF DISCRETE AND MONOLITHIC MICROWAVE INTEGRATED CIRCUITS (MMIC'S), IS NOT SATISFACTORY FOR OSCILLATOR APPLICATIONS DUE TO THE OBSERVED EXCESSIVE FM NOISE COMPARED TO Si BIPOLAR TRANSISTOR OR GUNN DIODE COMPONENTS. Si BIPOLAR TRANSISTORS AND GUNN

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DIODES ARE HOWEVER NOT SUITABLE FOR MONOLITHIC INTEGRATION OF MICROWAVE CIRCUITS ON GaAs. THE HIGHER FM NOISE OF GaAs MESFET OSCILLATORS HAS BEEN ATTRIBUTED TO THE HIGHER 1/F NOISE OF THE GaAs MESFET DEVICE. MICROWAVE MONOLITHICS INCORPORATED HAS DEVELOPED A "FLASH ANNEALING" TECHNIQUE WHICH MAY SUBSTANTIALLY REDUCE THE 1/F NOISE OF GaAs FET'S. GaAs MESFET'S WHICH HAVE BEEN FABRICATED BY THIS PROPRIETARY PROCESS, AND SHORT GATE GaAs JFET'S WHICH ARE VIABLE UTILIZING THE FLASH ANNEALING FABRICATION TECHNOLOGY, WILL BE MEASURED TO ASCERTAIN THEIR 1/F NOISE PERFORMANCE. THESE MEASURED RESULTS WILL BE COMPARED WITH PUBLISHED DATA FOR Si BIPOLAR TRANSISTORS AND GaAs MESFET'S. AN IMPROVED DEVICE WILL BE DESIGNED AFTER THE EXPECTED REDUCTION IN NOISE IS VERIFIED, AND DESIGN OF A LOW NOISE LOCAL OSCILLATOR WILL BE INITIATED IN PROGRAM PHASE I. EFFORTS OF PHASE II WILL BE CONCENTRATED ON THE OPTIMIZATION OF THE SELECTED LOW 1/F NOISE FET TECHNOLOGY AND THE FABRICATION OF A HIGH PERFORMANCE MONOLITHIC LOCAL OSCILLATOR DEMONSTRATION CIRCUIT.

MICROWAVE MONOLITHICS INC — ARMY — $ 50,000
465 E EASY ST
SIMI VALLEY, CA 93065
WENDELL C PETERSEN
TITLE:
HIGH Q PLANAR VARACTOR DIODE FOR ADVANCED MILLIMETER-WAVE COMPONENTS
TOPIC: 32 OFFICE: LABCOM

ALTHOUGH HIGH PERFORMANCE GaAs VARACTOR DIODES ARE READILY AVAILABLE AS DISCRETE DEVICES FABRICATED ON HEAVILY DOPED MATERIAL, THEIR INCLUSION IN MMIC (MONOLITHIC MICROWAVE INTEGRATED CIRCUIT) COMPONENTS IS PRECLUDED BY THE REQUIREMENT FOR A SEMI-INSULATING SUBSTRATE. HIGH Q IS REQUIRED FOR HIGH PERFORMANCE MILLIMETER WAVE COMPONENTS SUCH AS VCO'S, TUNABLE FILTERS, AND FREQUENCY MULTIPLIERS. A DEVELOPMENT PROGRAM FOR HIGH PERFORMANCE GaAs VARACTOR DIODES COMPATIBLE WITH MMIC AND HEMT TECHNOLOGY AT MICROWAVE AND MILLIMETER WAVE FREQUENCIES IS HEREBY PROPOSED. INCLUDED ARE THEORETICAL AND EXPERIMENTAL EVALUATION OF VERTICAL (BURIED CONTACT VARACTOR) AND HORIZONTAL (LATERAL VARACTOR) GEOMETRIES. ION IMPLANTATION IS USED TO FORM THE ACTIVE LAYERS AS WELL AS LOW RESISTANCE CONTACTS FOR HIGH Q, AND TAILORING OF THE DOPING PROFILES IS CONSIDERED FOR OPTIMIZATION TO VARIOUS PERFORMANCE OBJECTIVES. A PROPRIETARY "FLASH ANNEALING" TECHNIQUE IS USED TO MINIMIZE DIFFUSION AND PRESERVE THE IMPLANTED PROFILE.

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MIDWEST SYSTEMS RESEARCH INC — AF — $ 50,178
5339 HUBERVILLE AVE
DAYTON, OH 45431
PETER B LOVERING
TITLE:
DISPLAY DEVELOPMENT FOR LOW LEVEL TERRAIN FOLLOWING FLIGHT
TOPIC: 206 OFFICE: AMD/RDO

MANNED LOW-LEVEL TERRAIN FOLLOWING AND/OR TERRAIN AVOIDANCE FLIGHT IS A VERY DIFFICULT TASK IN LIMITED VISIBILITY OR INSTRUMENT FLIGHT CONDITIONS. HIGH PILOT WORKLOAD IN THIS ARENA IS CAUSED IN PART BY THE REQUIREMENT TO MANAGE A COMPLEX WEAPON SYSTEM AND IN PART BY THE DISPLAYS PROVIDED FOR ACCOMPLISHING THE TASK. IN FACT, FLIGHT BELOW SOME SET MINIMUM, MEAN SEA LEVEL ENROUTE ALTITUDE, IS SELDOM ATTEMPTED IN INSTRUMENT CONDITIONS. THE OBJECTIVES OF THIS RESEARCH EFFORT ARE TO DESIGN A SET OF DISPLAY FORMATS FOR HEAD-UP AND HEAD-DOWN FLIGHT THAT WILL PERMIT GREATER PRECISION AND SAFETY IN THIS ENVIRONMENT WITH LESS PILOT CONCENTRATION AND WORKLOAD. RESEARCH WILL ADDRESS STEERING COMMANDS AND THE ADDITION OF SYMBOLOGY TO THE HUD DISPLAY TERRAIN, CLOSURE RATE AND RELATIVE ELEVATION IN A PILOT ACCEPTABLE MANNER. AN EFFORT WILL BE MADE TO INTEGRATE TERRAIN DATA AND STEERING INFORMATION ON A SINGLE HEAD-DOWN DISPLAY TO REDUCE SCANNING AND PILOT INTEGRATION REQUIREMENTS. THIS EFFORT WILL ALSO ADDRESS BASIC TF STEERING ALGORITHMS WITH A VIEW TOWARD LIMITING MAXIMUM PITCH RATE AND FREQUENCY TO MAKE THE COMMANDS MORE FLYABLE AT LOWER SET CLEARANCE PLANE LEVELS.

MISSION RESEARCH CORP — AF — $ 49,381
1720 RANDOLPH RD SE
ALBUQUERQUE, NM 87106
ROBERT J RICHTER-SAND
TITLE:
X-RAY SMEAR CAMERA
TOPIC: 186 OFFICE: AD/PMR

MISSION RESEARCH CORPORATION PROPOSES TO PERFORM AN ANALYTIC INVESTIGATION OF THE DESIGN FEASIBILITY OF AN X-RAY SMEAR (STREAK)

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CAMERA WITH A .5-50 MICROSEC RECORDING TIME. RADIOGRAPHY SOURCES TYPICALLY EMIT BROADBAND PENETRATING RADIATION IN THE SPECTRAL RANGE OF 10 keV TO 300 keV. X-RAYS WILL BE CONVERTED TO OPTICAL IMAGES WITH A FAST SCINTILLATOR AND A GATED MICROCHANNEL PLATE. THE LIGHT IS TRANSFERRED TO A SENSITIVE FILM PLANE BY A ROTATING MIRROR ASSEMBLY. A PROTOTYPE CAMERA EMPLOYING THIS TECHNIQUE WILL BE DESIGNED.

MISSION RESEARCH CORP — NAVY — $ 50,000
1720 RANDOLPH RD SE
ALBUQUERQUE, NM 87106
JEROME R CLIFFORD
TITLE:
COSMIC RAY ICE THICKNESS MEASUREMENT TECHNIQUE
TOPIC: 124 OFFICE: NSWC

WE PROPOSE TO MEASURE ICE THICKNESS FROM A SUBMERGED SUBMARINE BY MEASURING THE ATTENUATION OF THE COSMIC RAY PRODUCED NETURON FLUX. A SIMILAR TECHNIQUE HAS BEEN USED SUCCESSFULLY TO MEASURE SNOW THICKNESS. TWO NEUTRON DECTORS, POSSIBLE BF3, WOULD OPERATE IN COINCIDENCE MODES TO REDUCE BACKGROUND CONTRIBUTIONS. THE DETECTION GEOMETRY WOULD DETERMINE THE APERTURE AND, THEREFORE, SIZE OF ICE AREA MEASURED. LABORATORY EXPERIMENTS USING BLOCK ICE WOULD EXAMINE THE FEASIBILITY AND ACCURACY OF ICE MEASUREMENTS. WE WOULD STUDY THE SCALING OF THIS TECHNIQUE TO OPERATIONAL MISSION REQUIREMENTS.

MISSION RESEARCH CORP — AF — $ 49,500
PO DRAWER 719 - 735 STATE ST
SANTA BARBARA, CA 93102
ROGER A DANA
TITLE:
NUCLEAR SCINTILLATION EFFECTS ON RF PROPAGATION AT SHF/EHF FREQUENCIES
TOPIC: 128 OFFICE: AFBMO/PMX

THE OBJECTIVES OF THE PROPOSED EFFORT ARE TO PROVIDE NUCLEAR SCINTILLATION SIGNAL DESCRIPTIONS FOR SATELLITE TO GROUND COMMUNICATIONS LINKS OPERATING IN THE SHF/EHF FREQUENCY BAND AND TO RESOLVE DIFFERENCES IN EXISTING SCINTILLATION STUDIES. THE SIGNAL DESCRIPTIONS WILL INCLUDE THE SPATIAL AND TEMPORAL VARIATIONS OF THE SIGNAL

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PARAMETERS AND MATHEMATICAL DESCRIPTIONS OF THE FIRST AND SECOND ORDER STATISTICS OF THE SCINTILLATION. IN THE PROCESS OF PROVIDING THE SIGNAL DESCRIPTIONS, UNCERTAINTIES IN THE NUCLEAR PHENOMENOLOGY AND PROPAGATION CALCULATIONS THAT IMPACT THE SPECIFIC APPLICATION WILL BE IDENTIFIED AS TASK FOR FUTURE RESEARCH. THE PROPOSED AP-PROACH IS TO USE THE DEFENSE NUCLEAR AGENCY'S SIGNAL SPECIFICATION FOR NUCLEAR SCINTILLATION TO DEVELOP SYSTEM DESIGN REQUIREMENTS. SYSTEM SPECIFIC EFFECTS SUCH AS PROPAGATION PATH GEOMETRY AND ANTENNA EFFECTS, IF ANY, WILL BE INCLUDED IN THE DESIGN REQUIREMENTS. DIF-FERENCES IN SCINTILLATION STUDIES WILL BE RESOLVED BY APPLYING THE RESULTS OF DETAILED NUCLEAR ENVIROMENT AND PROPAGATION SIMULATIONS AND EXPERIMENTS.

MRM ENGINEERS AF $ 49,000
918 PARK AVE
PITTSBURGH, PA 15234
THOMAS H WILSON
TITLE:
ECONOMICAL GEOTECHNICAL EXPLORATIONS
TOPIC: 88 OFFICE: AFBMO/PMX

IT IS REQUIRED TO DEVELOP A SYSTEM TO QUICKLY AND INEXPENSIVELY MEASURE IN-SITU ROCK PROPERTIES DOWN TO DEPTHS OF SEVERAL THOUSAND FEET TO ASCERTAIN GEOLOGIC CONDITIONS SINCE THE PRESENT DRILLING/ TESTING METHODS ARE VERY EXPENSIVE. THIS PROGRAM SUGGESTS A SYSTEM/ METHOD TO ACHIEVE THE DESIRED GOAL AFTER REVIEWING THE STATE-OF-THE-ART TECHNIQUES.

MRM ENGINEERS AF $ 50,000
918 PARK AVE
PITTSBURGH, PA 15234
P A CUNDALL
TITLE:
REINFORCED CONCRETE DISCRETE ELEMENT CODE
TOPIC: 217 OFFICE: AFESC

PREDICTING THE BEHAVIOR OF REINFORCED CONCRETE STRUCTURES SUBJECTED TO BLAST LOADING UNDER WEAPONS EFFECTS IS OF INTEREST. THE MODELING

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TECHNIQUES DEVELOPED USING FINITE ELEMENT METHOD ALLOWS CONCRETE TO DEFORM/CRACK. HOWEVER, THE BEHAVIOR OF THESE CRACKED BLOCKS AND THE BREAK-UP AND SPALLING OF CONCRETE CAN'T BE PREDICTED BY THESE TECHNIQUES. THE DISCRETE ELEMENT METHOD ALLOWS CONCRETE TO CRACK AND THE BLOCKS TO SEPARATE/SPLIT INTO INDIVIDUAL ELEMENTS ACTING AS RIGID BODIES PERMITTING TO PREDICT MORE REALISTICALLY THE BEHAVIOR OF THE STRUCTURE AT FAILURE. THE OBJECTIVE OF THIS RESEARCH IS TO DEVELOP AN ANALYTICAL MODELING USING DEM FOR REINFORCED CONCRETE TO PREDICT THE BEHAVIOR OF THE STRUCTURE AT FAILURE.

MRM ENGINEERS — AF — $ 49,500
918 PARK AVE
PITTSBURGH, PA 15234
A R PADHYE
TITLE:
INNOVATIVE DESIGN/DEVELOPMENT OF RAMJET-SLURRY FUEL INJECTORS
TOPIC: 67 OFFICE: AFWAL/PO

ADVANCED RAMJET ENGINES ARE EXPECTED TO BURN HIGHER ENERGY-HIGHER DENSITY FUELS SUCH AS BORON, CARBON, AND METALS MIXED WITH LIQUID FUELS IN A SLURRY FORM. ONE OF THE MOST IMPORTANT FACTOR DETERMINING PERFORMANCE OF RAMJETS IS FUEL DROPLET FORMATION AND DROPLET SIZE DISTRIBUTION. RECENT PROJECTS HAVE STUDIES THE EFFECTS OF INJECTANT VISCOSITY, SURFACE TENSION, AND PARTICLE LOADING ON PENETRATION, BREAK-UP, AND ATOMIZATION OF TRANSVERSE LIQUID AND SLURRY JETS. HOWEVER, NONE OF THESE PROJECTS CONSIDERED NEW INJECTOR DESIGNS AND THEIR EFFECTS ON ATOMIZATION. THIS PROJECT PROMISES TO DESIGN, AND DEVELOP NEW SLURRY FUEL INJECTORS, AND TO CONDUCT EXPERIMENTAL STUDY OF EFFECT OF INJECTOR DESIGNS ON INJECTANT ATOMIZATION AND COMBUSTION IN CROSS FLOWS.

N A T DEVELOPMENT INC — ARMY — $ 0
PO BOX 2486
WESTFORD, MA 01886
NOEL A TOOHER
TITLE:
PROTECTION OF MEDICAL EQUIPMENT AGAINST ELECTROMAGNETIC PULSE
TOPIC: 93 OFFICE: MED FT. DET

ELECTROMAGNETIC PULSE (EMP) PHENOMENA CAN CAUSE SEVERE COMPROMISE IN

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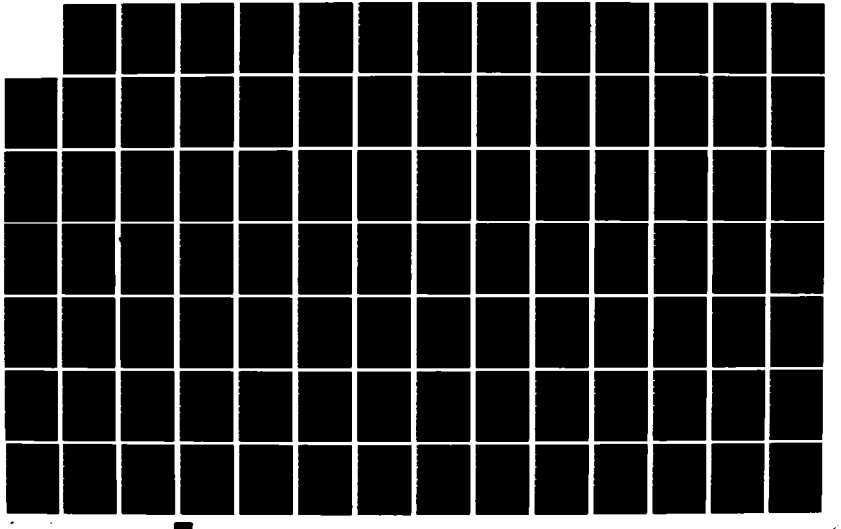
ELECTRONIC EQUIPMENT. IN THE MEDICAL AREAS, EQUIPMENT FAILURE IS LIFE-THREATENING. THE PURPOSE OF THIS PROPOSAL IS TO REQUEST PHASE I FUNDING FOR THE DEVELOPMENT OF THREE NEW TECHNOLOGIES THAT WILL ACHIEVE EMP SHIELDING, WHILE REPLACING EXISTING TECHNIQUES THAT INVOLVE APPLICATION OF EXPENSIVE CONDUCTIVE METALS. N A T DEVELOPMENT HAS DEVELOPED A THREE PART APPROACH TO ACHIEVE EMP SHIELDING IN NEW AND USED EQUIPMENT THAT PROVIDES SUPERIOR ECONOMICS, AS WELL AS IMPROVED PHYSICAL PROPERTIES. THE APPROACH INVOLVES: 1) CREATION OF A NEW CONDUCTIVE MOIETY COMBINING THE EMP CONDUCTIVE EFFICIENCIES OF SILVER AND/OR GOLD WITH GLASS SPHERES AND/OR HOLLOW GLASS BEADS TO OBTAIN A COATED MATERIALS WITH EMP CONDUCTIVE PROPERTIES EQUAL TO SILVER AND GOLD AT APPROXIMATELY ONE-SEVENTH THE LOADING WITH SUPERIOR DENSITY AND VOLUME CONCENTRATION. 2) INCORPORATION AND STABILIZATION OF THESE MATERIALS TO ACHIEVE EMP RESISTANT COATINGS THAT CAN BE APPLIED DIRECTLY TO NEW OR USED EQUIPMENT, FACILITY WALLS, OR FABRIC, TO CREATE A PORTABLE EMP SHROUD OR EMP "FREE" ZONE. 3) THE LAST PROJECT EFFORT IS TO OPTIMIZE THE HIGHLY CONDUCTIVE NEW FILLER. PHYSICAL PROPERTIES SHALL INCLUDE LOW DENSITY (> 1.0 GM/CC), WHICH WILL CAUSE THE CONDUCTIVE SPHERES TO FLOAT TO THE SURFACE OF THE CONDUCTIVE INTERFACE. THIS WILL OPTIMIZE THE EFFECTIVENESS OF THE SYSTEM BY ALLOWING EVEN LOWER CONCENTRATIONS OF SILVER TO BE USED, WHILE CONCENTRATING CONDUCTIVE MATERIALS AT THE EMP ACTIVE SURFACES.

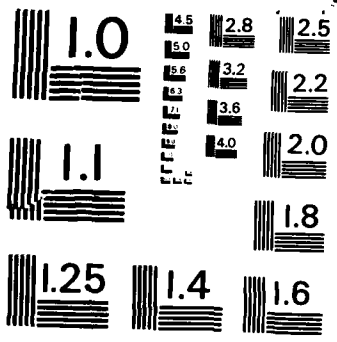
NEW TECHNOLOGY INC — AF — $ 72,662
4811 BRADFORD BLVD
HUNTSVILLE, AL 35805
DR ALFRED J BOGUSH JR
TITLE:
NEAR FIELD EFFECTS ON MICROJAMMERS ON ABM RADARS
TOPIC: 94 OFFICE: AFBMO/PMX

A SIMULATION APPROACH IS PROPOSED TO DETERMINE THE DEGRADING EFFECTS OF MICROJAMMERS, POSITIONED IN THE GROUND, ON ABM RADARS. UNIQUE FEATURES OF THE PROPOSED WORK INCLUDE THE USE OF GAUSSIAN FIELD EXPANSIONS TO DESCRIBE NEAR/FRESNEL/FAR FIELD DISTRIBUTIONS OR PATTERNS. ALSO UNIQUE IS THE DESCRIPTION OF IRREGULAR TERRAIN FEATURES AND RESULTING SCATTERED SIGNALS IN TERMS OF FRACTAL MATHEMATICAL MODELS. A PROBLEM FORMULATION AND CONCEPTUAL ALGORITHM DESIGN EFFORT IS PROPOSED WITH A PLAN INCLUDED FOR THE DEVELOPMENT OF THE SIMULATION PROGRAM.

AD-A166 900 DEFENSE SMALL BUSINESS INNOVATION RESEARCH PROGRAM (SBIR) ABSTRACTS OF PHASE I AWARDS 1985(U) DEPARTMENT OF DEFENSE WASHINGTON DC 1985 3/4

UNCLASSIFIED F/G 5/3 NL





MICROCOPY RESOLUTION TEST CHART
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NEW TECHNOLOGY INC — AF — $ 47,433
4811 BRADFORD BLVD
HUNTSVILLE, AL 35805
WILLIAM D HYMAN
TITLE:
EFFECT OF CLOUD COVER ON SURVEILLANCE OF MOBILE SMALL ICBM
TOPIC: 125 OFFICE: AFBMO/PMX

THE PROBLEM OF PREDICTING DETECTION/IDENTIFICATION PROBABILITIES FOR A SMALL, MOBILE ICBM IS TO BE ADDRESSED THROUGH A SPECTRAL MODEL INCLUDING TARGET REFLECTIVITY, BACKGROUND REFLECTIVITY, SOLAR IRRADIANCE, ATMOSPHERIC TRANSMITTANCE/SCATTERING, SENSOR SENSITIVITY RESPONSE, SENSOR SPECTRAL RESPONSE, AND DETECTION/IDENTIFICATION RESOLUTION CRITERIA. THE MODEL IS TO USE A FRACTAL STATISTICAL BASIS FOR THE SYNTHESIS OF CLOUD DATA, DUST DATA, HAZE DATA, AND FOG DATA INTO A WORKING PROBABILITY FUNCTION.

NIAGARA SCIENTIFIC INC — AF — $ 49,997
4004 NEW COURT RD
SYRACUSE, NY 13206
DR SYLVAN Z BEER
TITLE:
CHEMICAL WARFARE (C-W) AGENT FILTER UTILIZATION MONITOR
TOPIC: 72 OFFICE: AMD/RDO

A MAJR PROBLEM FACING DEFENSIVE FORCES EXPOSED TO CHEMICAL AGENTS IS THE LACK OF AN ACCURATE METHOD FOR DETECTING THE ACTIVE LIFE REMAINING IN FILTERS. METHODS AVAILABLE TO-DATE ARE SLOW AND INVOLVE FAIRLY EXPENSIVE EQUIPMENT WHICH REQUIRE MORE THAN CASUAL FAMILARITY WITH CHEMICAL INSTRUMENTATION. IN ADDITION, MUCH OF THE PRESENT DAY, INSTRUMENTATION THAT WOULD BE USEABLE FOR SUCH MEASUREMENTS IS FRAGILE AND THUS, UNSUITABLE FOR FIELD USEAGE. A MONITOR, THAT WOULD MEASURE THE RESIDUAL FILTER LIFE, TO BE BUILT-UNDER THIS CONTRACT WOULD BE VERY SMALL AND INEXPENSIVE. THESE SENSORS WOULD BE EXPENDABLE AND COULD BE BUILT INTO THE FIBER BED. THEY WOULD BE VERY STURDY AND REQUIRE LITTLE POWER TO OPERATE.

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NIAGARA SCIENTIFIC INC — ARMY — $ 49,997
4004 NEW COURT RD
SYRACUSE, NY 13206
DR SYLVAN Z BEER
TITLE:
COLORIMETRIC FILTER-LIFE INDICATOR
TOPIC: 21 OFFICE: CRDC

UNDER BATTLEFIELD CONDITIONS A SENSOR THAT WOULD PRESENT THE SOLDIER WITH AN UNEQUIVOCAL INDICATOR OF THE LIFE REMAINING IN HIS CW FILTER IS AN URGENT REQUIREMENT. IT MUST BE DEPENDABLE, SIMPLE INTERPRET AND HAVE NO UNUSUAL POWER REQUIREMENT. IT SHOULD BE INEXPENSIVE ENOUGH TO DISPOSE AWAY WITH THE EXHAUSTED FILTER, YET HAVE LONG SHELF LIFE. THE COLORIMETRIC SENSING MECHANISM DEVELOPED IN THIS PROGRAM MEETS THESE PROPERTIES. IT IS INTERFERENCE FREE, WITH RESPECT TO MOST COMMON POLLUTANTS SUCH AS MOTOR EXHAUSTS AND MOST INDUSTRIAL POLLUTANTS. IT WILL NOT DETERIORATE IN THE PRESENCE OF FILTER MATERIALS SUCH AS ASC WHETLERITE AND THE COLOR CHANGE WILL NOT BE IMPEDED OR OBSCURED BY IT.

NICHOLS RESEARCH CORP — AF — $ 49,106
4040 S MEMORIAL PKWY
HUNTSVILLE, AL 35802
ANDREW T TEXTORIS
TITLE:
IMPLICATION OF OPEN DATA RELEASE ON STRATEGIC ICBM SYSTEMS
TOPIC: 75 OFFICE: AFBMO/PMX

OPEN LITERATURE SOURCES SUCH AS TECHNICAL JOURNALS, TRADE MAGAZINES AND NEWSPAPERS ROUTINELY CONTAIN INFORMATION ON U.S. STRATEGIC MISSILE SYSTEMS. THE INFORMATION RELEASED THROUGH THESE SOURCES WHEN USED SINGLY, IN COMBINATION, OR IN CONJUNCTION WITH DATA OBTAINED THROUGH MONITORING TEST SHORTS INTO KWAJALEIN CAN BE POTENTIALLY VERY DAMAGING TO THE U.S.. THE OBJECTIVE OF THIS EFFORT IS TO DEVELOP A METHODOLOGY FOR ASSESSING THE VALUE OF SUCH DATA TO AN OPPOSING INTELLIGENCE SERVICE AND THE VALUE TO THE U.S. OF REVEALING OR DENYING SUCH DATA ON OUR STRATEGIC SYSTEMS. UNDER THIS PHASE I EFFORT, A LITERATURE SEARCH WILL BE CONDUCTED TO DETERMINE THE KINDS OF INFORMATION WHICH HAVE BEEN RELEASED ON A REPRESENTATIVE U.S. MISSILE

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SYSTEM AND AN ASSESSMENT OF THE VALIDITY OF THIS INFORMATION. THIS WILL BE COMBINED WITH ASSESSMENTS OF MEASUREMENT CAPABILITIES AGAINST U.S. TEST SHOTS TO DETERMINE THE OVERALL VALUE OF THE INFORMATION TO AN OPPOSING INTELLIGENCE SERVICE. THESE RESULTS WILL BE USED TO DETERMINE THE VALUE OF THE U.S. OF REVEALING/DENYING SUCH DATA TO THE SOVIETS AND TO DEVELOP A PRIORITIZED LIST OF SPECIFIC DATA ELEMENTS WHICH SHOULD BE CLOSELY HELD.

NICHOLS RESEARCH CORP — AF — $ 49,105
4040 S MEMORIAL PKWY
HUNTSVILLE, AL 35802
ROGER TIPPETS
TITLE:
OPTICAL MASKING BY MEANS OF EXPULSION OF MATERIALS
TOPIC: 79 OFFICE: AFBMO/PMX

THE ANALYSIS OF EXO AND ENDO ATMOSPHERIC AEROSOL DATA FOR PHENEMO-NOLOGY CHARACTERIZATION IS PROPOSED. THE PHASE I PRODUCTS WOULD BE A PRIORITIZED LIST OF MEASURED PHENOMENA WHICH CONTRIBUTE TO AEROSOL SIGNATURES. THE IMPLEMENTATION OF THESE PHENOMENA INTO A SIMULATION CODE WOULD BE A PHASE II PRODUCT. THE END RESULT WOULD BE A CODE WHICH RELIABLY PREDICTS AEROSOLS SIGNATURE IN THE EXO TO ENDO REGIME.

NICHOLS RESEARCH CORP — DNA — $ 49,998
4040 S MEMORIAL PKWY
HUNTSVILLE, AL 35802
PATRICIA L ATHA
TITLE:
OPTICAL SIGNAL PROCESSING ON IMAGE ENHANCED NUCLEAR FIREBALLS
TOPIC: 1 OFFICE: OAAM

THIS PROJECT DEMONSTRATES AN EFFECTIVE METHOD FOR RESOLVING THE PRO-BLEM OF TRANSIENT BACKGROUND PHOTON NOISE (TEMPORIAL REDOUT VARIA-TIONS) CAUSED BY AN INTERMEDIATE ALTITUDE (40 TO 125 KM) NUCLEAR FIREBALL WHICH AFFECTS THE FUNCTIONS OF BMD OPTICAL SENSORS. THE OBJECTIVE OF THE PHASE I STUDIES IS TO: 1) DEVELOP A PERMANENT DATA BASE FROM DIGITIZED IMAGE ENHANCED ORIGINAL TEST FILM IN WHICH TO DE-M ONSTRATE AN IMPROVED CAPABILITY IN PERFORMING TWO-DIMENSIONAL SIGNAL

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PROCESSING BY OPTICAL SENSOR ALGORITHMS; AND 2) DEVELOP POWER SPECTRAL DENSITY PROFILES. IN PHASE II: 1) THE EFFECTIVE METHOD WILL BE FURTHER IMPROVED, 2) TWO-DIMENSIONAL SIGNAL PROCESSING CLUTTER MODELS WILL BE DEVELOPED AND FORMATTED FOR TESTING BY POTENTIAL USERS, AND 3) PROVIDE CONCEPTS AND TECHNIQUES FOR IMPROVING THE IR SYSTEMS FUNCTIONS OF ACQUIRING, TRACKING, AND INTERCEPTING RV'S TO THE NUCLEAR WEAPONS EFFECT OF REDOUT. THE METHOD WILL BE TO EFFECTIVELY DIGITIZE THE APPROPRIATE EG&G TEST FILM OBTAINED FROM DNA. THE APPROACH USED IN PHASE I WILL BE A STANDARD IMAGE RESTORATION MODEL THAT CAN FIND THE RELATIONSHIP BETWEEN THE DENSITY OF A PHOTOGRAPHIC NEGATIVE AND LIGHT INTENSITY DURING EXPOSURE TO ARRIVE AT THE ORIGINAL SOURCE OF ENERGY, WHILE WORKING IN THE FREQUENCY DOMAIN, THAT PRODUCED THE VARIATIONS OF VISIBLE INTENSITY IN EACH PICTURE FRAME.

NICHOLS RESEARCH CORP — NAVY — $ 49,950
4100 BIRCH ST - STE 100
NEWPORT BEACH, CA 92660
GREGORY R McNEIL
TITLE:
CLUTTER SUPPRESSION PROCESSING FOR INFRARED SEARCH AND TRACK
TOPIC: 101 *OFFICE:* NSWC

THE DETECTION OF TARGETS IN BACKGROUND CLUTTER WITH AN IRST IS A KEY FUNCTION FOR SUPPORTING U.S. NAVAL SURVEILLANCE ACTIVITIES. THIS INVOLVES THE EXTRACTION OF TARGETS FROM BACKGROUND WHOSE RADIANCE MEANS AND STANDARD DEVIATIONS ARE MANY TIMES THAT OF THE TARGET. A SUCCESSFUL APPROACH, IN MANY CASES IS TO EMPLOY MTI TECHNIQUES TO EXTRACT THE TARGET FROM THE BACKGROUND. HOWEVER, PREPROCESSING TECHNIQUES ARE NEEDED TO REMOVE SCENE MOTION BEFORE THE APPLICATION OF MTI. THIS MAY REQUIRE THE APPLICATION OF SPATIAL FILTERING TECHNIQUES TO SEGMENT THE SCENE INTO REGIONS WHICH HAVE NEARLY THE SAME VELOCITY OF MOTION. THESE SCENE SEGMENTATION TECHNIQUES ARE CLOSELY RELATED TO THE TACTICAL IMAGE PROCESSING APPROACHES EMPLOYED BY NRD IN THE EXTRACTION OF STATIONARY TARGETS. OTHER TECHNIQUES, SUCH AS EDGE ENHANCEMENT PROCESSES, ARE ALSO USEFUL IN SEPARATING SECTIONS OF THE SCENE. ONCE THESE SCENES ARE SO SEGMENTED, APPARENT MOTION IN THE SCENE CAN BE REMOVED BY PERFORMING TWO-DIMENSIONAL CORRELATIONS OF THE BACKGROUND IRRADIANCE. WITH THE REMOVAL OF APPARENT MOTION, FRAME-TO-FRAME SUBTRACTION FOLLOWED BY TRACK ASSOCIATION CAN BE EMPLOYED TO EXTRACT THE TARGET AND REJECT

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CLUTTER.

NICHOLS RESEARCH CORP INC — NAVY — $ 48,528
4040 S MEMORIAL PARKWAY
HUNTSVILLE, AL 35802
JOSEPH MUDAR
TITLE:
DECOY DEVELOPMENT
TOPIC: 11 OFFICE: CMC

THIS PROPOSAL DISCUSSES THE DESIGN AND ANALYSIS OF A MODULAR SYSTEM OF DECOYS. THE DECOYS WOULD SIMULATE THE VISIBLE, INFRARED, AND MICROWAVE SIGNATURES OF A VARIETY OF TACTICAL WEAPONS AND VEHICLES. THE DECOYS WOULD BE LIGHTWEIGHT, INEXPENSIVE AND EASILY DEPLOYABLE.

NIELSEN ENGINEERING & RESEARCH INC — NAVY — $ 55,018
510 CLYDE AVE
MOUNTAIN VIEW, CA 94043
DR MARNIX F E DILLENIUS
TITLE:
DESIGN PROCEDURE FOR AEROELASTICALLY TAILORED MISSILE CONTROL SURFACES
TOPIC: 62 OFFICE: NASC

A PROCEDURE IS PROPOSED FOR THE DESIGN OF MISSILE CONTROL SURFACES USING AEROELASTIC TAILORING TO ENHANCE THEIR PERFORMANCE. THE PRINCIPAL GOAL OF THE PROCEDURE IS TO MINIMIZE THE VARIATION OF THE CHORDWISE POSITION OF THE AERODYNAMIC CENTER OF PRESSURE AS THE SURFACE DEFORMS UNDER LOAD. OTHER PERFORMANCE OBJECTIVES, SUCH AS MAINTAINING OR IMPROVING MARGINS OF SAFETY AGAINST FLUTTER, CAN ALSO BE INCORPORATED. THE PURPOSE OF THE PRESENT RESEARCH IS TO DEVELOP THE PROCEDURE FOR SUPERSONIC SPEEDS AND EVALUATE IT BY COMPARING AN AEROELASTICALLY TAILORED COMPOSITE FIN DESIGN WITH A CONVENTIONAL DESIGN. SUCCESSFUL COMPLETION OF THIS PHASE I WORK IS EXPECTED TO LEAD TO FABRICATION AND EXPERIMENTAL EVALUATION OF THE DESIGN IN A SUPERSONIC WIND TUNNEL IN PHASE II.

NOISE COM INC — ARMY — $ 66,769
111 MOORE ST
HACKENSACK, NJ 07601
KURT STERN
TITLE:
POWER/FREQUENCY ADAPTIVE AMPLIFIERS AND TRANSMITTERS
TOPIC: 52 OFFICE: CECOM/SWL

THIS PROPOSAL DESCRIBES A 3 MHz TO 300 MHz JAMMING SYSTEM. IT WILL

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HAVE THE CAPABILITY OF CHANGING BANDWIDTH AND FREQUENCY IN MILLI-SECONDS. THESE CHANGES WILL BE INITIATED BY DIGITAL INPUT. THE SYSTEM OUTPUT LEVEL WILL BE KEPT THE SAME INDEPENDENT OF BANDWIDTH. SPECIFICATIONS INCLUDE BANDWIDTH 2 MHz TO 64 MHz IN ONE MHz STEPS. OUTPUT 1 WATT - 10 WATT RANGE. THE END PRODUCT OF THIS EFFORT WILL BE A WORKING BREADBOARD SYSTEM AND A FINAL REPORT DESCRIBING THE SYSTEM AND ITS PERFORMANCE.

NORTH AMERICAN CORROSION CONSULTANTS NAVY $ 49,900
3974 COLUMBUS RD
GRANVILLE, OH 43023
BRYAN E WILDE
TITLE:
CORROSION BEHAVIOR OF METAL MATRIX COMPOSITES IN HOSTILE ENVIRON-MENTS
TOPIC: 96 OFFICE: NSWC

SIGNIFICANT PROGRESS HAS BEEN MADE TOWARD THE DEVELOPMENT OF A COM-PREHENSIVE MECHANICAL PROPERTY DATA BASE FOR P100 Gg/Al METAL MATRIX COMPOSITE MATERIAL. LITTLE OR NO DATA EXISTS RELATIVE TO THE ENVIRO-MENTAL BEHAVIOR OF THIS MATERIAL. THE PRESENT ANTICIPATED APPLICA-TION ENVIRONMENTS FOR THIS MATERIAL INCLUDE SEACOAST, SHIPBOARD, AND ENVIRONMENTS IN WHICH FOSSIL FUEL EXHAUSTS ARE PRESENT. THE PROPOSED PROGRAM WILL PROVIDE FOR THE CHARACTERIZATION OF Gr/Al IN THESE EN-VIRONMENTS. THE Gr/Al WILL BE CHARACTERIZED WITH AND WITHOUT SURFACE PROTECTION. ADDITIONALLY, P100 Gr/Mg WILL BE CHARACTERIZED IN THESE ENVIRONMENTS. Gr/Mg IS RECEIVING SIGNIFICANT ATTENTION CURRENTLY BE-CAUSE OF THE ZERO COEFFICIENT OF THERMAL EXPANSION PROPERTY OF THIS MATERIAL. CORROSION BEHAVIOR OF THESE MATERIALS WILL BE COMPARED TO THE BEHAVIOR OF THE WROUGHT MATERIAL EXPOSED TO IDENTICAL TEST CON-DITIONS. THE APPLICABILITY OF ELECTROCHEMICAL LINEAR POLARIZATION RESISTANCE TECHNIQUES TO THE ENVIRONMENTAL CHARACTERIZATION OF THESE MATERIALS WILL BE DEMONSTRATED. THIS TECHNIQUE PROVIDES A MORE EX-PEDIENT METHOD FOR EVALUATION OF GENERAL CORROSION THAN THE TRADI-TIONAL COUPON EXPOSURE TESTS. THE PROPOSED PROGRAM WILL PROVIDE THE FOUNDATION FOR A COMPREHENSIVE PHASE II ENVIRONMENTAL CHARACTERI-ZATION OF THE METAL MATRIX COMPOSITES.

NORTHERN VIRGINIA RESEARCH INSTITUTE ARMY $ 49,904
RD 5 - BOX 1495
SPOTSYLVANIA, VA 22553
DR T R THOMPSON
TITLE:
ADAPTIVE CONTROL IN EXPERT SYSTEMS
TOPIC: 13 OFFICE: AkDC

A CENTRAL ELEMENT IN MILITARY EXPERT-SYSTEM (ES) APPLICATION IS THE

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DYNAMIC HANDLING AND ADAPTIVE CONTROL OF EVIDENCE AND UNCERTAINTY. THERE ARE CURRENTLY FIVE DISTINCT APPROACHES TO THE PROBLEM OF EVIDENTIAL REASONING (ER). THESE ARE THE BAYESIAN, NEYMAN-PEARSON, DEMPSTER-SHAFTER, KYBURG, AND POSSIBILITY/FUZZY APPROACHES. IN ADDITION TO THE ER TASK OF REVISING DEGREES OF BELIEF OR SUPPORT, WE MUST CONTROL THE ACCUMULATION OF EVIDENCE. THE ER APPROACHES DO NOT CURRENTLY ADDRESS QUESTIONS OF EVIDENTIAL CONTROL. HOWEVER, THE FIELDS OF SEQUENTIAL STATISTICS, SEQUENTIAL DECISION ANALYSIS, AND SEQUENTIAL PATTERN RECOGNITION PROVIDE SEVERAL CANDIDATE CONTROL TECHNIQUES. THE PROPOSED EFFORT WILL FIRST APPLY CURRENT SEQUENTIAL CONTROL TECHNIQUES TO EACH OF THE ER APPROACHES, THUS CLEARLY IDENTIFYING INCOMPATIBILITIES BETWEEN THESE TECHNIQUES AND THE ER THEORIES. IT WILL THEN ANALYZE THESE INCOMPATIBILITIES, THUS PROVIDING A FRAMEWORK FOR, AND INITIATING DEVELOPMENT OF, CONTROL TECHNIQUES THAT CAN BE BETTER INTERFACED WITH EACH OF THE ER METHODS FOR MILITARY EXPERT SYSTEMS.

NORTHWEST ENGINEERING CONSULTANTS AF $ 49,972
7201 26TH AVE NE
SEATTLE, WA 98115
SIDNEY GROSS
TITLE:
ADVANCED RECHARGEABLE SATELLITE BATTERIES
TOPIC: 68 OFFICE: AFWAL/PO

TO OBTAIN SPACECRAFT POWER LEVELS GREATER THAN ABOUT 7 kW FOR GEO-SYNCHRONOUS ORBIT, IT WILL BE NECESSARY TO REDUCE THE WEIGHT OF THE POWER SYSTEM, PARTICULARLY THE BATTERIES WHICH ARE ESPECIALLY HEAVY. IT IS NOT CLEAR AT THIS TIME WHICH BATTERY SYSTEM IS BEST SUITED TO THE NEEDS OF AN ADVANCED ENERGY STORAGE SYSTEM FOR SATELLITES, FOR ONLY REASONABLY WELL-DEVELOPED SYSTEMS HAVE BEEN CONSIDERED FOR THIS PURPOSE TO DATE. THUS, IT IS ESSENTIAL THAT ALL CANDIDATE ADVANCED BATTERY SYSTEMS BE IDENTIFIED AND ANALYZED TO DETERMINE WHICH ONES ARE THE MOST WORTHWHILE FOR DEVELOPMENT. THE GENERAL OBJECTIVE OF THIS WORK IS TO PERFORM STUDIES WHICH WILL IDENTIFY THOSE ADVANCED RECHARGEABLE BATTERY SYSTEMS WHICH HAVE THE BEST POTENTIAL FOR MEETING FUTURE SATELLITE REQUIREMENTS, AND ARE MOST SUITED FOR DEVELOPMENT TO MEET AIR FORCE NEEDS.

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NU-TECH INDUSTRIES INC — AF — $ 50,000
5905 WOLF CREEK PIKE
DAYTON, OH 45426
MILTON S ISAACSON
TITLE:
OPTIMIZATION OF MOTOR/GEAR DRIVE SYSTEM FOR ELECTRIC RPV
TOPIC: 4 OFFICE: ASD/EN

THE SEVERAL DISADVANTAGES OF CURRENT RPV PROPULSION SYSTEMS (E.G. HIGH AUDIBLE NOISE AND INFRARED SIGNATURES, UNRELIABLE STARTING, SHORT STORAGE LIFE, ROUTINE RUN-UPS, AND FUELING AND RUN-UP BEFORE LAUNCH) CAN BE ELIMINATED IN AN ELECTRIC PROPULSION SYSTEM. THIS PHASE I EFFORT WILL DEMONSTRATE THE PERFORMANCE CAPABILITY OF A BRUSHLESS DC MOTOR WITH GEAR REDUCER AND ELECTRONIC CONTROLLER SYSTEM THAT IS CONFIGURED FOR OPTIMUM SIZE AND WEIGHT. THE GEAR REDUCER WILL ALLOW THE MOTOR TO BENEFIT FROM THE INHERENT SIZE, WEIGHT AND EFFICIENCY ADVANTAGES OF A HIGH SPEED DC MOTOR. THE SYSTEM WILL BE DESIGNED TO PROVIDE ADEQUATE POWER FOR BOTH RPV CRUISE (5 HP) AND CLIMB (10 HP) CONDITIONS. THE REQUIRED POWER LEVELS WILL BE DEMONSTRATED IN A BENCH TEST USING A PROPELLER ESPECIALLY DESIGNED TO ABSORB THE POWER AT THE SAME PROPELLER SPEEDS ENCOUNTERED IN FLIGHT (APPROXIMATELY 5000 AND 6300 RPM). FEASIBILITY OF THE PROPOSED SYSTEM WILL BE JUDGED BY THE BENCH TEST DEMONSTRATION OF POWER, SPEED, MOTOR TEMPERATURE RISE, TOTAL SYSTEM WEIGHT, AND OVERALL SYSTEM EFFICIENCY.

NUMERICAL COMPUTATION CORP — DARPA — $ 51,924
22 MEADOW DR
STONY BROOK, NY 11790
YUNG MING CHEN
TITLE:
NUMERICAL ALGORITHM FOR SOLVING SCATTERING AND INVERSE SCATTERING PROBLEMS OF ELECTROMAGNETIC WAVES
TOPIC: 14 OFFICE: DARPA

THE DEVELOPMENT OF AN EFFICIENT NUMERICAL ALGORITHM (COMPUTER CODE) CAPABLE OF DETERMINING THE UNKNOWN MATERIAL COMPOSITION AND SHAPE OF AN ARBITRARY TARGET FROM THE MEASURED ELECTROMAGNETIC WAVES IN THE FAR FIELD REGION WILL ENHANCE THE CAPABILITY OF THE DEFENSE RADAR SYSTEM TO DEFEAT KNOWN EVASIVE SCHEMES. THIS CAN BE ACHIEVED BY IMPROV-

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ING THE PROVEN ITERATIVE NUMERICAL ALGORITHM, GENERALIZED PULSE-SPECTRUM TECHNIQUE (GPST), BY TAKING ADVANTAGES OF PARALLELISM, VECTORIZATION, ADAPTIVE GRIDS, DOMAIN DECOMPOSITION, ETC. THE PHASE I EFFORT IS TO DEVELOP AN EFFICIENT COMPUTER CODE FOR CALCULATING THE TIME-HARMONIC ELECTROMAGNETIC WAVES SCATTERED FROM A TWO-DIMENSIONAL SCATTERER OF ARBITRARY MATERIAL COMPOSITION AND SHAPE. THIS COMPUTER CODE IS AN IMPORTANT SUBROUTINE OF GPST FOR SOLVING THE INVERSE SCATTERING PROBLEMS, AND IT CAN BE 30 TIMES FASTER THAN THE EXISTING FINITE DIFFERENCE TIME-DOMAIN METHOD (WITH THE SAME ACCURACY) BY THE ESTIMATION OF THE TOTAL FLOATING POINT ARITHMETIC OPERATION COUNT NEEDED FOR THE CALCULATION.

NW SYSTEMS SDIO $ 0
36 PANORAMA TRAIL
ROCHESTER, NY 14625
DR CAROL A NIZNIK
TITLE:
STRATEGIC DEFENSE DATA BASE TRANSFER SOFTWARE TOOL FOR REAL-TIME OPTIMAL TRANSMISSION OF WORSE CASE THREAT DATA
TOPIC: 4 OFFICE: IST

THE DEVELOPMENT OF A GENERAL PURPOSE, UNIVERSAL INTERFACE SOFTWARE (UIS) WHICH ENABLES THE EFFICIENT, CONGESTION FREE TRANSFER OF DATA BASES BETWEEN CENTRAL COMPUTING FACILITIES FOR THE PURPOSE OF REAL TIME, OPTIMAL TRANSMISSION OF WORSE CASE THREAT DATA, IS DESCRIBED IN THIS PROPOSAL. THE MATHEMATICAL RESEARCH BASIS FOR THIS SOFTWARE WILL BE COMPRISED OF THE FOLLOWING THREE AREAS: (A) THE OPTIMIZATION OF THE PERCENTAGE OF NETWORK OR SUBNETWORK LINK LOAD LINKED TO A % OF CONGESTION WHICH MINIMIZES THE DELAY REGARDLESS OF THE NETWORK OR SUBNETWORK SIZE, (B) THE OPTIMIZATION OF THE AVAILABILITY OF LINKS IN A CONTENTION SOFTWARE WITH RESPECT TO THE SYSTEM LOAD FOR NETWORKS AND SUBNETWORKS, (C) THE COMPUTATION STORAGE AND TIME OPTIMIZATION OF THE MATHEMATICAL COMPUTER SOFTWARE. THE UIS WILL BE FOCUSED ON A CONTINUATION OF THE MAP AND INTERFACE SOFTWARE THEORY DEVELOPED FOR THE DARPA INTERNETWORK BY NIZNIK IN DCA100-84-C-0038, TO TRANSFER DATA BASES BETWEEN IMP'S AND GATEWAYS. THE INTERFACE SOFTWARE CURRENTLY CONTAINS A CLOSED HASHING TABLE WHICH ENABLE ROUTING OF THE DELAY TABLES ONLY WHEN PATHS ARE AVAILABLE. THE INTERFACE COMPARISON CRITERIA IS WHETHER THE REAL TIME PATH IS LESS THAN THE OPTIMALLY DERIVED PATH DELAY FOR A SERIES OF M/M/1 QUEUEING SYSTEM NODES. THE THEORETICAL BASIS FOR DETERMINING THE POINT IN THE LOAD WHERE THIS

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ROUTING AVAILABILITY IS BELOW A CERTWAIN THRESHOLD WILL BE DERIVED HERE. THIS WILL PROVIDE FOR A MEANINGFUL CONNECTION BETWEEN ETHERNET LAN'S CONTENTION AND THE FINITE BUFFER CLASSES OR BLOCKS IN GATEWAYS AND FIRST LEVEL COMPUTER NODES TO EFFECTUATE CONGESTION CONTROL.

OCEAN & ATMOSPHERIC SCIENCE INC ARMY $ 0
145 PALISADE ST
DOBBS FERRY, NY 10522
DR ROSS E WILLIAMS
TITLE:
AUTOMATIC MONITORING AND ASSESSMENT OF VEHICLE OPERATOR DYSFUNCTIONS
TOPIC: 94 OFFICE: MED FT. DET

A MONITORING AND DECISION SYSTEM IS PROPOSED TO MEASURE THE PHYSIOLOGICAL AND BEHAVIORAL PARAMETERS OF A SOPHISTICATED VEHICLE (E.G. BATTLE TANK, HELICOPTER, ETC.) OPERATOR, AS WELL AS MOTION PARAMETERS OF THE VEHICLE, TO ASSESS A STATE OF OPERATOR PARTIAL OR COMPLETE DISABILITY, SUCH THAT VEHICLE CONTROL COULD BE TRANSFERRED APPROPRIATELY TO AN AUTOMATIC GUIDANCE SYSTEM. CANDIDATE PHYSIOLOGICAL FACTORS ARE DISCUSSED AND TRANSDUCERS FOR THEIR MONITORING IDENTIFIED. A NEED FOR CAREFUL INTEGRATION AND INTERPRETATION OF THE SENSOR READINGS TO AVOID FALSE DECLARATIONS OF DISABILITY IS EMPHASIZED. VEHICLE PARAMETERS (SPEED, HEADING, PRIOR TRACK, ACCELERATIONS, ALTITUDE, ATTITUDE, ETC.) ARE ALSO DISCUSSED. BEHAVIORAL SENSORS COULD FUNCTION IN A FEEDBACK LOOP REQUIRING THE OPERATOR TO RESPOND TO SYSTEM QUERIES IN A MANNER THAT DEMONSTRATES ALERTNESS, RATIONAL CAPABILITY AND PHYSICAL COORDINATION. ADDITIONALLY, BEHAVIOR ABNORMALITIES COULD BE DETECTED BY HIS FAILURE TO CARRY OUT SCHEDULED FUNCTIONS OR A PRESCRIBED VEHICLE EVOLUTION. A MICROPROCESSOR COMPUTER INTEGRATES THE SENSOR READINGS AND ASSESSES, CONTINUOUSLY, THE OPERATOR'S FUNCTIONAL STATUS. ALGORITHMS FOR THIS PURPOSE SHOULD POSSESS INDIVIDUAL SENSOR THRESHOLDS AND PRIORITY RATINGS THAT ADAPT TO THE SCENARIO AND THE ENVIRONMENT. A MULTI-STEP DECISION PROCESS INVOLVING OPERATOR ALERT, DEMAND FOR AND EVALUATION OF OPERATOR RESPONSE, AND CONTROL TRANSFER IS SUGGESTED.

OCEAN & ATMOSPHERIC SCIENCE INC NAVY $ 68,675
145 PALISADE ST
DOBBS FERRY, NY 10522
DR FREDRICK COTTON
TITLE:
DESIGN AND IMPLEMENTATION OF A SUPERCONDUCTING ACOUSTIC PROJECTOR
TOPIC: 129 OFFICE: NUSC

A DESIGN IS PROPOSED FOR A CRYOGENIC ACOUSTIC PROJECTOR FOR LOW FRE-

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QUENCY UNDERSEA COMMUNICATIONS OR SURVEILLANCE OVER LONG DISTANCES. ALTERNATIVELY THIS VIBRATIONAL POWER SOURCE COULD BE USED TO TEST THE PHYSICAL INTEGRITY OF STRUCTURES, TO DRIVE PILINGS, OR FOR OTHER INDUSTRIAL APPLICATIONS. ITS UNIQUE FEATURE IS A VERY HIGH POWER-TO-WEIGHT RATIO, EXCEEDING THAT OF ANY OTHER LOW FREQUENCY VIBRATIONAL SOURCE BY MORE THAN A FACTOR OF TEN. THE PROPOSED PHASE I EFFORT SEEKS TO BALANCE THE SYMMETRICAL DRIVES TO THE TWO END PLATES, NULL OUT UNWANTED VIBRATIONS, REDUCE EDDY CURRENTS BY DESIGNING COIL MOUNTS OF NON-CONDUCTING MATERIALS, PROPERLY MATCH THE STIFFNESS OF THE VIBRATING DIAPHRAGMS TO THAT OF THE COIL MOUNTS, DESIGN AND BUILD ELECTRONIC POWER SUPPLIES WITH ADAPTIVE FEEDBACK CONTROL ON THE AC DRIVES TO MAINTAIN PROPER BALANCE, AND TO DESIGN THE SUPER CONDUCTING DC COIL AND ITS ASSOCIATED ELECTRONICS. THE WORK PLAN INCORPORATES THE DESIGN AND CONSTRUCTION OF MOST OF THESE COMPONENTS, THEIR ASSEMBLY INTO THE PROJECTOR, AND REPEATED TESTING OF THE ASSEMBLED PROJECTOR IN AIR AND IN WATER TO EVALUATE EACH COMPONENT DESIGN. A CALIBRATED ACCELEROMETER SYSTEM WILL PERMIT MEASUREMENT OF FREQUENCY RESPONSE, Q AT RESONANCE, PISTON DISPLACEMENTS, POWER OUTPUT, AND UNWANTED VIBRATIONAL MODES.

OCEANOGRAPHIC SERVICES INC — NAVY — $ 49,828
25 CASTILIAN DR
SANTA BARBARA, CA 93117
R WALLERSTEDT
TITLE:
SUBMARINE ICE THICKNESS AND PROFILING SYSTEM
TOPIC: 124 OFFICE: NWSC

A PHASE I STUDY IS PROPOSED TO VERIFY THE TECHNICAL FEASIBILITY AND REFINE THE CONCEPT DESIGN FOR A SUBMARINE-INSTALLED ICE THICKNESS AND PROFILING MEASUREMENT SYSTEM. THE SYSTEM IN REAL-TIME WILL PROVIDE A CONTINUOUSLY UPDATED 3-D DISPLAY OF THE UNDER-ICE SURFACE PLUS ACCURATE MEASUREMENT OF ICE THICKNESS. THE SYSTEM PROVIDES IMMEDIATE AND NECESSARY INFORMATION FOR THROUGH-ICE DEPLOYMENT AND FOR HIGH-SPEED MANEUVERS UNDER THE PACK ICE. THE DESIGN CONCEPT IN A MORE SIMPLIFIED FORM, HAS DIRECT APPLICATION TO SEABED DEPLOYED ICE MEASUREMENT EQUIPMENT. THE PROPOSED SYSTEM UTILIZES A VARIABLE LOW-FREQUENCY PARAMETRIC SONAR APPROACH TO DETERMINE THE OVERHEAD ICE THICKNESS. THE SYSTEM ALSO DEPICTS A REAL-TIME 3-D PROJECTION OF THE UNDER-ICE SURFACE. THE ESTIMATED PROFILING RANGE AND ICE THICKNESS

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CAPABILITY ARE 1,000 METERS TO 10 METERS, RESPECTIVELY. SUCCESSFUL COMPLETION OF PHASE I WOULD LEAD INTO A BREADBOAD DEMONSTRATION AND PRELIMINARY DESIGN PREREQUISITE TO OPERATIONAL DEPLOYMENT.

OLIS ENGINEERING — ARMY — $ 37,098
PO BOX 408D
SEDALIA, CO 80135
CARTER K LORD
TITLE:
VEHICLE WASTE DISPOSAL SYSTEM - CONCEPT STUDY
TOPIC: 72 OFFICE: TACOM

THE PROPOSED CONCEPT STUDY WILL INVESTIGATE EXISTING WASTE DISPOSAL SYSTEMS DEVELOPED FOR OTHER APPLICATIONS (I.E., SPACECRAFT, CONTAMINATED WORK STATIONS, ETC.) TO DETERMINE THE FEASIBILITY OF MODIFICATION OF ONE OF THESE SYSTEMS FOR USE IN VEHICLES OPERATING IN AN NBC CONTAMINATED ENVIRONMENT. THE PROPOSED STUDY WILL ALSO DEFINE AND EVALUATE SEVERAL NEW APPROACHES TO THE PROBLEM OF DISPOSAL OF WASTE MATERIALS. BASED ON THE RESULTS OF THE REVIEW OF EXISTING SYSTEMS AND EVALUATION OF THE NEW CONCEPTS DEFINED, A WORKING MODEL OF THE MOST PROMISING APPROACH WILL BE FABRICATED TO DEMONSTRATE THE FEASIBILITY OF THE CONCEPT FOR THIS APPLICATION. THE WORKING MODEL MAY BE A MODIFICATION OF AN EXISTING SYSTEM, OR A DEMONSTRATION MODEL OF ONE OF THE NEW CONCEPTS DEVELOPED DURING THIS PROPOSED STUDY. THE PURPOSE OF THE WORKING MODEL WILL BE TO DEMONSTRATE THE FEASIBILITY APPROACH, AND TO HELP IN THE IDENTIFICATION OF POSSIBLE PROBLEMS REQUIRING FURTHER DEVELOPMENT. A RESEARCH PLAN WILL BE DEVELOPED TO IDENTIFY THE RECOMMENDED COURSE OF ACTION FOR THE FURTHER DEVELOPMENT OF THE RECOMMENDED APPROACH INTO AN OPERATIONAL SYSTEM.

OMUTEC ODETICS INC — NAVY — $ 49,980
1515 S MANCHESTER AVE
ANAHEIM, CA 92802
ROBERT LINDNER
TITLE:
MATERIAL APPLICATION STUDY FOR VERY LOW FREQUENCY HYDROPHONE
TOPIC: 104 OFFICE: NSWC

A REQUIREMENT EXISTS FOR THE DETECTION AND IDENTIFICATION OF UNDER-

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WATER ACOUSTICS OF VERY LOW FREQUENCIES AT EXTREMELY LOW AMPLITUDES IN AMBIENT WATER PRESSURES OF 3000 TO 5000 psi. THE GENERATED OUTPUT FROM THE BASIC SENSOR MUST PRODUCE A NOISE FREE SIGNAL LEVEL OF SUFFICIENT AMPLITUDE SUITABLE FOR SIGNAL CONDITIONING FOR TELEMETERING TO SHIP, SHORE OR SATELLITE. DEVELOPMENT BY OMUTEC, ODETICS HAS BEEN IN PROGRESS USING A PIEZOELECTRIC SENSOR AND A CHARGE AMPLIFIER; HOWEVER, DUE TO JOHNSON NOISE OR PYROELECTRIC EFFECTS IN PIEZOELECTRIC CRYSTALS, THERMAL ISOLATION IS REQUIRED TO ELIMINATE DRIFT DUE TO TEMPERATURE CHANGES. THE HYDROPHONIC TRANSDUCER IS CAPABLE OF OPERATING AT DEPTHS OF UP TO 10,000 FEET AND CAN DETECT PRESSURE VARIATIONS OF .00142 psi AND HAS A BANDWIDTH RESPONSE FROM .03 hz TO 10KHz. AN ANALYSIS OF MAGNETOELASTIC MATERIAL INDICATES THAT IT WOULD HAVE DISTINCT ADVANTAGES OVER PIEZOELECTRIC CRYSTALS FOR LOW FREQUENCY SENSITIVITY AND TEMPERATURE STABILITY.

ONTAR CORPORATION — NAVY — $ 49,968
129 UNIVERSITY RD
BROOKLINE, MA 02146
JOHN SCHROEDER
TITLE:
INFRARED CLOUD/SEA MODELING AND UNDERLYING FUNDAMENTAL PHYSICS
TOPIC: 102 OFFICE: NSWC

THE NAVY IS CURRENTLY DEVELOPING A PASSIVE INFRARED SYSTEM FOR FLEET DEFENSE TO DETECT AIRBORNE TARGETS AGAINST A CLUTTER BACKGROUND. THE BACKGROUND MEASUREMENT AND ANALYSIS PROGRAM (BMAP) IS SUPPORTING THIS EFFORT IN THE ACQUISITION AND ANALYSIS OF ARCHIVAL QUALITY IMAGERY DATA OF CLOUD AND SEA CLUTTER BACKGROUNDS. THE PROPOSED PROGRAM WILL PROVIDE BMAP WITH THE OVERALL ARCHITECTURE AND MODULES FOR A MULTIFUNCTIONAL, USER-INTERACTIVE CODE TO MODEL BACKGROUNDS, AND EVALUATE SIGNAL PROCESSING CLUTTER SUPPRESSION TECHNIQUES. THE PHENOMENOLOGICAL PART OF THE CODE WILL INCORPORATE SIMPLE CLOUD AND SEA RADIANCE MODELS THAT ARE BASED ON THE UNDERLYING PHYSICS AND CELLULAR AUTOMATA WILL BE USED TO DEVELOP A SPATIAL AND TEMPORAL CLUTTER MODEL BASED ON THE FLUID DYNAMIC PROPERTIES OF CLOUDS. THE BMAP INFRARED SYSTEMS CODE (BISC) WILL SUPPORT MEASUREMENT PLANNING, DATA VAKUDATION, CLUTTER CHARACTERIZATION AND PROVIDE THE FRAMEWORK TO EVALUATE CANDIDATE IRST CONCEPTS.

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OPCOA
1201 N BROADWAY
SANTA ANA, CA 92701
DR WILLIAM H QUICK
TITLE:
HIGH ACCURACY FABRY-PEROT OCEAN TEMPERATURE SENSOR
TOPIC: 124 OFFICE: NWSC

NAVY $ 49,514

A HIGH-ACCURACY TEMPERATURE SENSOR--WITH IMMUNITY TO EMI--IS PROPOSED AS AN OCEAN TEMPERATURE MONITOR. THE SENSOR CONSISTS OF A BROADBAND LIGHT SOURCE COUPLED INTO AN OPTICAL FIBER WHICH TRANSMITS THIS BROADBAND SPECTRUM TO THE REMOTE SENSOR ELEMENT. THE SENSOR ELEMENT IS A VARIABLE GAP FABRY-PEROT CAVITY WHICH MODULATES THE REFLECTED SPECTRUM ACCORDING TO GAP DIMENSION. THE REFLECTED SPECTRUM IS FIBER-TRANSMITTED BACK TO A MICROPROCESSOR BASED, COLOR DEMODULATION SYSTEM. THIS COLOR DEMODULATION IS ACCOMPLISHED BY PRISM DISPERSION OVER A CHARGE-COUPLED-DEVICE (CCD). THE MICROPROCESSOR USES KALMAN FILTERING TO ANALYZE AND CONVERT THE SPECTRAL DATA TO TEMPERATURE.

OPHIR CORP
7333 W JEFFERSON AVE - STE 210
LAKEWOOD, CO 80235
LOREN D NELSON
TITLE:
PASSIVE COVERT SINGLE-ENDED CROSS-SPECTRAL RADIOMETRIC MEASUREMENT OF THE VERTICAL PROFILE OF WIND SPEED AND DIRECTION
TOPIC: 28 OFFICE: LABCOM

ARMY $ 49,993

WE PROPOSE A COVERT ATMOSPHERIC WIND SOUNDING SYSTEM WHICH OPERATES BY PASSIVELY LOOKING AT THE TEMPORAL AND SPATIAL COHERENCE OF SMALL SCALE FLUCTUATIONS OF BACKGROUND INFRARED RADIATION EMITTED BY THE ATMOSPHERE AS A FUNCTION OF WAVELENGTH. IT RADIATES NO ELECTROMAGNETIC ENERGY AND DOES NOT INVOLVE THE USE OF ANY BALLOONS OR TOWERS. BY OPERATING PASSIVELY IN THE INFRARED PORTION OF THE SPECTRUM, IT CAN BE EXPECTED TO BE MUCH SMALLER AND MORE PORTABLE THAN SURFACE-BASED MICROWAVE PROFILERS, RADARS, LIDARS, OR SPACED-ANTENNA RADIO METHODS. A PORTABLE, LIGHTWEIGHT, REAL-TIME COVERT SOUNDING SYSTEM FOR USE NEAR THE BATTLEFIELD THUS SEEM ACHIEVABLE. THIS IS THEORETICALLY POSSIBLE BY FURTHER DEVELOPMENT OF A CURRENT OPHIR CORPO-

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RATION COVERT RADIOMETRIC TEMPERATURE SOUNDING SYSTEM UNDER DEVELOPMENT WITH PRIOR SUPPORT FROM THE U.S. ARMY AND U.S. AIR FORCE.

OPHIR CORP — ARMY — $ 49,993
7333 W JEFFERSON AVE - STE 210
LAKEWOOD, CO 80235
LOREN D NELSON
TITLE:
ATMOSPHERIC INFRARED TRANSMISSION HYGROMETER
TOPIC: 30 OFFICE: LABCOM

WE HAVE EXTENSIVE RECENT EXPERIENCE IN THE MEASUREMENT OF HUMIDITY AND TEMPERATURE USING NON-CONTACT INFRARED TECHNOLOGY. IN THIS PHASE I RESEARCH WE WILL COMPLETE A FEASIBILITY STUDY TO ACCESS ADAPTING OUR EXISTING TECHNOLOGY TO TROUBLE-FREE LONG TERM HIGH HUMIDITY USE. IF SUCCESSFUL IN PHASE I, WE WILL PROCEED IN PHASE II TO CONSTRUCT, TEST, CALIBRATE, AND DELIVER TO THE ARMY A WORKING PROTOTYPE HIGH HUMIDITY FAST RESPONSE SENSOR.

OPTELECOM INC — DARPA — $ 49,967
15930 LUANNE DR
GAITHERSBURG, MD 20877
WILLIAM H CULVER
TITLE:
FABRY-PEROT OPTICAL HYDROPHONE SENSING SYSTEM
TOPIC: 7 OFFICE: DARPA

THE RECENT DEVELOPMENT OF PASSIVE FIBER OPTIC SENSOR SYSTEMS ALLOWS FOR THE FIRST TIME THE ABILITY TO DEVELOP ALL-DIELECTRIC HYDROPHONE ARRAYS. THESE FIBER OPTIC SENSOR SYSTEMS ALSO HAVE THE POTENTIAL FOR BEING EXTREMELY LOW IN COST SO THAT THEY MAY IN MANY INSTANCES BE CONSIDERED DISPOSABLE. THE PROPOSED TECHNICAL APPROACH COMBINES LOW COST COMPONENTS TO CREATE A PASSIVE OPTICAL FIBER SENSOR SYSTEM WHOSE SIGNAL CONSISTS OF AN OPTICAL SIGNATURE WHICH CHANGES ITS WAVELENGTH WHEN AN ACOUSTIC SIGNAL IS APPLIED TO THE SENSING ELEMENT. THIS TYPE OF MODULATION PROVIDES IMMUNITY FROM NOISE CREATED BY VARIATIONS IN OPTICAL FIBER LINK CHARACTERISTICS IN MUCH THE SAME WAY THAT FM RADIO BROADCASTS PROVIDE BETTER NOISE IMMUNITY THAN AM BROADCASTS. OPTELE-

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COM PROPOSES TO DEVELOP FUNCTIONAL SPECIFICATIONS FOR A DISPOSAL OPTICAL FIBER HYDROPHONE ARRAY, DEVELOP A PRELIMINARY DESIGN, CONSTRUCT A PROOF-OF-CONCEPT DEMONSTRATION SUBSYSTEM, AND DEVELOP A PHASE II PROGRAM PLAN.

OPTICAL TECHNOLOGIES INC — ARMY — $ 49,963
8200 GREENSBORO DR - STE 550
McLEAN, VA 22102
DR CHARLES M DAVIS
TITLE:
TRANSIENT HIGH PRESSURE FIBER-OPTIC SENSOR
TOPIC: 7 OFFICE: ARDC

OPTICAL TECHNOLOGIES, INC. (OPTECH) HAS DESIGNED AN INEXPENSIVE FIBER-OPTIC PRESSURE SENSOR CAPABLE OF DETECTING IMPULSES WITH PEAK PRESSURES OF 700 MPa AND A RISE TIME OF 10 TO THE -4TH POWER. THIS FIBER-OPTIC PRESSURE SENSOR PROVIDES THE FOLLOWING MAJOR FEATURES: (1) PRESSURE RANGE > 700 MPa, (2) COST OF SENSOR ELEMENT < $25, (3) DYNAMIC RANGE GREATER THAN 100 dB PROVIDING HIGH RESOLUTION DATA, AND (4) SINGLE OPTICAL FIBER CONSTRUCTION TO MINIMIZE SENSOR SIZE. THE PHASE I TECHNICAL OBJECTIVES ARE: (1) TO DESIGN THE LOW-COST FIBER-OPTIC SENSOR ELEMENT FOR TRANSIENT HIGH-PRESSURE APPLICATION, AND (2) FABRICATE AND TEST THE HIGH-FREQUENCY DEMODULATION ELECTRONICS. THUS, THE PHASE I STUDY WILL VALIDATE THE METHOD INTENDED TO ACHIEVE THE PHASE II GOAL OF CONSTRUCTING INEXPENSIVE TRANSIENT HIGH-PRESSURE FIBER-OPTIC SENSORS, AND WILL PROVIDE THE NECESSARY PHASE II DETAILED SYSTEM DESIGN PARAMETERS.

OPTIMA SYSTEMS INC — ARMY — $ 61,177
ONE NORTH AVE
BURLINGTON, MA 01803
DAVID KRALL
TITLE:
SIMPLE MAN/ROBOT INTERACTION LANGUAGE
TOPIC: 81 OFFICE: HEL

A NATURAL, MICROCOMPUTER-BASED, MAN/ROBOT INTERACTION LANGUAGE IS PROPOSED FOR USE BY NON-TECHNICAL PERSONNEL. BASED ON A THREADED

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INTERPRETIVE LANGUAGE (FORTH), SUCH A LANGUAGE WILL NOT REQUIRE THE EXTENSIVE OVERHEAD OF AN OPERATING SYSTEM USUALLY ASSOCIATED WITH HIGH-LEVEL, NATURAL LANGUAGES, AND HENCE CAN BE IMPLEMENTED ON INEXPENSIVE, SINGLE-BOARD COMPUTERS. MOREOVER, BECAUSE OF THE INTERPRETIVE NATURE OF THE LANGUAGE, SPEECH INTERACTION WITH ROBOTS WOULD REQUIRE ONLY A SPEECH RECOGNITION FRONT END WITH MINIMAL ADDITIONAL LANGUAGE DEVELOPMENT. THE PROPOSED PHASE I EFFORT WILL PROVIDE THE GROUND WORK FOR THE DEVELOPMENT OF THE BASIC ROBOT INTERACTION LANGUAGE. THE FEASIBILITY, DESIRABILITY AND POWER OF A PROGRAMMING LANGUAGE ORIENTED FOR THE NON-TECHNICAL USER WILL BE DEMONSTRATED.

OPTIMETRICS INC — AF — $ 71,623
2000 HOGBACK RD - STE 3
ANN ARBOR, MI 48104
JOHN R HUMMEL
TITLE:
ANALYZING THE EFFECTS OF A CLOUD COVER ON SURVEILLANCE OF MOBILE SMALL ICBM'S METHODOLOGY DEVELOPMENT
TOPIC: 125 OFFICE: AFBMO/PMX

THE TOPIC DESCRIPTION INDICATES THE NEED TO "DETERMINE THE EFFECT OF CLOUD COVER (AND OTHER OBSCURATION FACTORS) UPON SOVIET SATELLITE BASED PHOTO SENSORS ATTEMPTING TO DETECT AND IDENTIFY VARIOUS PRO POSED SMALL ICBM MOBILE LAUNCHER SYSTEMS". IN ORDER TO EFFECTIVELY ACCOMPLISH THIS RESULT, IT IS NECESSARY TO HAVE AND APPLY A WELL DESIGNED METHODOLOGY TO MOLD TOGETHER THE DETERMINISTIC, STATISTICAL AND PHYSICAL PARAMETERS WHICH MUST BE USED IN SUCH AN ASSESSMENT. OUR PROPOSED PHASE I OBJECTIVE IS TO PROVIDE SUCH A METHODOLOGY AND TO TAKE PRELIMINARY IMPLEMENTATION STEPS TO APPLY THIS METHODOLOGY FOR THE PROPOSED SITES.

OPTRA INC — ARMY — $ 48,122
83 PINE ST - W PEABODY OFFICE PK
PEABODY, MA 01960
GEERT WYNTJES
TITLE:
FAST HIGH PRESSURE TRANSDUCER WITH FIBER OPTIC READOUT
TOPIC: 5 OFFICE: ARDC

OPTRA PROPOSES TO DEVELOP AND DEMONSTRATE A FAST HIGH PRESSURE TRANS-

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DUCER BASED ON THE STRESS-OPTICAL EFFECT IN A SINGLE OPTICAL CRYSTAL. THE SMALL SIZE OF THE SENSOR RESULTS IN A FAST RESPONSE, AND ITS MONOLITHIC NATURE--WITH SENSING AND TRANSDUCING FUNCTIONS COMBINED IN ONE AND THE SAME ELEMENT--SHOULD AVOID RECIPROCITY FAILURES COMMON TO TRANSDUCERS WHERE THESE FUNCTIONS ARE DISTINCT. THE STRESS INDUCED OPTICAL BIREFRINGENCE WILL BE READ OUT BY OPTRA'S UNIQUE 2-FREQUENCY HETERODYNE LASER VIA AN OPTICAL FIBER LINK. THE READOUT IS INHERENTLY DIGITAL AND INDEPENDENT OF SIGNAL STRENGTH. THE BASIC SIMPLICITY OF THE SENSOR, AND ITS PASSIVE NATURE, SHOULD GIVE IT THE POTENTIAL OF IT BEING USED AS A "ONE-TIME" COMPONENT.

OPTRA INC — AF — $ 49,281
83 PINE ST - W PEABODY OFFICE PK
PEABODY, MA 01960
GEERT WYNTJES
TITLE:
RUGGED HIGH TEMPERATURE OPTICAL THERMOMETER WITH FIBER OPTIC READOUT
TOPIC: 65 OFFICE: AFWAL/PO

RESEARCH LEADING TO AN ABSOLUTE THERMOMETER WITH A FIBER OPTIC READOUT IS PROPOSED. THE BASIC SENSING ELEMENT IS A SHORT LENGTH OF SAPPHIRE. UNDER A PREVIOUSLY FUNDED EFFORT, OPTRA HAS DEMONSTRATED THAT THE OPTICAL BIREFRINGENCE OF SAPPHIRE IS HIGHLY PREDICTABLE AND A NEARLY LINEAR FUNCTION OF TEMPERATURE. READOUT OF THE BIREFRINGENCE WOULD BE VIA A FIBER OPTIC LINK USING OPTRA'S UNIQUE 2-FREQUENCY HETERODYNE LASER. THE USE OF A SAPPHIRE ELEMENT PROMISES A SENSOR HIGHLY TOLERANT TO THE SEVERE ENVIRONMENT INSIDE A TURBINE ENGINE IN TERMS OF EROSION, CORROSION AND VIBRATION. ITS SMALL SIZE SHOULD CAUSE IT TO ONLY MINIMALLY INTERFERE WITH THE GAS FLOW. FOR THIS SPECIFIC EFFORT THE MAIN EMPHASIS WOULD BE CHARACTERIZING THE FIBER OPTIC LINK AND THE EFFECTS OF VIBRATION ON THE TRANSDUCER ELEMENT.

OPTRA INC — NAVY — $ 49,281
83 PINE ST - W PEABODY OFFICE PK
PEABODY, MA 01960
GEERT WYNTJES
TITLE:
HETERODYNE LASER EYE ATTITUDE SENSOR WITH RAPID RESPONSE
TOPIC: 134 OFFICE: NTEC

AN IMPROVED LASER DOPPLER TECHNIQUE TO MONITOR EYE ATTITUDE USING AN

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OPTRA DEVELOPED 2-FREQUENCY He Ne LASER IS PROPOSED. THE HETERODYNE APPROACH MAKES IT POSSIBLE TO UNAMBIGUOUSLY MEASURE EYE ATTITUDE BY INTEGRATING THE DOPPLER SHIFT OF LIGHT SCATTERED OFF THE CORNEA OR SCLERA. THE HIGH SENSITIVITY OF THIS METHOD MAKES IT POSSIBLE TO OPERATE A LOW LIGHT LEVELS--WELL BELOW THE EYE SAFETY EXPOSURE LIMITS. SINCE THE MEASUREMENT SAMPLING RATE IS AT THE HETERODYNE FREQUENCY (TYPICALLY 250 KHz), THE SYSTEM RESPONSE IS FAST, E.G. LESS THAN 1 MSEC, MAKING THIS METHOD WELL-SUITED FOR MONITORING RAPID SACCADIC EYE MOTIONS AND FOR COUPLING WITH STIMULUS-BASED DISPLAY SYSTEMS. THE RESOLUTION IS HIGH, SINCE THE MEASUREMENT IS PERFORMED AT OPTICAL WAVELENGTHS. MOREOVER, THE METHOD IS CAPABLE OF FOLLOWING LARGE EYE EXCURSIONS. WE PROPOSE, IN ORDER TO MINIMIZE WEIGHT AND HEAD RESTRAINTS, TO USE FIBER OPTICS BOTH TO BRING ILLUMINATION TO THE EYE, AND TO COLLECT THE SCATTERED LIGHT. WHILE THE PHASE I EFFORT INVOLVES ONLY ANALYSIS OF A SINGLE AXIS, THE APPROACH IS INHERENTLY CAPABLE OF MONITORING MULTI-AXIAL MOTIONS.

PACER SYSTEMS INC NAVY $ 37,326
8128 WEST HIGHWAY 98 - STE C
PANAMA CITY BEACH, FL 32407
PAUL PALMER
TITLE:
INDEPENDENT VALIDATION AND VERIFICATION OF TACTICAL AIR OPERATIONS CENTRAL - '85 SOFTWARE
TOPIC: 13 OFFICE: CMC

THE TACTICAL AIR OPERATIONS CENTRAL - 1985 (TAOC-85) ENGINEERING DEVELOPMENT MODEL (EDM) SOFTWARE/FIRMWARE IS BASELINED TO 1979 - 1980 MILITARY DOCUMENTATION STANDARDS. INDEPENDENT VALIDATION AND VERIFICATION (IV&V) OF THIS COMPLEX PROGRAM PACKAGE IS REQUIRED. THE FIRST PHASE OF THIS SMALL BUSINESS INNOVATIVE RESEARCH PROGRAM IS TO PREPARE AN INDEPENDENT VALIDATION AND VERIFICATION PLAN WHICH WILL SUPPORT THE SUCCESSFUL TRANSITION OF THE TAOC-85 PROGRAM INTO PRODUCTION. THE PHASE I EFFORT WILL DEVELOP A TAILORED IV & V PLAN FOR THE TAOC-85 PROGRAM WHICH RELATES MIL-STD 483, 490, 499 DOCUMENTATION TO THE DOD-STD-1679A DATA ITEM DESCRIPTIONS. THIS PLAN WILL ALSO DESCRIBE THE COMPARTMENTATION OF THE COMPUTER PROGRAM INTO UNITS AND MODULES, WHERE POSSIBLE, APPROXIMATING THE REQUIREMENTS OF DOD-STD-1679A SUCH THAT CURRENT CRITERIA ON PERFORMANCE AND ABSTRACTS CAN BE APPLIED. THE IV & V PLAN WILL COVER ALL CONVENTIONAL TOPICAL AREAS AS WELL; NOTABLY, BASELINE IDENTIFICATION ACCOUNTING AND LIBRARY PROCEDURES,

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TEST AND SIMULATION TOOLS, DESIGN REVIEW PROCEDURES, PERSONNEL REQUIREMENTS, ETC.

PACIFIC PRECISION PRODUCTS — ARMY — $ 38,922
4007 W SEGERSTROM AVE
SANTA ANA, CA 92704
IVAN E BILLSON
TITLE:
QUICK DISCONNECT COOLANT HOSE
TOPIC: 69 OFFICE: TACOM

THE OBJECT OF THIS PROJECT IS TO EVALUATE THE PRESENT DESIGN OF COOLANT HOSE CONNECTIONS USED ON TANKS AND TO DESIGN A UNIT THAT WILL SIGNIFICANTLY REDUCE MAINTENANCE PROBLEMS AND UNIT FAILURES - THEREBY REDUCING CRITICAL DOWN TIME, COSTLY REPAIRS TO THE ENGINES AND ALLOWING FOR THE TANKS MISSION COMPLETION.

PACIFIC-SIERRA RESEARCH CORP — AF — $ 73,943
12340 SANTA MONICA BLVD
LOS ANGELES, CA 90025
STUART N ROSENWASSER
TITLE:
EROSION-RESISTANT RAILS FOR MULTISHOT ELECTROMAGNETIC LAUNCHERS DEVELOPMENT
TOPIC: 188 OFFICE: AD/PRM

RAIL GUN BARRELS WILL BE REQUIRED TO LAST FOR MULTIPLE SHOTS WITHOUT DETERIORATING PERFORMANCE. THE EROSION OF THE CONDUCTIVE RAILS IN CURRENTLY OPERATING ELECTROMAGNETIC LAUNCHERS LIMITS BOTH PERFORMANCE AND LIFETIME. IN THE PROPOSED PROGRAM, ADVANCED FABRICATION TECHNOLOGY WILL BE UTILIZED TO DEVELOP RAILS WITH EROSION-RESISTANCE SURFACE LAYERS BONDED TO THE BULK RAIL CONDUCTOR. A KEY FEATURE WILL BE AN EROSION-RESISTANT LAYER OF SUFFICIENT THICKNESS TO RESIST PLASMA-ARC EROSION FOR MANY SHOTS. PHASE I GOALS INCLUDE SELECTING CANDIDATE EROSION-RESISTANT SURFACE MATERIALS; DEVELOPING THE PROCEDURES AND ESTABLISHING THE FEASIBILITY OF BONDING THEM TO THE COPPER OR COPPER ALLOY RAIL SUBSTRATE, AND DESTRUCTIVELY EVALUATING THE QUALITY OF THE BONDS. THE FOCUS WILL BE ON REFRACTORY METAL AND CONDUCTIVE CERAMIC SURFACE LAYER MATERIALS WITH DEMONSTRATED EROSION RESISTANCE

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IN THE PRESENCE OF A PLASMA ARC. DEPENDING ON THE MATERIAL, THE LAYERS WILL BE APPLIED USING PSR'S LOW-TEMPERATURE, SOLID-STATE BONDING TECHNIQUE; CHEMICAL VAPOR DEPOSITION; OR HIGH-ENERGY DETONATION GUN SPRAYING. THE THREE MOST PROMISING CONCEPTS WILL BE FABRICATED INTO RAIL SEGMENTS FOR SCREENING TESTS IN A HIGH-ENERGY STANDING ARC.

PACIFIC-SIERRA RESEARCH CORP — AF — $ 48,507
3138 PRESIDENTIAL DR - BLDG 1
FAIRBORN, OH 45234
RONALD RIECHERS
TITLE:
COMMUNICATIONS JAMMING THREAT SIMULATION
TOPIC: 22 OFFICE: AFWAL/AA

THE OBJECTIVE OF THIS RESEARCH IS TWOFOLD, FIRST TO IDENTIFY, AND PRIORITIZE THE POSSIBLE THREAT TO TACTICAL COMMUNICATION SYSTEMS IN THE TIME PERIOD 1990-2000, SECOND, TO PROVIDE THE CSEL FACILITY WITH A SOFTWARE SIMULATION OF A PROPOSED "SMART" COMMUNICATIONS JAMMING SYSTEM. THE EFFECTIVENESS OF THE PROPOSED "SMART" JAMMER WILL BE ESTIMATED AGAINST VARIOUS STATE OF THE ART COMMUNICATIONS SYSTEMS IN THE USAF DEVELOPMENT CYCLE. PSR WILL ALSO PROVIDE A HARDWARE IMPLEMENTATION PLAN TO DEFINE REQUIREMENTS FOR A PHASE II EFFORT.

PACIFIC-SIERRA RESEARCH CORP — SDIO — $ 0
1401 WILSON BLVD - STE 1100
ARLINGTON, VA 22209
WILLIAM W CARTER
TITLE:
LETHALITY ASSESSMENT OF HIGH POWER MICROWAVES ON SDI TARGETS
TOPIC: 3 OFFICE: IST

HIGH POWER MICROWAVES (HPM) ARE THE NEWEST MEMBER OF THE DIRECT ENERGY WEAPON FAMILY. RECENT DATA INDICATES THAT SHORT, INTENSE PULSES OF MICROWAVE ENERGY ARE VERY EFFECTIVE IN PERMANENTLY DAMAGING ELECTRONIC COMPONENTS. THE TECHNOLOGY OF GENERATING HIGH PEAK POWER PULSES OF MICROWAVES HAS ADVANCED IN THE LAST FEW YEARS BY MORE THAN AN ORDER OF MAGNITUDE. SIMULTANEOUSLY THE VULNERABILITY OF SOLID

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STATE ELECTRONIC COMPONENTS HAS INCREASED BY SEVERAL ORDER OF MAGNITUDE. THE FEASIBILITY OF USING HPM FOR TACTICAL APPLICATIONS IS JUST BEING ASSESSED AND IS BEING FOUND TO BE EFFECTIVE IN SEVERAL TACTICAL ROLES. IT IS TIME TO APPLY SIMILAR TECHNOLOGIES TO SDI PROBLEMS. IT IS PROPOSED TO GENERATE MATRICES OF (a) ESTIMATED VULNERABILITY LEVELS OF VARIOUS SDI TARGETS, (b) PRESENT AND PROJECTED FUTURE U.S. STATE OF ART IN GENERATING AND PROPAGATING HPM TO THE TARGETS, AND (c) ESTIMATED CAPABILITY OF THE SOVIETS TO HARDEN THEIR TARGETS TO HPM.

PDA ENGINEERING AF $ 65,507
1560 BROOKHOLLOW DR
SANTA ANA, CA 92627
MATTHEW M SHERMAN
TITLE:
RADAR BEAM/PLASMA INTERACTION EXPERIMENTS
TOPIC: 96 OFFICE: AFBMO/PMX

STUDIES WILL BE CONDUCTED TO DEFINE GROUND TESTS TO MEASURE THE EFFECTS OF FLOWFIELD PLASMA ON RADAR BEAM ATTENUATION AND DEFLECTION. REENTRY FLIGHT ENVIRONMENTS WILL BE ANALYZED TO DEFINE SIMULATION REQUIREMENTS, TEST FACILITIES AND EXPERIMENTAL APPROACHES WILL BE SELECTED, AND A TEST PLAN WILL BE PREPARED FOR CONDUCTIONG THE RECOMMENDED TESTS IN A PHASE II PROGRAM EFFORT. THE TEST PLAN WILL SPECIFY TEST MODEL DESIGNS, INSTRUMENTATION REQUIREMENTS, AND TEST CONDITIONS AND TECHNIQUES.

PDA ENGINEERING AF $ 49,999
1560 BROOKHOLLOW DR
SANTA ANA, CA 92705
PAUL C KOCHENDORFER
TITLE:
TRANSPIRATION COOLED NOSETIP FLOW CALIBRATION
TOPIC: 97 OFFICE: AFBMO/PMX

A REQUIREMENT EXISTS TO INSPECT AND CALIBRATE TRANSPIRATION COOLED NOSETIPS (TCNT) AND OTHER HARDWARE WHICH UTILIZE TRANSPIRATION COOLING. THE PROPOSED PROGRAM ADDRESSES THE FEASIBILITY DEMONSTRATION OF CRITICAL ELEMENTS AND A PRELIMINARY DESIGN OF A HIGH RESOLUTION

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FULLY AUTOMATED INSPECTION/CALIBRATION SYSTEM. THE PROPOSED PROGRAM CONSISTS OF THE FOLLOWING TECHNICAL TASKS: (1) INTERNAL FLOW ANALYSES, (2) FLOW CONTOUR MAPPING AND (3) SECTOR CALIBRATION. THE ACTUAL FABRICATION AND DEMONSTRATION OF A FULLY AUTOMATED INSPECTION/CALIBRATION WOULD BE PART OF THE PHASE II PROGRAM.

PDA ENGINEERING — AF — $ 49,998
1560 BROOKHOLLOW DR
SANTA ANA, CA 92705
H L MOODY
TITLE:
IMPACT OF DIRECTED ENERGY WEAPON DEPLOYMENT ON PENETRATION AIDS
TOPIC: 107 OFFICE: AFBMO/PMX

U.S. RESPONSE TO CURRENT SOVIET ICBM DEFENSE HAS INCLUDED THE DEVELOPMENT OF PENETRATION AID SYSTEMS TO DENY OR DELAY THE ACQUISITION OF U.S. REENTRY VEHICLES. WITH DEPLOYMENT OF SOVIET DIRECTED ENERGY WEAPONS (DEW), THE EFFECTIVENESS OF THESE COUNTERMEASURES MAY BE REDUCED. IN THE PROPOSED PROGRAM, THE RESPONSE OF PEN-AIDS TO DIRECTED ENERGY WEAPONS AND THE CORRESPONDING REDUCTION IN MISSION EFFECTIVENESS SHALL BE EVALUATED. THE IMPACT THE DEW'S HAVE ON PEN-AID DESIGN, DEPLOYMENT AND PEN-AID MIX SHALL BE ASSESSED. FIRST ORDER HARDENING APPROACHES WILL BE IDENTIFIED AND PARTIALLY EVALUATED.

PDA ENGINEERING — AF — $ 45,000
1560 BROOKHOLLOW DR
SANTA ANA, CA 92705
RANDY DONHAM
TITLE:
HARDENED LIGHTWEIGHT AFT COVER DESIGN
TOPIC: 112 OFFICE: AFBMO/PMX

STUDIES WILL BE CONDUCTED TO DEFINE FEASIBLE AFT COVER DESIGN THAT EXPLOIT THE IMPROVED PROPERTIES OF NEW ADVANCED MATERIALS TO ENHANCE SURVIVABILITY IN ANTICIPATED FUTURE NUCLEAR ENVIRONMENTS. GEOMETRIC DESIGN CONFIGURATIONS AND CANDIDATE MATERIALS THAT SATISFY THE DESIGN CONSTRAINTS WILL BE EVALUATED WITH STRUCTURE RESPONSE ANALYSES IN THE

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POSTULATED NUCLEAR ENVIRONMENTS. THE DESIGN AND MATERIAL SOLUTIONS WILL BE RANKED ON THEIR ABILITY TO SATISFY THE DESIGN PERFORMANCE CRITERIA AND PROVIDE IMPROVED NUCLEAR SURVIVABILITY.

PDA ENGINEERING — AF — $ 49,996
1560 BROOKHOLLOW DR
SANTA ANA, CA 92705
ROBERT E JACKSON
TITLE:
FAST LAUNCH ICBM SHROUD TECHNOLOGY REQUIREMENTS
TOPIC: 114 OFFICE: AFBMO/PMX

THE EXIT SHROUDS ON FAST-LAUNCH ICBMs WILL EXPERIENCE THERMAL, STRUCTURAL, AND EROSIVE ENVIRONMENTS THAT ARE SIGNIFICANTLY MORE SEVERE THAN ON CONVENTIONAL ICBM's. THIS PROGRAM WILL EVALUATE THESE ENVIRONMENTS AND DETERMINE THE EFFECTS OF SYSTEM DESIGN PARAMETERS, SUCH AS TRAJECTORY, GEOMETRY, AND DEFENSIVE THREATS, ON SHROUD DESIGN REQUIREMENTS. SHROUD CONCEPTS WILL BE GENERATED, AND KEY DESIGN CONSTRAINTS AND POTENTIAL PROBLEMS WILL BE IDENTIFIED FOR MORE DETAILED STUDY.

PDA ENGINEERING — AF — $ 49,543
1560 BROOKHOLLOW DR
SANTA ANA, CA 92705
EDWARD L STANTON
TITLE:
CARBON-CARBON MATERIAL PROPERTY SENSITIVITY
TOPIC: 160 OFFICE: AFRPL/TSTR

THE THERMOSTRUCTURAL PERFORMANCE SENSITIVITY OF NOZZLES TO CHANGES IN CARBON-CARBON COMPOSITE MATERIAL PROPERTIES HAS BEEN A SIGNIFICANT PROBLEM. THE PROPOSED STUDY WILL IDENTIFY CRITICAL PROPERTIES AND DEVELOP A TEST MATRIX FOR CHARACTERIZING CHANGES IN THESE PROPERTIES AS A FUNCTION OF DENSIFICATION PROCESS AND FINAL HEAT TREATMENT. OUR OBJECTIVE IS TO DETERMINE NOZZLE SENSITIVITY TO CHANGES IN RAW MATERIALS AND COMPOSITE CONSTRUCTION ANALYTICALLY AND THEN IN PHASE II EXPERIMENTALLY DETERMINE PROCESS-PROPERTY RELATIONS. THE PROJECT IS MULTIDISCIPLINARY, MEANING THAT DESIGN, ANALYSIS AND MANUFACTURE, AND

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THEIR INTERACTIONS MUST ALL BE CONSIDERED. WE PROPOSE TO STUDY A BASELINE NOZZLE WITH CARBON-CARBON COMPONENTS MADE FROM GRAPHITE FABRIC AND THREE DIFFERENT DENSIFICATION PROCESSES: CVD, LIQUID PITCH, AND A HYBRID PROCESS.

PDA ENGINEERING — AF — $ 49,999
1560 BROOKHOLLOW DR
SANTA ANA, CA 92705
PAUL KOCHENDORFER
TITLE:
INTERNAL INSPECTION OF LONG TUBES
TOPIC: 211 OFFICE: AEDC/DOT

A REQUIREMENT EXISTS FOR THE PRECISION INSPECTION OF THE AEDC TRACK G FACILITY BETWEEN SHOTS TO SURVEY FOR DAMAGE TO AS WELL AS MISALIGNMENT. THE CRITICAL FACILITY ELEMENTS WHICH PROVIDE BEARING SURFACES FOR THE HYPERVELOCITY MODEL. THE PROPOSED PROGRAM ADDRESSES THIS NEED. A BASELINE SELF-CONTAINED INSPECTION SYSTEM DESIGN WITH DIGITAL MEMORY AND MICROPROCESSOR AUTOMATED DATA REDUCTION HAS BEEN DEVELOPED. THIS DESIGN PROVIDES AN IMPORTANT POINT OF DEPARTURE FOR THE PROPOSED INVESTIGATION. TWO BASIC TYPES OF INSPECTION SYSTEMS WILL BE INVESTIGATED: (1) A HIGH RESOLUTION SELF-CONTAINED PRECISION INSPECTION DEVICE AND (2) AN INSPECTION PROJECTILE WHICH CAN SENSE ALIGNMENT AND FACILITY DAMAGE INDUCED LOADS. THE PROPOSED PROGRAM IS DIVIDED INTO SIX TECHNICAL TASKS AS FOLLOWS: (1) SENSOR RESEARCH, (2) DAMAGE CHARACTERISTICS TESTING, (3) SENSOR EVALUATION, (4) ELECTRONIC DESIGN AND TESTING, AND PRELIMINARY DESIGN. THE ACTIAL FABRICATION OF AN INSPECTION SYSTEM WOULD BE PART OF THE PHASE II PROGRAM.

PDA ENGINEERING/SHANEST INC — ARMY — $ 50,000
1560 BROOKHOLLOW DR
SANTA ANA, CA 92705
NICHOLAS J DELOLLIS
TITLE:
PLASMA TREATMENT OPTIMIZATION OF POLYARAMID FILAMENTS TO IMPROVE KEVLAR/EPOXY COMPOSITES
TOPIC: 78 OFFICE: AMMRC

PLASMA TREATMENT OF POLYARAMID FILAMENTS WITH AMINES TO INDUCE SUR-

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FACE CHEMICAL MODIFICATION, HAS CREATED IMPROVED PERFORMANCE KEVLAR/ EPOXY COMPOSITES. COVALENT BONDS ARE ESTABLISHED BETWEEN THE TWO CONSTITUENTS WHEN PLASMA TREATMENT ABLATES THE POLYARAMID OXIDIZED HYDROCARBON SURFACE LAYER AND DEPOSITES APPROPRIATE REACTIVE GROUPS ON THE FILAMENT SURFACE. PROCESS OPTIMIZATION IS REQUIRED TO SUPPORT FULL-SCALE FABRICATION STUDIES. COMPATIBILITY WITH A BROAD RANGE OF EPOXY FORMULATIONS MUST BE DEMONSTRATED, REQUIRING ATTENTION TO MODIFICATION OF SURFACE ENERGETICS. THE EFFECT OF OTHER PLASMA GASES ON WETTING AND BONDING BETWEEN THE TWO CONSTITUENTS MUST BE INVESTI-GATED. SOLUTIONS TO IDENTIFIED PROBLEMS (E.G., PLASMA TREATMENT, NON-UNIFORMITY, OXYGEN INFLUENCE) MUST BE DEVELOPED. SURFACE CHEMI-CAL MODIFICATION OF POLYARAMID FILAMENTS THAT IMPROVES WETTING AND BONDING WITH EPOXY RESINS HAS SIGNIFICANT BENEFITS. IMPROVED WETTING ENHANCES RESIN PENETRATION INTO FIBER BUNDLES AND REDUCES AIR BUB-BLES. MICROVOIDS AT THE INTERFACE ARE ALSO REDUCED THROUGH IMPROVED WETTING AND BONDING. OFF-AXIS MECHANICAL STRENGTHS ARE INCREASED. LONG-TERM RESISTANCE TO MOISTURE ABSORPTION IS INCREASED. GOOD FRACTURE TOUGHNESS IS RETAINED.

PEM RESEARCH CO — ARMY — $ 43,726
3104 ROBERTA ST
LARGO, FL 33541
DR RICHARD K SPEARS
TITLE:
HIGH DIELECTRIC STRENGTH MATERIALS FOR SHORT-PULSED ELECTRICAL STRESS
TOPIC: 66 OFFICE: MICOM

SIX POLYMERIC MATERIAL SYSTEMS ALL HAVING EXCELLENT DIELECTRIC STRENGTH ARE TO BE EXAMINED TO DETERMINE THEIR FAST RISETIME PULSE DIELECTRIC STRENGTH. THE MATERIALS TO BE TESTED INCLUDE EPOXIES, POLYURETHANES AND SILICONE ELASTOMERS. A SURVEY WAS MDE TO LOCATE A TEST FACILITY THAT COULD DUPLICATE THE SOLICITATION PULSE SIGNATURE. NONE WAS FOUND, HOWEVER, THE WESTINGHOUSE CORP. HAS SUBMITTED A PRO-POSAL TO REDSTONE ARSENAL TO CONSTRUCT SUCH A FACILITY AND SUGGESTED THAT THIS FACILITY BE USED FOR THESE TESTS. IT IS PROPOSED THAT PHASE I TESTING BE PERFORMED ON AN AVAILABLE 400KV TESTER. IT IS BELIEVED THAT A GOVERNMENT INSTALLATION COULD BE FOUND FOR THIS PUR-POSE. FOUR RISETIME (.01, 1, 10 & 100us) ARE SUGGETED FOR STUDY. THE EFFECT OF THICKNESS WILL BE DETERMINED AND A PHYSICAL EXAMINATION OF THE BREAKDOWN PATH WILL BE UNDERTAKEN USING SEM AND OPTICAL MICRO-

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SCOPY.

PERCEPTRONICS INC — AF — $ 71,470
610 MASONS MILL BUSINESS PK
HUNTINGDON VALLEY, PA 19006
O J SNOW
TITLE:
LEMMING: AN ACTIVE RF COUNTERMEASURE
TOPIC: 10 OFFICE: ASD/XR

THIS PROPOSED EFFORT IS CONCERNED WITH AN ACTIVE R.F. COUNTERMEASURE OF THE DECEPTION TYPE FOR MISSILE SYSTEMS EMPLOYING PHASE MONOPULSE SEEKERS. IT IS ESSENTIALLY A GUIDANCE LOOP DESTABILIZER WHERE THE GUIDANCE LOOP, BY DEFINITION, INCLUDES GEOMETRY AND KINEMATICS. FURTHER DISCUSSION ON THIS TOPIC CANNOT BE INCLUDED IN THIS ABSTRACT BECAUSE OF CLASSIFICATION.

PERSON-SYSTEM INTEGRATION LTD — NAVY — $ 49,941
3012 DUKE ST
ALEXANDRIA, VA 22314
JAMES McGUNNESS
TITLE:
HUMAN FACTORS EXPERT SYSTEM DESIGN AID FOR MILITARY APPLICATIONS OF ROBOTICS
TOPIC: 84 OFFICE: NSWC

HUMAN FACTORS NEEDS TO BE EMBODIED AS AN "EXPERT SYSTEM" TO BE EFFECTIVELY INTEGRATED WITHIN ROBOTICS APPLICATIONS. THIS PROPOSED EFFORT WILL DESIGN AND DEVELOP AN "EXPERT SYSTEM" TO GUIDE THE APPLICATION OF HUMAN FACTORS IN ROBOTICS. THE EXPERT SYSTEM WILL CONTAIN TWO ELEMENTS: FIRST, A KNOWLEDGE BASE. SECOND, AN "INFERENCE DRIVE." THE KNOWLEDGE BASE WILL BE CONSTRUCTED BY INCORPORATING THE KNOWLEDGE OF EXPERTS AND BY AUTOMATING SELECTED SECTIONS OF CURRENT HUMAN FACTORS GUIDEBOOKS/HANDBOOKS AND OTHER DESIGN AIDS. THE SELECTION WOULD BE GUIDED BY INPUTS FROM HUMAN FACTORS PROFESSIONALS AS WELL AS FROM PROFESSIONALS INVOLVED IN APPLICATIONS OF ROBOTICS. THE INFERENCE DRIVER WILL USE RULES OF REASONING (I.E., HEURISTICS) TO ACCESS, AS WELL AS INTERPRET INFORMATION IN THE KNOWLEDGE BASE AND GENERATE CONCLUSIONS. INFORMATION FROM PAST DESIGN EFFORTS AND STATE-

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OF-THE-ART DATA SOURCES CONTAIN THOUSANDS OF HUMAN FACTORS PRINCIPLES; THE USE OF WHICH COULD ASSIST IN THE DESIGN OF ROBOTICS SYSTEMS. THE PROPOSED PROJECT WILL IDENTIFY AND EVALUATE PRESENTLY AVAILABLE, VALIDATED HUMAN FACTORS DATA SOURCES. AUTOMATE THESE SOURCES WOULD BE PARTICULARLY APPLICABLE TO ENHANCING SAFETY, OPERATION MAINTENANCE AND OTHER CONSIDERATIONS WITHIN BOTH GOVERNMENT AND COMMERCIAL SECTORS.

PHYSICAL RESEARCH INC — NAVY — $ 68,015
655 DEEP VALLEY DR - STE 320
PALOS VERDES, CA 90274
DR J H WANG
TITLE:
THREE-DIMENSIONAL BOUNDARY-LAYER METHODS FOR TACTICAL MISSILE CONFIGURATIONS
TOPIC: 63 OFFICE: NASC

THE DEVELOPMENT OF TWO DIFFERENT THREE-DIMENSIONAL (3-D) BOUNDARY-LAYER COMPUTER CODES AND THE COUPLING OF THESE CODES TO A 3-D SUPERSONIC INVISCID FLOW-FIELD CODE TO ACCURATELY DETERMINE THE SKIN-FRICTION DRAG FOR MISSILE CONFIGURATIONS THAT MAY HAVE AIR-BREATHING INLETS AND FINS IS PROPOSED. BOTH FINITE-DIFFERENCE AND INTEGRAL SOLUTIONS TO THE 3-D BOUNDARY-LAYER EQUATIONS WILL BE DEVELOPED, INCLUDING THE EFFECTS OF BOUNDARY-LAYER TRANSITION, TURBULENCE, CROSS-FLOW SEPARATION, AND SHOCK WAVE-BOUNDARY LAYER INTERACTION. IN ADDITION, THE RESULTING BOUNDARY-LAYER CODES WILL BE COUPLED TO AN EXISTING STATE-OF-THE-ART 3-D INVISCID CODE, NAMELY WITHER SWINT (SUPERSONIC WING, INLET, TAIL), DEVELOPED BY NAVAL SURFACE WEAPONS CENTER, OR CM3DS (CONFORMAL MAPPING 3-DIMENSIONAL SUPERSONIC), DEVELOPED BY SCIENCE APPLICATIONS INTERNATIONAL CORPORATION. IN ADDITION, A DETAILED INVESTIGATION OF THE EXISTING EXPERIMENTAL DATA-BASE FOR SUPERSONIC FLOWS ABOUTH THREE-DIMENSIONAL GEOMETRIES, WITH PARTICULAR ATTENTION TO CONFIGURATIONS HAVING AIR-BREATHING INLETS AND FINS, WILL BE CARRIED OUT, AND REYNOLDS NUMBER-MACH NUMBER MAPS DEVELOPED FOR COMPARISON WITH FLIGHT CONDITIONS. WHERE DIFFERENCES EXIST, MEANS OF INTERPOLATING AND/OR EXTRAPOLATING THESE DATA TO FLIGHT CONDITIONS WILL BE DEVELOPED, UTILIZING CODE RESULTS AS A GUIDE.

PHYSICAL SCIENCES INC — AF — $ 74,904
PO BOX 3100 - DASCOMB RESEARCH PK
ANDOVER, MA 01810
DR HARTMUT H LEGNER
TITLE:
ANTI-SIMULATION TECHNIQUES APPLICABLE TO BALLISTIC AND MANEUVERING REENTRY VEHICLES AND ASSOCIATED PENETRATION AIDS STUDY
TOPIC: 77 OFFICE: AFBMO/PMX

THE PROPOSED RESEARCH EFFORT CONSIDERS A DEVICE WITH SIGNIFICANT

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POTENTIAL FOR ANTI-SIMULATION: A NEAR-WAKE TETHER. THIS DEVICE RELIES UPON THE ALTERATION OF INITIAL CONDITIONS TO PRODUCE A SIGNIFICANTLY DISRUPTED WAKE BY INTRODUCING STREAMWISE AND CROSS-STREAM VORTICITY INTO THE WAKE. THE TECHNIQUE IS VERY GENERAL AND ENVISIONED TO FUNCTION AT ALL ALTITUDES OF INTEREST. THE TECHNICAL APPROACH INCLUDES WAKE FLUID MECHANICS MODELING, AEROTHERMODYNAMICS ANALYSIS, AND FLIGHT STABILITY CHARACTERIZATION. A FEASIBILITY EXPERIMENT FOR GROUND-TEST EVALUATION WILL ALSO BE DESIGNED.

PHYSICAL SCIENCES INC — AF — $ 49,988
PO BOX 3100 - DASCOMB RESEARCH PK
ANDOVER, MA 01810
G E CALEDONIA
TITLE:
WAKE MODIFICATION OF BALLISTIC AND MANEUVERING REENTRY VEHICLES AND ASSOCIATED PENETRATION AIDS
TOPIC: 78 OFFICE: AFBMO/PMX

WE PROPOSE TO INVESTIGATE THE POTENTIAL OF INTRODUCING FINE PARTICLES INTO THE WAKES OF REENTRY VEHICLES TO HASTEN ELECTRON DECAY. THE PARTICLES WOULD BE FORMED IN SITU IN THE NEAR WEAK THROUGH THE APPROPRIATE CHOICE OF FILLER ADDITIVES TO HEAT SHIELD MATERIALS. THE FULL WAKE PLASMA/PARTICLE INTERACTION WOULD BE ADDRESSED AND INCORPORATED INTO AN EXISTING FINITE RATE KINETICS WAKE COMPUTER CODE. RELEVANT PARTICLE PROPERTIES WOULD BE ASSESSED, OPTIMUM MATERIALS WOULD BE IDENTIFIED AND MODELED WITH THE WAKE COMPUTER CODE TO EVALUATE ELECTRON QUENCH EFFECTIVENESS. A PROOF-OF-CONCEPT TEST SERIES WOULD BE DEFINED.

PHYSICAL SCIENCES INC — AF — $ 74,907
PO BOX 3100 - DASCOMB RESEARCH PK
ANDOVER, MA 01810
MICHAEL B FRISH
TITLE:
THREE-COLOR PYROMETRY FOR TEMPERATURE MEASUREMENT OF REENTRY VEHICLE NOSETIP MATERIALS
TOPIC: 92 OFFICE: AFBMO/PMX

WE PROPOSE TO INVESTIGATE THE FEASIBILITY OF CONSTRUCTING A HIGH-SPEED, TWO-DIMENSIONAL PYROMETER SYSTEM CAPABLE OF MEASURING REENTRY

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VEHICLE NOSETIP TEMPERATURES BETWEEN 800 K AND 6000 K DURING BALLISTIC RANGE GROUND TESTS. THE PHASE I EFFORT WILL FOCUS ON EXPLORING THE PYROMETER'S CAPABILITIES AT THE LOW END OF THE TEMPERATURE RANGE, WHERE THE REQUIRED SPATIAL RESOLUTION OF 0.1 IN. AND DATA ACQUISITION TIME OF 10 NANOSECONDS IMPOSE SEVERE CONSTRAINTS. A ONE-DIMENSIONAL PYROMETER WILL BE BUILT HAVING CHARACTERISTICS WHICH SIMULATE THOSE REQUIRED OF THE TWO-DIMENSIONAL SYSTEM TO TEST EXPERIMENTALLY ITS LOW TEMPERATURE SENSITIVITY. ALSO, THE FEASIBILITY OF ADAPTING A TWO-DIMENSIONAL PYROMETER TO A COST-EFFECTIVE COMPUTERIZED DATA ACQUISTION SYSTEM WILL BE EXPLORED, AND COMPONENTS WILL BE SPECIFIED FOR CONSTRUCTION OF A THREE-COLOR PYROMETER FOR FIELD USE HAVING TEMPERATURE ERRORS RESULTING FROM UNKNOWN TARGET EMISSIVITIES MINIMIZED.

PHYSICAL SCIENCES INC — AF — $ 74,918
PO BOX 3100 - DASCOMB RESEARCH PARK
ANDOVER, MA 01810
DR ASHOK MODAK
TITLE:
LASER DAMAGE TO RV ANTENNA WINDOWS
TOPIC: 100 OFFICE: AFBMO/PMX

THE PROPOSED STUDY WILL INVESTIGATE DAMAGE TO RV ANTENNA WINDOWS BY PULSED AND CW LASERS AT 0.35, 0.53, 1.6, AND 3.8 MICROMETERS. THE STUDY WILL CONSIST OF MEASURING THE TRANSMITTANCE, REFLECTANCE, ABSORPTION AND SCATTERING IN THE WINDOWS AT THE WAVELENGTHS OF INTEREST AND MEASURING THE SURFACE AND INDEPTH PHENOMENOLOGY (E.G. ABLATION SPALLING, EXFOLIATION, CRACKING) IN WINDOWS EXPOSED TO PULSED XeF, Nd:GLASS AND CW, DF LASERS. THESE MEASUREMENTS WILL BE COUPLED TO THEORETICAL MODELS OF PULSED AND CW LASER INTERACTIONS WITH (THREE-DIMENSIONAL) FUSED SILICA TYPE MATERIALS TO ELUCIDATE DAMAGE MECHANISMS AND TO PERFORM THEORY/DATA COMPARISONS. THE COMPARISONS ARE EXPECTED TO SUGGEST IMPROVED METHODS OF HARDENING RV WINDOW MATERIALS TO LASER IRRADIATION. THE OBSERVED DAMAGE MECHANISMS WILL BE USED TO ESTIMATE PERFORMANCE DEGRADATION OF RV ANTENNAS, RV ANTENNA WINDOWS AND DEGRADATION IN CEP. A MAJOR MANUFACTURER AND INVENTOR OF RV ANTENNA WINDOW MATERIALS WILL BE A CONSULTANT TO THE PROPER AND SHALL ALSO SUPPLY THE PROPOSER WITH EXISTING STATE-OF-THE-ART WINDOW MATERIALS FOR TESTING AND ANALYSIS.

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PHYSICAL SCIENCES INC — AF — $ 51,961
PO BOX 3100 - DASCOMB RESEARCH PK
ANDOVER, MA 01810
W T RAWLINS
TITLE:
PARTICLE INFRARED (IR) OPTICAL PROPERTY MEASURMENT TECHNIQUE DEFINITION AND DESIGN
TOPIC: 163 OFFICE: AFRPL/TSPR

THE FUNDAMENTAL OPTICAL PROPERTIES OF SEVERAL PURE AND CONTAMINATED PARTICULATE SPECIES AT HIGH TEMPERATURES ARE CITICAL INGREDIENTS IN THE NUMBERICAL PREDICTION OF THE RADIATIVE SIGNATURES OF ROCKET EXHAUST PLUMES. PSI PROPOSES TO INVESTIGATE EXPERIMENTAL METHODS FOR MEASURING THE DESIRED OPTICAL PROPERTIES OVER THE WIDEST POSSIBLE RANGE OF WAVELENGTH, TEMPERATURE, AND PARTICLE SIZE, AND TO DESIGN A SERIES OF EXPERIMENTS TO ACHIEVE OPTIMAL RESULTS FOR USE IN PREDICTIVE CODES. ALTHOUGH SEVERAL POSSIBLE TECHNIQUES WILL BE EVALUATED, ONE OF THE MORE ATTRACTIVE POSSIBILITIES INVOLVES THE USE OF A SHOCK TUBE COUPLED WITH A VARIETY OF EXTINCTION, EMISSION, AND SCATTERING DIAGNOSTICS, INCLUDING RAPID-SCANNING MONOCHROMATORS AND DIODE ARRAY DEVICES.

PHYSICAL SCIENCES INC — NAVY — $ 79,499
PO BOX 3100 - DASCOMB RESEARCH PARK
ANDOVER, MA 01810
PETER NEBOLSINE
TITLE:
ARCTIC ICE EXCITATION TECHNOLOGY
TOPIC: 38 OFFICE: NSSC

THIS COMBINED THEORETICAL AND EXPERIMENTAL PROGRAM WILL INVESTIGATE GENERATION OF ACOUSTIC SIGNALS WITH A CO2 LASER. ACOUSTIC SIGNAL GENERATION HAS BEEN DEMONSTRATED AND THIS PROGRAM WILL PROVIDE THE RELATIONSHIP BETWEEN LASER PARAMETERS AND ACOUSTIC PARAMETERS FOR THE EXPERIMENTALLY USED SEA ICE THICKNESS OF APPROXIMATELY 30 CENTIMETERS. THE EXPERIMENTS WILL BE PERFORMED IN THE ONLY COMMERCIALLY AVAILABLE COLD ROOM IN NORTH AMERICA.

PHYSICAL SCIENCES INC — AF — $ 54,051
PO BOX 3100 - DASCOMB RESEARCH PK
ANDOVER, MA 01810
G E CALEDONIA
TITLE:
SPACE SHUTTLE OUTGASSING
TOPIC: 154 OFFICE: AFGL/XOP

WE PROPOSE TO REVIEW AND ANALYZE PHENOMENA ASSOCIATED WITH THE SPACE

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SHUTTLE CONTAMINANT CLOUD WHICH LEADS TO ION FORMATION. THE AVAILABLE DATA BASE ON NEUTRAL AND IONIC SPECIES IN THE SHUTTLE CLOUD WILL BE CRITICALLY REVIEWED AND GENERIC CONTAMINANT SPECIES SOURCE TERMS DEFINED. POTENTIAL KINETIC MECHANISMS BETWEEN IONOSPHERIC SPECIES AND CLOUD SPECIES, ALONG WITH SUBSEQUENT SECONDARY REACTIONS, WILL BE EVALUATED WITH PARTICULAR EMPHASIS ON REACTION ENERGETICS. ADDITIONAL IONIC SOURCE TERMS, SUCH AS GAS SURFACE INTERACTIONS, WILL ALSO BE ASSESSED. LASTLY, THE POSSIBLE IMPACT OF ELECTROMAGNETIC FORCES, PECULIAR TO SHUTTLE, ON THE IONIC KINETICS WILL BE EVALUATE. THE PROJECT RESULT WILL BE A SPECIFICATION OF SOURCE STRENGTHS AND ENERGY DISTRIBUTIONS OF IONS WITHIN THE SHUTTLE CLOUD FOR SPECIFIC SHUTTLE FLIGHT SCENARIOS. THESE RESULTS WILL FORM A BASIS FOR DESIGNING FLIGHT EXPERIMENTS TO MORE ACCURATELY TEST THE ON-ORBIT ENVIRONMENT. THUS THEY ARE THE FIRST STEP TOWARD UNDERSTANDING AND IMPROVING THAT ENVIRONMENT.

PHYSICAL SCIENCES INC — SDIO — $ 0
PO BOX 3100
ANDOVER, MA 01810
STEVEN J DAVIS
TITLE:
VISIBLE/UV HALOGEN TRANSFER LASERS
TOPIC: 17 OFFICE: IST

PHYSICAL SCIENCES INC. PROPOSES TO MEASURE PHOTON YIELDS FOR PRODUCTION OF THE D' STATES OF THE HALOGEN AND INTERHALOGEN MOLECULES VIA ENERGY TRANSFER FROM THE METASTABLE SPECIES N2(A) AND ACTIVE NITROGEN. THESE NITROGEN SPECIES ARE OF CURRENT INTEREST AS CHEMICAL LASER ENERGY RESERVOIRS. THE HALOGEN ZAND INTERHALOGENS ARE PROVEN LASER SYSTEMS WITH OUTPUT WAVELENGTHS RANGING FROM 158 TO 750 nm. THERE ARE SCATTERED REPORTS OF OBSERVATIONS OF ENERGY TRANSFER FROM EXCITED NITROGEN TO SOME OF THESE SPECIES. PSI PROPOSES TO UNDERTAKE A SYSTEMATIC STUDY OF THE ENERGY TRANSFER EFFICIENCIES FROM N2(A) AND ACTIVE NITROGEN TO THE HALOGENS AND INTERHALOGENS. THIS STUDY WILL RESULT IN A "RANK ORDERING" OF THE TRANSFER EFFICIENCIES. BY CONDUCTING A SURVEY OF THE YIELDS OF THE D' STATE RESULTING FROM ENERGY TRANSFER, PSI WILL BE ABLE TO IDENTIFY THE PROMISING LASER SYSTEMS.

PHYSICAL SCIENCES INC — SDIO — $ 49,789
PO BOX 3100
ANDOVER, MA 01810
ALAN GELB
TITLE:
INTERCEPTOR BLINDING FROM ATMOSPHERE INDUCED EMISSIONS
TOPIC: 18 OFFICE: IST

THE EFFECTS OF ATMOSPHERE-INDUCED RADIATIVE EMISSIONS ON SENSOR

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SYSTEMS OF KINETIC ENERGY WEAPONS WILL BE INVESTIGATED. AT THE HIGH VELOCITIES OF PLANNED KINETIC ENERGY WEAPONS, COLLISIONS WITH THE AMBIENT ATMOSPHERE WILL PRODUCE MOLECULES CAPABLE OF RADIATING IN VEHICLE SENSOR BANDWIDTHS. THESE EMISSIONS WOULD BE FROM ELECTRONICALLY EXCITED MOLECULAR STATES IN THE UV/VISIBLE AND FROM HIGHLY VIBRATIONALLY EXCITED STATES IN THE IR. THUS, MANY SENSOR BANDPASSES MAY BE EFFECTED BY THE LIKELY MOLECULAR RADIATORS. THE MAGNITUDE OF THESE EMISSIONS WILL BE DETERMINED FOR A NUMBER OF SCENARIOS AND THEIR EFFECT ON VEHICLE PERFORMANCE ASSESSED.

PINSON ASSOCS INC — ARMY — $ 49,685
PO BOX 9648
AUSTIN, TX 78766
A WAYNE SEFCIK
TITLE:
DOPPLER CHAFF
TOPIC: 46 OFFICE: LABCOM

THIS PROPOSED PROGRAM IS TO INVESTIGATE THE FEASIBILITY OF GENERATING DOPPLER FREQUENCIES FROM A CHAFF CLOUD BY USING NON-LINEAR DIPOLES AND ILLUMINATING THE CLOUD WITH A MODULATED CW SIGNAL. FEASIBILITY WILL BE ESTABLISHED BY A DETAILED ANALYSIS OF THE POWER AND FREQUENCY REQUIREMENTS AND AN INVESTIGATION OF THE MATERIALS REQUIRED TO MAKE THE NON-LINEAR DIPOLES WITH CONSIDERATION GIVEN TO COST AND MANUFACTURING PROBLEMS. THE THRUST WILL BE TO INVESTIGATE CONCEPTS AND TECHIQUES THAT WILL BE COMPATABLE WITH EXISTING ARMY CHAFF DISPENSERS AND JAMMING PODS. THE PHASE I EFFORT IS EXPECTED TO ESTABLISH THE FEASIBILITY OF THE CONCEPT AND THE POTENTIAL VALUE OF FURTHER WORK.

PK CORP — SDIO — $ 0
24 SUMMIT RD
STORRS, CT 06268
DR P PAPANTONI-KAZAKOS
TITLE:
RANDOM-ACCESS TRANSMISSION ALGORITHMS FOR DATA LOCAL AREA NETWORKS
TOPIC: 4 OFFICE: IST

IT IS PROPOSED THAT "LIMITED SENSING" ASYNCHRONOUS RANDOM-ACCESS

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TRANSMISSION ALGORITHMS BE DEVELOPED, ANALYZED, AND EVALUATED, FOR DATA LOCAL AREA NETWORKS, (LAN's). THE LAN TOPOLOGIES CONSIDERED ARE MAINLY MOBILE RADIO AND ETHERNET-TYPE CONFIGURATIONS. THE ASYNCHRONOUS, LIMITED SENSING CLASS OF RANDOM-ACCESS ALGORITHMS IS MOST APPROPRIATE FOR SUCH TOPOLOGIES, ATTAINING SUPERIOR PERFORMANCE CHARACTERISTICS, IN CONJUNCTION WITH EASE IN IMPLEMENTATION, AND LOW OPERATIONAL COST. THE EXISTING ALGORITHMS FOR THE ABOVE TOPOLOGIES ARE EITHER UNSTABLE OR NONIMPLEMENTABLE. THE ALGORITHMS WE PROPOSE CAN BE EASILY IMPLEMENTED ON THE EXISTING SYSTEMS, WITHOUT CHANGES IN THE HARDWARE AND WITH MINIMAL SOFTWARE ADAPTATION.

PLANNING SYSTEMS INC — NAVY — $ 49,960
7900 WESTPARK DR - STE 600
McLEAN, VA 22102
PETER S TONG
TITLE:
HIGH FREQUENCY FREQUENCY SHIFT/PHASE SHIFT PERFORMANCE INVESTIGATION
TOPIC: 25 OFFICE: NESC

HIGH FREQUENCY (HF) COMMUNICATION IS VERY SENSITIVE TO THE TIME-VARYING NATURE OF THE CHANNEL AND CONSEQUENTLY DATA CANNOT BE TRANSMITTED ACROSS THE CHANNEL ERROR FREE. THE CHANNEL IS INHERENTLY LIMITED IN PERFORMANCE SINCE THE CHANNEL USES THE IONOSPHERE TO REFLECT THE TRANSMITTED SIGNAL. THE QUALITY OF THE CHANNEL IS HIGHLY DEPENDENT ON THE WEATHER CONDITIONS, TIME OF DAY, AND OTHER CHANNEL VARIABLES. IN ORDER TO ESTABLISH RELIABLE COMMUNICATIONS, IT IS NECESSARY TO INCREASE THE SIGNAL-TO-NOISE (SNR) RATION AND/OR USE REDUNDANCY TECHNIQUES SUCH AS CODING. UNDER THIS EFFORT, PSI WILL INVESTIGATE POTENTIAL IMPROVEMENTS TO THE NTDS LINK 11 HF COMMUNICATION SYSTEM BY USING TRANSMISSION SIGNAL CODING. THE RELATIVE EFFICIENCY OF ERROR CONTROL CODING SCHEMES WILL BE COMPARED USING BIT ERROR RATE (BER) AS A PERFORMANCE MEASURE. THE SPECIFIC OBJECTIVE WILL BE TO ESTABLISH POSSIBLE IMPROVEMENTS IN LINK 11 PERFORMANCE WITHOUT ALTERING THE SYSTEM.

PLANNING SYSTEMS INC — NAVY — $ 49,980
7900 WESTPARK DR - STE 600
MCLEAN, VA 22102
DAVID JAARSMA
TITLE:
BROADBAND TRACKING ALGORITHM DEVELOPMENT
TOPIC: 108 OFFICE: NSWC

PARAMETRIC APPROACHES TO TARGET TRACKING ARE STRAIGHTFOWARD AND

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USUALLY IMPLEMENTED VIA SOME VARIATION OF THE KALMAN FILTER. HOWEVER, A PARAMETRIC APPROACH USES SOME FORM OF A GRADIENT SEARCH ALGORITHM WHICH CAN BECOME LOCKED ONTO EXTRANEOUS OR AMBIGUOUS SOLUTIONS. THIS OCCURS BECAUSE THE OBJECTIVE FUNCTION IS MULTIMODAL. NOT ONLY CAN A PARAMETRIC APPROACH YIELD ERRONEOUS SOLUTIONS, BUT IT CANNOT DISCERN THAT IT HAS LOCKED ONTO A LOCAL RATHER THAN A GLOBAL SOLUTION. AN ALTERNATIVE TARGET TRACKING APPROACH IS PROPOSED FOR THIS EFFORT. THE SOLUTION PROPOSED IS BASED ON A NON-PARAMETRIC TECHNIQUE WHICH DOES NOT INVOKE A PRATICULAR STRUCTURE ON TARGET MOTION DYNAMICS. THIS APPROACH DISCRETIZES TARGET LOCATION TO A TWO-DIMENSIONAL GRID IN (x.y), WHICH IS PROBABILISTICALLY UPDATED VIA BAYESIAN METHODS. THIS APPROACH EXAMINES THE LIKELIHOOD OF ALL POSSIBLE SOLUTIONS IN THE (x<y) GRID, AND HENCE, IS ALWAYS SEEKING A GLOBAL SOLUTION. THE TARGET POSITION IS ESTIMATED EITHER AS AN MSE SOLUTION OR MAP SOLUTION.

PLASMATRONICS INC — SDIO — $ 0
2460 ALAMO SE - STE 101
ALBUQUERQUE, NM 87106
ALAN E HILL
TITLE:
HIGH CURRENT PLASMA SWITCH
TOPIC: 2 OFFICE: IST

THIS PROJECT IS DESIGNED TO STUDY A PROMISING HIGH CURRENT PLASMA SWITCH DEVELOPED BY PLASMATRONICS, INC., AND TO DETERMINE IT'S SCALEABILITY FOR APPLICATION TO THE STRATEGIC DEFENSE INITIATIVE (SDI) TECHNOLOGIES. THE EXISTING PLASMA SWITCH WILL BE USED TO GENERATE DATA WHICH PROVIDES DETAILS OF IT'S OPERATION. THESE EXPERIMENTAL TEST RESULTS WILL BE FED INTO A COMPUTER MODEL BY THE BDM CORPORATION TO REFINE THE THEORETICAL UNDERSTANDING OF THE SWITCH. ITTERATIONS OF TEST RESULTS AND COMPUTER PREDICTIONS WILL DEFINE TESTS OF SCALEABILITY. EXTRAPOLATION OF EXPERIMENTAL DATA TO PREDICT REQUIREMENTS WILL DETERMINE WHETHER OR NOT THIS PLASMATRONICS PROPRIETRY SWITCH CAN BE MADE LARGE ENOUGH FOR SDI TECHNOLOGY APPLICATIONS. A SECOND GOAL OF THE PROJECT IS TO DETERMINE THE LEVEL OF EFFORT REQUIRED AND THE RISK ASSOCIATED WITH A PROJECT TO BUILD A LARGE SCALE PROTOTYPE OF THE PLASMA SWITCH.

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POLAR MATERIALS INC — ARMY — $ 70,670
BEN FRANKLIN TECH CTR-HOMER RSCH/BLDG F
BETHLEHEM, PA 18016
DR DEREK SHUTTLEWORTH
TITLE:
PLASMA POLYMER COATINGS TO PREVENT PIPELINE CORROSION AND REDUCE FRICTION
TOPIC: 59 OFFICE: BRDC

THIS PROGRAM WILL INVESTIGATE THE PREPARATION OF CORROSION AND FRICTION REDUCTION COATINGS FOR PIPELINE PROTECTION PREPARED BY STATE-OF-THE-ART PLASMA METHODS. PLASMA TECHNIQUES CAN PRODUCE COATINGS OF CERAMIC-LIKE MATERIALS WITH HIGH ABRASION RESISTANCE. THEIR CHEMICAL UNREACTIVITY AND UNIFORMITY OF COVERAGE ALLOWS THEM TO FUNCTION AS EFFECTIVE BARRIER COATINGS FOR CORROSION PROTECTION. DIAGNOSTIC AND REAL-TIME PROCESS CONTROL METHODS WILL BE DEVELOPED TO MAKE THE PROCEDURES A VIABLE PRODUCTION METHOD.

POLAR MATERIALS INC — NAVY — $ 50,000
BEN FRANKLIN TECH CTR-HOMER RSCH/BLDG F
BETHLEHEM, PA 18016
DR DEREK SHUTTLEWORTH
TITLE:
HARD COATINGS FOR CORROSION PROTECTION USING PLASMA ENHANCED CVD
TOPIC: 74 OFFICE: NSWC

THIS PROGRAM WILL INVESTIGATE THE GENERATION OF CORROSION RESISTANCE COATINGS BY A PLASMA ENHANCED CVD (PECVD) ROUTE, HOWEVER, FROM NON-CONVENTIONAL PECVD MATERIALS. THE COATINGS COMPOSITION WILL BE CERAMIC-LIKE WITH GOOD CHEMICAL RESISTANCE AND ADHESION. THE MATERIALS ARE INTENDED FOR USE AS THIN COATINGS AND THEREFORE ARE DESIGNED TO WITHSTAND THERMAL STRESSING. TEST PROCEDURES WILL BE APPLIED FOR CORROSION RESISTANCE, ADHESION, AND HARDNESS, AS WELL AS DETAILED MICROSCOPIC AND CHEMICAL ANALYSIS.

POLAR MATERIALS INC — AF — $ 75,000
BEN FRANKLIN TECH CTR-HOMER RSCH/BLDG F
BETHLEHEM, PA 18016
DR H RONALD THOMAS
TITLE:
THREE SURFACE FLUORINATION PROCESSES FOR THE MODIFICATION OF TRANSPARENT PLASTICS STUDY
TOPIC: 56 OFFICE: AFWAL/ML

THIS PROPOSAL ADDRESSES THE DIRECT FLUORINATION OF TRANSPARENT

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PLASTIC MATERIALS TO IMPROVE THE ATMOSPHERIC DEGRADATION AND SOLVENT RESISTANCE FOR USE IN AIRCRAFT WINDSHIELDS AND WINDOWS. THREE LABORATORY DEMONSTRATED PROCESSES: DIRECT FLUORINATION, PLASMA ACTIVATED FLUORINATION, AND PLASMA POLYMERIZATION WILL BE INVESTIGATED IN DETAIL. REACTION CONDITIONS WILL BE OPTIMIZED THROUGH THE USE OF DESIGNED EXPERIMENTS AND CHEMICAL CHARACTERIZATION OF THE SURFACE FLUORINATIONS WILL BE ACCOMPLISHED THROUGH DETAILED X-RAY PHOTOELECTRON SPECTROSCOPY STUDIES TO DETERMINE DEPTH OF FLUORINATION, FLUORINATION LEVELS, AND CHEMISTRY OF THE FLUORINATION. ENVIRONMENTAL TESTING WILL INCLUDE SUNLIGHT, HUMIDITY, AND SOLVENT EXPOSURE.

POLLARD ROAD INC — AF — $ 72,357
226 MASSACHUSETTS AVE NE
WASHINGTON, DC 20002
HARRY LEE
TITLE:
ADVANCED NULLING TECHNIQUES
TOPIC: 135 OFFICE: AFSTC

IT IS PROPOSED TO DEVELOP A SET OF ADVANCED ADAPTIVE NULLING ALGORITHMS TO ENABLE SENSOR ARRAYS TO OPERATE EFFECTIVELY IN A RAPIDLY CHANGING ELECTROMAGNETIC ENVIRONMENT CHARACTERIZED BY SPREAD-SPECTRUM SIGNALS AND SOPHISTICATED JAMMERS. AS ENVISIONED THE ADVANCED ADAPTIVE NULLING ALGORITHM WILL CONSIST OF TWO ELEMENTS: (1) A QUICK REACTION CAPABILITY (QRC) THAT ENABLES THE ARRAY TO RESPOND RAPIDLY TO SUDDEN CHANGES IN THE ELECTROMAGNETIC ENVIRONMENTS, AND (2) A FOLLOW-ON RAPIDLY-COVERGENT ITERATIVE ALGORITHM. THE QRC ALGORITHM WILL PROVIDE A MODIFIED (ALBEIT SUB-OPTIMUM) WEIGHT VECTOR TO EFFECTIVELY SUPPRESS NEW INTERFERENCE AFTER ONE OR A SMALL NUMBER OF ARRAY SAMPLES (MANY FEWER THAN REQUIRED BY THE SMI METHOD). THE FOLLOW-ON ITERATIVE COMPONENT WILL RAPIDLY BRING THE MODIFIED WEIGHT VECTOR CLOSE TO THE OPTIMUM VALUE NOTWITHSTANDING MODEST EQUIPMENT MISALIGNMENT (CONVERGENCE MUCH MORE RAPID THAN STEEPEST DESCENT). TO ASSURE HARDWARE COMPATIBILITY OF THE ALGORITHMS, AN EXAMPLE HIGH-LEVEL DESIGN WILL BE DEVELOPED. THE DESIGN WILL INCLUDE THREE DIFFERENT MEASURES OF REQUIRED DIGITAL PROCESSING HARDWARE.

POLYTRONIX INC — ARMY — $ 0
1820 N GLENVILLE - STE 116
RICHARDSON, TX 75081
JACOB W LIN
TITLE:
HARD COATINGS FOR OPTICAL SYSTEM
TOPIC: 77 OFFICE: AMMRC

THE PROPOSED RESEARCH WILL INVESTIGATE THE FEASIBILITY OF DEPOSITION-

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ING HARD DIAMOND LIKE CARBON COATINGS ON SURFACES OF OPTICAL ELEMENTS. IT IS RECOGNIZED THAT THIS PROTECTIVE LAYER DEVELOPED MUST BY CORROSION AND EROSION RESISTANT AND IT MUST BE OPTICALLY TRANSPARENT FROM UV AND IR WAVELENGTHS. FOR REASONS DESCRIBED IN THIS PROPOSAL, THE USE OF A RADIO FREQUENCY (RF) PLASMA DISCHARGE SYSTEM APPEARS TO BE A PROMISING APPROACH TO PREPARATION OF THE DIAMOND-LIKE SURFACES REQUIRED. OUR PREVIOUS STUDIES WITH THIS METHOD HAVE DEMONSTRATED A HARD CARBON FILM WITH DIAMOND-LIKE PROPERTIES CAN BE FORMED BY THE DEPOSITION OF ENERGETIC CARBON ATOMS OR HYDROCARBON FRAGMENTS. THE PROPOSED WORK WILL INVOLVE A SYSTEMATIC STUDY OF THE EFFECTS OF PLASMA DISCHARGE CONDITIONS ON THE DEPOSITION LAYERS OBTAINED. THIS WILL INCLUDE SUCH VARIABLES AS GAS FLOWRATE, PRESSURE, RF POWER, AND SUBSTRATE ELECTRODE SELF BIAS POTENTIAL.

POTOMAC MICROSYSTEMS INC — NAVY — $ 69,288
2600 VIRGINIA AVE NW - STE 1000
WASHINGTON, DC 20037
WILLIAM H IMMERMAN
TITLE:
APPLICATION OF NONPROCEDURAL LANGUAGE TO EMBEDDED WEAPON SYSTEMS SOFTWARE DEVELOPMENT
TOPIC: 69 OFFICE: NSWC

A NONPROCEDURAL, VERY HIGH-LEVEL COMPUTER LANGUAGE CALLED RSP HAS BEEN DEFINED FOR SPECIFYING AND IMPLEMENTING PROCESS-CONTROL SOFTWARE. THE PROPOSED WORK WOULD EXAMINE THE APPLICABILITY OF RSP TO EMBEDDED WEAPONS SYSTEM SOFTWARE DEVELOPMENT AND WOULD IDENTIFY MODIFICATIONS OF RSP NEEDED FOR THE APPLICATION. REQUIREMENTS WOULD BE ANALYZED FOR AN IMPLEMENTATION OF AN RSP-BASED DEVELOPMENT SYSTEM FOR EMBEDDED WEAPONS SYSTEM SOFTWARE. DURING THE COURSE OF THE STUDY, TYPICAL NAVY APPLICATIONS WOULD BE CHARACTERIZED AND EXAMPLES SELECTED, SPECIFIED, AND PROGRAMMED IN RSP.

POTOMAC SYNERGETICS INC — ARMY — $ 0
PO BOX 953
MCLEAN, VA 22101
V J CORCORAN
TITLE:
PASSIVE PROTECTOR OF OPTICAL SENSORS (PAPOOSE)
TOPIC: 96 OFFICE: MED FT. DET

IN ORDER TO DECREASE THE VULNERABILITY OF THE EYE TO INTENSE

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RADIATION, PSI HAS DEVELOPED A PROPRIETARY TECHNIQUE CALLED PAPOOSE, WHICH HAS A LARGE INSERTION LOSS FOR RADIATION AT LEVELS THAT WOULD PRODUCE EYE DAMAGE AND VIRTUALLY NO LOSS FOR LOW LEVELS OF LIGHT NEEDED FOR VIEWING. THIS IS POSSIBLE BECAUSE THE PAPOOSE USES A PASSIVE MEANS TO ATTENUATE THE INCIDENT RADIATION WHICH IS PROPORTIONAL TO THE SQUARE OF THE INCIDENT PEAK POWER IN A TRANSPARENT MEDIUM. IN ADDITION, THE PAPOOSE PROVIDES ESSENTIALLY DISTORTION FREE VIEWING WHICH IS LIMITED PREDOMINANTLY BY THE QUALITY OF THE INPUT AND OUTPUT OPTICS. THE PAPOOSE REQUIRES NO POWER SINCE IT IS TOTALLY PASSIVE AND IT HAS EXTREMELY FAST RISE AND FALL TIMES. OTHER FEATURES INCLUDE A LARGE ACCEPTANCE ANGLE, VIRTUALLY UNLIMITED APERTURE SIZE AND A FAST RECOVERY TIME FROM INTENSE INCIDENT RADIATION. A FULLY DEVELOPED PAPOOSE CAN BE EXPECTED TO BE COMPACT, LIGHTWEIGHT AND INEXPENSIVE, AS WELL AS RELIABLE AND EASILY MAINTAINABLE.

PRACTICAL SCIENCES INC — NAVY — $ 90,296
40 LONG RIDGE RD
CARLISLE, MA 01741
DR HAROLD STALFORD
TITLE:
GUN SIMULATION MODEL WHICH OPTIMALLY ENGAGES MANEUVERING TRAJECTORIES - ADVANCED DEVELOPMENT
TOPIC: 138 OFFICE: JCM

THE LATEST TRACK, FILTERING AND PREDICTION TECHNOLOGY DEVELOPED FOR ENGAGING MANEUVERING CRUISE MISSILES WILL BE IMPLEMENTED IN COMPUTER CODE FORM FOR USE IN SURVIVABILITY STUDIES OF CRUISE MISSILES VERSUS GUN SYSTEMS. ADVANCED MULTI-LEVEL FILTERING TECHNOLOGY WILL BE USED WHICH OPTIMALLY TRACKS, FILTERS AND PREDICTS ALL TRAJECTORY TYPES, FROM THE SIMPLEST OF CONSTANT SPEED AND HEADING TO THE MOST COMPLEX FORM OF EVASIVE MANEUVERS. THE RESULTING COMPUTED CODE WILL BE USED TO MODIFY CURRENT GUN SYSTEM SIMULATION PROGRAMS. THE MODIFY PROGRAMS WILL BE USED TO CONDUCT SURVIVABILITY STUDIES FOR CRUISE MISSILE TRAJECTORIES OF CURRENT INTEREST TO THE NAVY.

PRECISION ACOUSTIC DEVICES INC — NAVY — $ 49,003
200 HAMMOND AVE
FREMONT, CA 94539
JOHN D FRASER
TITLE:
LOW FREQUENCY ACOUSTIC MICROSCOPY FOR NDE OF COMPOSITE AND OTHER AEROSPACE MATERIALS
TOPIC: 113 OFFICE: NWC

A NEW TYPE OF ACOUSTIC MICROSCOPE HAS BEEN DEMONSTRATED BY PROF. B. T.

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KHURI-YAKUB AT STANFORD UNIVERSITY, WORKING UNDER AN AIR FORCE GRANT. THIS MICROSCOPY UTILIZES SPECIAL WIDE APERTURE ULTRASONIC TRANSDUCERS DESIGNED AND BUILT BY THE PROPOSER, AND MAKES USE OF A SURFACE WAVE EFFECT ON THE SAMPLE UNDER TEST TO ENHANCE SENSITIVITY TO CERTAIN TYPES OF DEFECTS. IMAGES OF SAMPLES OF KEVLAR-EPOXY AND CARBON-CARBON COMPOSITES HAVE RESOLVED INDIVIDUAL BROKEN FIBERS, AND TRACED THE STRUCTURE OF CRACKS DOWN INTO THE MATERIAL. SHARP FOCUSSING ALLOWS VIEWING LAYER BY LAYER AS IF PEELING THE LAMINA AWAY. THE MICROSCOPE ALSO HAS DEMONSTRATED GOOD RESULTS ON ADHESIVE BONDED AND DIFFUSION BONDED METAL SAMPLES, AND HONEYCOMB STRUCTURES. WE PROPOSE TO ACQUIRE A LICENSE FROM STANFORD, TO DEVELOP THIS MICROSCOPE AS A COMMERCIAL PRODUCT, AND USE FUNDS FROM THE GRANT, ALONG WITH FUNDS OF OUR OWN TO SETUP A TEST BED SYSTEM AND PERFORM EXPERIMENTS NECESSARY TO QUANTITATIVELY EVALUATE THE PERFORMANCE AND COMMERCIAL FEASIBILITY OF THIS SYSTEM AS A PRODUCT. WE WILL BE EVALUATING RESOLUTION, SENSITIVITY TO VARIOUS TYPES OF DEFECTS, AND DEPTH OF PENETRATION IN VARIOUS TYPES OF SAMPLES. WE WILL ALSO DETERMINE MAXIMUM SCANNING SPEED AND HARDWARE FACTORS AFFECTING SYSTEM COST.

PRECISION ACOUSTIC DEVICES INC — ARMY — $ 48,856
200 HAMMOND AVE
FREMONT, CA 94539
DR B. T. KHURI-YAKUB
TITLE:
50 MHz LIQUID COUPLED ULTRASONIC SHEAR WAVE IMAGING SYSTEM FOR NONDESTRUCTIVE EVALUATION OF CERAMICS
TOPIC: 80 OFFICE: AMMRC

THEIR OUTSTANDING PHYSICAL PROPERTIES ARE CAUSING CERAMICS TO BECOME IMPORTANT STRUCTURAL MATERIALS. THEIR SUSCEPTIBILITY TO FAILURES INITIATED BY VERY SMALL DEFECTS HAS LED TO A NEED FOR HIGH RESOLUTION FLAW DETECTION. EXISTING TECHNIQUES HAVE NOT DEMONSTRATED ADEQUATE ABILITY TO DETECT DANGEROUS DEFECTS. WE PROPOSE TO MODIFY AND EXISTING ULTRASONIC C-SCAN SYSTEM TO USE 45 DEG INCIDENCE SHEAR WAVES AND LIQUID COUPLING. TH USE OF SHEAR WAVES WILL DOUBLE THE RESOLUTION OBTAINABLE AT A GIVEN FREQUENCY, AND ENHANCE SENSITIVITY TO CERTAIN TYPES AND ORIENTATIONS OF DEFECTS. THE 45 DEG INCIDENCE WILL ELIMINATE THE NEAR-SURFACE DEAD ZONE OF TYPICAL ULTRASONIC SYSTEMS, AND WILL PERMIT THE USE OF LIQUID COUPLING. THIS WILL ALLOW RAPID SCANNING OF THE SAMPLE, IMPORTANT FOR PRACTICAL, ECONOMIC TESTING SYSTEMS. P.A.D. POSSESSES UNIQUE EXPERTISE IN THE FABRICATION OF

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TRANSDUCERS AND ELECTRONIC EQUIPMENT FOR THIS PROJECT, AND HAS AVAILABLE A SCANNING SYSTEM WHICH CAN BE USED AS A TEST BED TO DEMONSTRATE THE VIABILITY OF THE TECHNIQUE. OUR CONSULTANT, PROF. B. T. KHURI-YAKUB OF STANFORD UNIVERSITY, HAS MADE IMPORTANT CONTRIBUTION TO THE FIELD OF NDE OF CERAMICS. WE ARE IN A UNIQUE POSITION TO DEMONSTRATE AN EFFECTIVE TESTING MODALITY FOR STRUCTURAL CERAMICS, AND TO DEVELOP A COMMERCIALLY SUCCESSFUL TESTING SYSTEM.

PROFESSIONAL TECH SERVICE OF TALLAHASSEE — NAVY — $ 47,525
4544 THOMASVILLE RD
TALLAHASSEE, FL 32308
CHARLES M ARNOLD
TITLE:
LOW COST EXPENDABLE FUEL TANKS FOR CARRIER AIRCRAFT
TOPIC: 40 OFFICE: NSSC

THE OBJECTIVE OF THE PROPOSED WORK IS TO DESIGN AND DEVELOP A LOW COST EXPENDABLE/REUSABLE AUXILIARY FUEL TANK THAT CAN BE DISASSEMBLED FOR HIGH-DENSITY STORAGE. THIS TANK WILL BE DESIGNED FOR QUICK ASSEMBLY/DISASSEMBLY (LESS THAN 15 MINUTES) AND HAVE THE CAPABILITY OF OPERATING IN EITHER A PRESSURIZED OR UNPRESSURIZED MODE. THE TANK WILL HAVE A STRUCTURAL INTEGRITY EQUAL TO OR GREATER THAN CURRENT ALL-WELDED MODELS AND HAVE A 300-400 GALLON CAPACITY. THE LOW COST TANK WILL CONSIST OF THREE MAJOR COMPONENTS THAT INTERFACE INTO AN INTEGRAL PART VIA AN INTERLOCK COUPLING AND BOLTING DEVICE. EACH MAJOR COMPONENT WILL BE STRUCTURALLY CONFIGURED TO MAXIMIZE CERTAIN AERODYNAMIC QUALITIES AND TO MEET THE REQUIREMENTS FOR HIGH DENSITY STORAGE. A PROTOTYPE MODEL WILL BE CONSTRUTED TO FACILITATE AND VERIFY MAJOR DESIGN CONSIDERATIONS, E.G., EASE OF ASSEMBLY/DISASSEMBLY, STORAGE DENSITY, STRUCTURAL INTEGRITY, ETC. THE MODEL WILL ALSO SERVE AS A MAJOR REFERENCE FOR FOLLOW-ON DESIGN ACTIVITIES. ALTERNATE STRUCTURAL MATERIALS SUCH AS CARBON FILAMENT COMPOSITES WILL BE INVESTIGATED.

PROGRESS INDUSTRIES INC — NAVY — $ 49,742
7290 MURDY CIRCLE
HUNTINGTON BEACH, CA 92647
KENNETH BUSCHE
TITLE:
SEAWORTHY SYRUP/CUP-TYPE SODA VENDING MACHINE
TOPIC: 42 OFFICE: NSSC

A NEW, INNOVATIVE CONTAINER AND UPDATING OF THE SYRUP/CUP TYPE

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VENDING MACHINE TECHNOLOGY IS PROPOSED. THE INTENT IS A SEAWORTHY MACHINE FOR SHIPBOARD VENDING WITHOUT PITCH AND ROLL INDUCED SPILLING. THIS WILL PROVIDE NAVAL SHIP SUPPLY OPERATIONS WITH SIGNIFICANT SAVINGS IN STORAGE OVER THE EXCESSIVE SPACE NOW REQUIRED TO STORE CASES OF CANS USED IN CAN TYPE MACHINES. A REDUCTION OF THE COMPLEXITY AND RELATED IMPROVED RELIABILITY AND MAINTAINABILITY OF THE SYRUP TYPE MACHINE IS ENVISIONED.

Q-DOT INC AF $ 49,991
1069 ELKTON DR
COLORADO SPRINGS, CO 80907
JAMES H LAUFFENBURGER
TITLE:
AUTOMATIC DIRECTION FINDING FEASIBILITY IN SPREAD-SPECTRUM SYSTEMS INVESTIGATION
TOPIC: 5 OFFICE: ASD/EN

A SPREAD-SPECTRUM AUTOMATIC DIRECTION FINDING SYSTEM WILL BE CAPABLE OF SELECTIVELY PROVIDING DIRECTIONAL INFORMATION IN A TACTICAL ENVIROMENT. ONLY AUTHORIZED RECEIVERS (THOSE WITH THE CORRECT PN CODE) WILL BE ABLE TO UTILIZE THE TRANSMITTED INFORMATION. CONVENTIONAL ADF SYSTEMS ARE INCOMPATIBLE WITH SPREAD SPECTRUM SINCE CORRELATION DETECTION IS REQUIRED BEFORE THE MESSAGE CAN BE DISTINGUISHED AND EXTRACTED FROM NOISE AND OTHER SIGNALS. THE PROJECT WILL INVESTIGATE SEVERAL ALTERNATIVE ADF STRUCTURES (SUBJECT TO A JAMMING ENVIRONMENT) SO THAT THE FEASIBILITY OF SPREAD SPECTRUM ADF SYSTEMS MAY BE ASSESSED.

Q-DOT INC AF $ 49,971
1069 ELKTON DR
COLORADO SPRINGS, CO 80907
DR PETER C T ROBERTS
TITLE:
LOW POWER A/D CONVERTER FOR SPACE SYSTEMS APPLICATION
TOPIC: 141 OFFICE: STC/XNE

AFSTC SEEKS ANALOG TO DIGITAL (A/D) CONVERTERS WHICH CAN OPERATE IN CLOSE VICINITY TO COOLED FOCAL PLANE IMAGERS AT SPEED COMPARABLE TO THEIR NORMAL READOUT SPEED FOR FUTURE SPACE SYSTEMS APPLICATIONS.

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Q-DOT, INC., PROPOSES A NOVEL 12-BIT, 1 MICROSECOND, 10 mW A/D CONVERTER CHIP WHICH CAN OPERATE AT CRYOGENIC TEMPERATURES (10 DEG K - 40 DEG K) AND IS SMALL ENOUGH (25 X 25 SQ MIL) TO BE LOCATED AT THE FOCAL PLANE ARRAY. THE CHIP IS BASED ON GEOMETRICAL RATIOS OF SURFACE-CHANNEL CHARGE COUPLED DEVICE (SCCD) STRUCTURES AND IS CONSEQUENTLY STABLE AND LINEAR.

QUANTEX CORP AF $ 47,191
2 RESEARCH CT - STE 100
ROCKVILLE, MD 20850
DR JOSEPH LINDMAYER
TITLE:
ELECTROLUMINESCENT (EL) LAMP TO ACHIEVE HIGHER BRIGHTNESS LONGER LIFE AND MORE UNIFORM LIGHT OVER TIME
TOPIC: 3 OFFICE: ASD/AE

ELECTROLUMINESCENT (EL) LAMPS HAVE BEEN USED IN A NUMBER OF APPLICATIONS, PARTICULARLY IN LARGE AND SMALL DISPLAY SYSTEMS AND FOR INSTRUMENTATION LIGHTING. THESE, AND OTHER, APPLICATIONS WOULD INCREASE IF EL LAMPS COULD BE IMPROVED AS TO THEIR BRIGHTNESS, LIFETIME AND UNIFORMITY OF INTENSITY OVER TIME. PRIOR DEVELOPMENT HAS FOCUSED PRINCIPALLY ON THIN-FILM ZnS:Mn DEVICES. THIS PROJECT WILL FIRST SEEK TO STABILIZE THE ACTIVE LAYER WITH VARIOUS MATERIALS FOR THE DEVICE DIELECTRICS. A NUMBER OF OXIDES WILL BE ASSESSED AS TO THEIR RELATIONSHIP TO EL DEVICE DEGRADATION. THIS ASSESSMENT WILL LEAD TO ABILITY TO RECOMMEND SUITABLE COMPOUNDS FOR THE DEVICE COMPONENTS FOR MAKING IMPROVED EL LAMPS.

QUANTIC INDUSTRIES INC AF $ 71,688
990 COMMERCIAL ST
SAN CARLOS, CA 94070
DALE SCHRUMPF
TITLE:
UNIQUE SIGNAL DEVICES
TOPIC: 118 OFFICE: BMO/PMX

QUANTIC INDUSTRIES HAS DEVELOPED FIVE DIFFERENT USD DESIGNS RECOGNIZING THE NEED TO PREVENT INADVERTENT INITIATION OF PROPULSIVE ORDNANCE FUNCTIONS OF THE MISSILE SYSTEM AND SUBSEQUENT WARHEAD

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MOVEMENT. PRESENT DEVICES ARE HEAVY, SLOW, EXPENSIVE, AND HAVE HUNDREDS OF SMALL, MOVING PARTS. QUANTIC PROPOSES A PROGRAM TO ASSEMBLE, TEST, AND EVALUATE TWO OF THESE DESIGNS, TO ENSURE THE RELIABILITY AND CAPABILITY OF PASSING NUCLEAR SAFETY SURETY CRITERIA. THROUGH THE RECEIPT OF A VALID COMMAND CODE QUANTIC'S ELECTRO-MECHANICAL DISCRIMINATOR HAS PROVEN TO BE EFFECTIVE BECAUSE IT IS LIGHT WEIGHT, FAST ARMING, AND HAS FEWER THAN 20 MOVING PARTS.

QUANTUM COMPOSITES INC — AF — $ 49,928
4702 JAMES SAVAGE RD
MIDLAND, MI 48640
NORMAN S STRAND
TITLE:
COMPOSITE REPAIR PREPREG USING MICROENCAPSULED CATALYSTS WITH ULTRASONIC INDUCED CURE
TOPIC: 48 OFFICE: AFWAL/ML

LONG SHELF LIFE EPOXY PREPREGS AND ADHESIVE FILMS ARE REQUIRED FOR REPAIR OF COMPOSITE VEHICLE PARTS AWAY FROM REPAIR DEPOTS. CONVENTIONAL PREPREGS AND SUPPORTED FILM ADHESIVES HAVE A LIMITED AMBIENT TEMPERATURE SHELF LIFE, USUALLY REQUIRING REFRIGERATED STORAGE. LATENT CURE SYSTEMS CAN BENEFIT FROM ADDITIONAL CATALYSTS, BUT THE LATENCY IS USUALLY COMPROMISED. OUR PROPOSED WORK WILL NOT ONLY INVESTIGATE FEASIBILITY OF MICROENCAPSULATION OF CURING AGENTS FOR EPOXY PREPREGS AND SUPPORTED FILM ADHESIVE, BUT WILL ALSO INVESTIGATE AN ULTRANSONIC METHOD OF RUPTURING MICROCAPSULES TO RELEASE CURING AGENT AND/OR CATALYST INTO PREPREG MATRIX. THIS TECHNIQUE OF UTILIZING ULTRASONICS TO PRODUCE SHEAR IN THE RESIN AND RUPTURING THE MICROENCAPSULATED CATALYST CAN BE ADAPTED TO VERY FAST REACTING SYSTEMS. AN ULTRASONIC TOOL WILL BE DEVISED TO RUPTURE ENCAPAULATED CATALYST AND/OR CURING AGENT IN AN EPOXY RESIN PREPREG. THIS TOOL WILL BE UTILIZED AS A FLAT IRON TO IRON ON A PREPREG PATCH OR TO PROCESS PREPREG TO RELEASE CATALYST BEFORE APPLICATION.

R-K RESEARCH & SYSTEM DESIGN — NAVY — $ 49,999
3947 RIDGEMONT DR
MALIBU, CA 90265
DR DIANE M RAMSEY-KLEE
TITLE:
DESIGN OF A COMPUTER-AIDED INSTRUCTIONAL MODULE FOR THE NAVY OCCUPATIONAL HEALTH INFORMATION MANAGEMENT SYSTEM (NOHIMS)
TOPIC: 49 OFFICE: NMC

THE DESIGN OF A COMPUTER-AIDED INSTRUCTIONAL MODULE FOR NOHIMS WILL

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BE DEVELOPED IN FIVE STEPS DURING PHASE I. THE FIRST STEP WILL BE TO SELECT THE BEST APPROACH(ES) FOR DESIGNING THE MODULE. THE TENTATIVE PLANNED APPROACH IS NEW AND INNOVATIVE WHICH WE ARE CALLING INSTRUCTION ON DEMAND (IOD). IOD WILL SUPPLEMENT MORE CONVENTIONAL FORMS OF SYSTEM ORIENTATION AND TRAINING, AND PROVIDE SYSTEM USERS WITH INSTRUCTION TO THE EXTENT DESIRED AND IN ACTUAL OPERATIONAL CONTEXTS. IN THE SECOND STEP, THE CRITICAL NOHIMS DATA ENTRY AND RETRIEVAL FUNCTIONS THAT MUST BE ADDRESSED BY THE IOD MODULE WILL BE SPECIFIED. STEP 3 WILL INVOLVE IDENTIFYING THE KNOWLEDGE REQUIRED BY A NOHIMS USER, INCLUDING THE OVERALL PURPOSE AND NATURE OF THE SYSTEM, CONVENTIONS AND RULES OF INTERACTION, PLANNING KNOWLEDGE, AND ENCODING AND DECODING RULES. THE INSTRUCTIONAL APPROACH AND EXPLICIT INSTRUCTIONAL OBJECTIVES OF IOD FOR NOHIMS WILL BE DEFINED IN STEP 4. THE FINAL STEP WILL BE TO DETERMINE THE SPECIFIC IOD FUNCTIONS TO BE IMPLEMENTED AND THE DETAILED IOD ARCHITECTURE. THE RESULTING DESIGN WILL LAY THE FOUNDATION FOR THE DEVELOPMENT OF AN IOD SYSTEM FOR NOHIMS TO BE IMPLEMENTED DURING PHASE II.

RADIATION MONITORING DEVICES INC AF $ 73,811
44 HUNT ST
WATERTOWN, MA 02172
DR GERALD ENTINE
TITLE:
ALL SOLID-STATE INTEGRATING DOSIMETER
TOPIC: 208 OFFICE: AMD/RDO

RECENTLY, RESEARCH AT SEVERAL GOVERNMENT FACILITIES HAS RESULTED IN SIGNIFICANT ADVANCES IN BOTH THE ELECTRONIC AND DETECTOR ASPECTS OF INTEGRATING RADIATION DOSIMETERS. ONE PARTICULAR APPROACH, THE LOS ALAMOS MULTIDETECTOR RADIATION MONITOR, IS A MICROPROCESSOR BASED INSTRUMENT, CAPABLE OF INTERROGATING SEVERAL DIFFERENT NUCLEAR DETECTORS SIMULTANEOUSLY. ALTHOUGH USING GEIGER TUBES FOR THE GAMMA AND BETA SENSORS, THIS DEVICE PROVIDES AN IDEAL FOUNDATION FOR AN ALL SOLID-STATE RADIAC. WE PROPOSE TO INCORPORATE SOLID-STATE GAMMA DETECTORS INTO THIS UNIT AS WELL AS A SENSITIVE SOLID-STATE SENSOR CAPABLE OF DETECTING FAST NEUTRONS. WE SHALL ALSO MODIFY THE LOS ALAMOS DESIGN TO ALLOW THE EXISTING SOLID-STATE ALPHA DETECTOR TO BE USED FOR BETAS. THE PHASE I PROGRAM WILL DEMONSTRATE THE FEASIBILITY OF MAKING AN ALL SOLID-STATE RADIAC. IN PHASE II A COMPLETE WORKING PROTOTYPE WILL BE DESIGNED AND CONSTRUCTED FOR TEST.

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RADIATION MONITORING DEVICES INC — ARMY — $ 65,634
44 HUNT ST
WATERTOWN, MA 02172
DR GERALD ENTINE
TITLE:
RAPID NONDESTRUCTIVE DETERMINATION OF RESIN/FIBER CONTENT IN COMPOSITES
TOPIC: 78 OFFICE: AMMRC

THE ADVENT OF FIBER REINFORCED COMPOSITES HAS MADE AVAILABLE NEW STRUCTURAL MATERIALS FOR USE IN MILITARY HARDWARE. IN PARTICULAR, ARMOR PANELS MADE FROM FIBERGLASS REINFORCED PLASTICS PROVIDE STRENGTH TO WEIGHT RATIOS SIGNIFICANTLY SUPERIOR TO THOSE MADE FROM METAL PLATE. THESE NEW MATERIALS ARE CRITICAL FOR MAXIMIZING THE PERFORMANCE OF MODER MILITARY ARTICLES SUCH AS HIGH SPEED TANKS AND TROOP CARRIERS. THE PREFORMANCE OF THESE COMPOSITES DEPENDS STRONGLY ON THE RATIO OF FIBER TO RESIN. PRESENTLY, RADIATION MONITORING DEVICES, INC. DEVELOPED A NONDESTRUCTIVE NUCLEAR MEASUREMENT TECHNIQUE TO DETERMINE THE GLASS CONTENT OF REINFORCED PLASTICS FOR THE AUTOMOBILE INDUSTRY. THIS METHOD IS BOTH ACCURATE AND RAPID, AND HAS SIGNIFICANTLY IMPROVED THE QUALITY OF THE COMPOSITES IN SEVERAL APPLICATIONS. THE PROPOSED PROGRAM WILL DEMONSTRATE THE FEASIBILITY OF SUCCESSFULLY EXTENDING THIS NEW APPROACH TO THE CRITICAL QUALITY ASSURANCE AND PROCESS CONTROL REQUIREMENTS IN THE PRODUCTION OF THICK, HEAVILY REINFORCED ARMOR PLATE. BY THE END OF THE PHASE I - PHASE II PROGRAM, A WORKING PROTOTYPE INSTRUMENT WILL HAVE BEEN COMPLETED AND MADE READY FOR FIELD TESTING AT RELEVANT FACILITIES.

RANA ASSOCS — NAVY — $ 25,600
505 W OLIVE AVE - #717
SUNNYVALE, CA 94086
DR MYRON F ELGART
TITLE:
MICROFILM AND COMPUTER FULL TEXT OF ARCHIVAL DOCUMENTS
TOPIC: 52 OFFICE: NMC

WE PROPOSE TO PROCESS THE ARCHIVAL DOCUMENTS BY COMPUTER-BASED DIGITAL IMAGING TECHNIQUES TO OBTAIN THE BEST POSSIBLE COPIES OF

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THESE DOCUMENTS, AND CREATE A DATA BASE FOR THE REQUESTED COMPUTER-BASED FILE SYSTEM USING STANDARD DATA-BASE MANAGEMENT SOFTWARE FOR LIBRARY APPLICATIONS. THE DIGITAL IMAGES WILL BE STORED ON LASER DISKS FOR PERMANENT ARCHIVAL RETENTION.

RD INSTRUMENTS NAVY $ 49,910
10035 CARROLL CANYON RD
SAN DIEGO, CA 92131
FRANCIS ROWE
TITLE:
PULSE-TO-PULSE COHERENT DOPPLER SONAR DEVELOPMENT
TOPIC: 3 OFFICE: ONR

A RESEARCH AND DEVELOPMENT PROJECT IS PROPOSED TO DEVELOP A PULSE-TO-PULSE COHERENT ACOUSTIC DOPPLER CURRENT PROFILER (ADCP). THIS ADCP WILL PROVIDE APPROXIMATELY A FACTOR OF 100 IMPROVEMENT OVER CONVENTIONAL ADCP'S IN BOTH SHORT-TERM MEAN WATER FLOW VELOCITIES AND DEPTH RESOLUTION. IN ADDITION, SMALL SCALE TURBULENCE LEVELS APPROACHING AMBIENT OCEAN TURBULENCE LEVELS MAY BE DIRECTLY COMPUTED FROM THE DOPPLER ECHO SPECTRUM SECOND MOMENT. THE PRIMARY PHASE I OBJECTIVES ARE TO INVESTIGATE TECHNIQUES OF IMPROVING THE QUALITY AND VELOCITY RANGE OF MEAN FLOW VELOCITY AND SMALL SCALE TURBULENCE MEASUREMENT, AND ACHIEVE A VELOCITY/TURBULENCE PROFILING RANGE TO SEVERAL HUNDRED METERS.

RELIABILITY SCIENCES INC NAVY $ 40,674
2361 S JEFFERSON DAVIS HWY - ML111
ARLINGTON, VA 22202
SPYROS A VRACHNAS
TITLE:
PACKAGE ELECTROSTATIC DISCHARGE (ESD) SUSCEPTABILITY
TOPIC: 123 OFFICE: NWSC

SINCE THE EARLY 1960'S, IT HAS BEEN RECOGNIZED THAT "ELECTROSTATIC DISCHARGE" (ESD) CAN DAMAGE ELECTRONIC PARTS. WITH THE PROGRESSIVE MICROMINIATURIZATION OF ELECTRONICS, MORE AND MORE PARTS BECOME SUSCEPTIBLE TO DAMAGE FROM ESD. THE TREND TOWARDS GREATER MICROMINIATURIZATION AND MORE COMPLEX DEVICES (E.G., VLSI AND VHSI) WILL

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RESULT IN ESD BECOMING AN EVEN MORE SIGNIFICANT PROBLEM IN THE FUTURE. TODAY MOST MICROCIRCUITS, LOW POWER DISCRETE SEMICONDUCTORS, AND THICK AND THIN FILM DEVICES ARE SUSCEPTIBLE TO DAMAGE FROM ESD. THIS DAMAGE CAN OCCUR DURING MANUFACTURE, ASSEMBLY, TEST, HANDLING, OR USE OF THE COMPONENT OR ASSEMBLY. THE DETERMINATION OF SENSITIVITY BY PACKAGE TYPE COULD RESULT IN USING THE LEAST SENSITIVE PACKAGE TYPE AND REDUCING OVERALL DAMAGE TO ESD SENSITIVE DEVICES. DETERMINATION OF PACKAGE SENSITIVITY REQUIRES CONTROLLED EXPERIMENTS AND DETERMINATION OF RELATIVE AGNITUDE OF ELECTROSTATIC CHARGE, FIELD STRENGTH DEVICE ORIENTATION, MATERIALS AND GROUNDING OF SURFACES ON WHICH DEVICES ARE TESTED.

REYNOLDS & TAYLOR INC — AF — $ 71,484
2109 S WRIGHT ST
SANTA ANA, CA 92705
CHARLES W DEMENT
TITLE:
REPRESENTATIONAL ISSUES IN A KNOWLEDGE-BASED JOB SHOP MANAGEMENT SYSTEM
TOPIC: 60 OFFICE: AFWAL/ML

WE PROPOSE TO DESIGN, IMPLEMENT AND TEST A KNOWLEDGE-BASED SYSTEM FOR THE DYNAMIC SCHEDULING OF JOB SHOPS. THE TASK OF SCHEDULING A JOB SHOP IS INHERENTLY DIFFICULT; INCLUDED ARE CONSIDERATIONS SUCH AS FLEXIBILITY, PROFITABILITY, TRACEABILITY, QUALITY ASSURANCE AND ERROR DETECTION AND CORRECTION. THE TWO KEY COMPONENTS OF THE PROPOSED SYSTEM THAT WE PLAN TO INVESTIGATE IN PHASE I ARE: (1) SELF-CORRECTING INFERENCE MECHANISM WHICH PERFORMS PLANNING BASED ON KNOWLEDGE OF CONSTRAINTS IN THE DOMAIN AND DOES RE-PLANNING DURING PLAN EXECUTION ON THE BASIS OF NEW UNFORSEEN INFORMATION THAT MAY ARISE; AND (2) A GENERIC REPRESENTATION OF KNOWLEDGE THAT ENABLES MULTIPLE DIFFERENT REPRESENTATIONS OF COMPLEX OBJECTS (E.G., PARTS, MATERIALS, MACHINES), IN ORDER TO ALLOW THE TRACKING OF OBJECTS THROUGH THE JOB SHOP DURING THE EXECUTION OF A JOB PLAN.

RIZZO P C ASSOCS INC — AF — $ 45,832
PO BOX 17180
PITTSBURGH, PA 15235
WILLIAM J JOHNSON
TITLE:
APPLICATION OF GEOPHYSICAL TECHNOLOGY TO ASSESSMENT OF DEEP GEOTECHNICAL CONDITIONS
TOPIC: 88 OFFICE: AFBMO/PMX

THE DEEP BASING PROGRAM REQUIRES THAT GEOTECHNICAL INFORMATION BE

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OBTAINED FROM THOUSANDS OF FEET BELOW THE GROUND SURFACE. CONVENTIONAL DRILLING, SAMPLING AND LABORATORY TESTING TO DERIVE GEOTECHNICAL PROPERTIES CAN BE OVERLY EXPENSIVE. THE APPLICATION OF GEOPHYSICAL TECHNOLOGY TO THE EXPLORATION PROGRAM OFFERS THE POTENTIAL FOR OBTAINING THE NECESSARY INFORMATION AT REDUCED COSTS. IN AREAS OF SEDIMENTARY ROCK, THE SEISMIC REFLECTION TECHNIQUE USING BOTH P AND S WAVE REFLECTIONS OFFERS GOOD POTENTIAL. TECHNIQUES INCLUDING AEROMAGNETICS, GRAVITY, RESISTIVITY AND ELECTROMAGNETIC CAN BE USED FOR CHARACTERIZING GEOTECHNICAL CONDITIONS IN CRYSTALLINE AND METAMORPHIC ROCK. THE PROPOSED RESEARCH WILL QUANTIFY THE POTENTIAL TECHNICAL BENEFITS OF THE DIFFERENT GEOTECHNICAL TECHNIQUES AND ALSO PROVIDE A COST BENEFIT ANALYSIS TO COMPARE GEOPHYSICS WITH DRILLING.

SAILCOMP INDUSTRIES INC — NAVY — $ 49,923
850 AQUIDNECK AVE
MIDDLETOWN, RI 02840
A H KITS VAN HEYNINGEN
TITLE:
SOLID-STATE DOPPLER WIND SENSOR
TOPIC: 131 OFFICE: NAEC

SAILCOMP INDUSTRIES PROPOSES TO DESIGN AN ACOUSTIC DOPPLER WIND VELOCITY AND DIRECTION SENSING SYSTEM THAT OVERCOMES THE PROBLEM ASSOCIATED WITH PRESENT MECHANICAL DESIGNS. THE ACOUSTIC VELOCIMETER SYSTEM WILL CONSIST OF FOUR PAIRS OF TRANSDUCERS IN FEEDBACK LOOPS. BY MEASURING THE DOPPLER PHASE SHIFT IN EACH OF THE FOUR LEGS OF THE SYSTEM, WIND VELOCITY AND DIRECTION CAN BE CALCULATED. THIS SOLID-STATE SYSTEM IS FREE FROM THE EFFECTS OF FRICTION, MASS AND INERTIA. IT IS NOT AFFECTED BY THE METEOROLOGICAL ENVIRONMENT AND WILL REQUIRE NO MAINTENANCE. THE SYSTEM WILL MEASURE WIND VELOCITIES OF UP TO 100 KNOTS WITH AN ACCURACY OF BETTER THAN PLUS OR MINUS 1 KNOT UP TO 60 KNOTS AND PLUS OR MINUS 2.5 KNOTS OVER 60 KNOTS. DIRECTIONAL ACCURACY WILL BE PLUS OR MINUS 2 DEGREES THROUGHOUT THE ENTIRE WIND VELOCITY RANGE. THE PROPOSED RESEARCH WILL COVER SIX MONTHS AND ADDRESS SUCH ISSUES AS LOOP STABILITY, LOOP GAIN, ICING, FLUTTER, BEAM WIDTH, SIDE LOBE RESPONSE AND AERODYNAMIC CONSIDERATIONS FOR SENSOR CONFIGURATION. SAILCOMP INDUSTRIES WILL BUILD A WORKING MODEL TO SHOW PROOF OF PRINCIPLE AND DELIVER A FINAL REPORT WHICH DETAILS THE OUTCOME OF THE RESEARCH AND ADDRESSES THE FEASIBILITY OF THE CONCEPT FOR FUTURE

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DEVELOPMENT.

SCHAFER W J ASSOCS INC — SDIO — $ 0
CORPORATE PLACE 128 - BLDG 2/STE 300
WAKEFIELD, MA 01880
DR RAYMOND B SCHAEFER
TITLE:
SURFACE DISCHARGE AS AN INCOHERENT PUMP SOURCE FOR SOLID STATE LASERS
TOPIC: 1 OFFICE: IST

THE PROGRAM PROPOSED HEREIN IS TO EXPERIMENTALLY INVESTIGATE THE SURFACE DISCHARGES AS AN INCOHERENT RADIATION SOURCE TO PUMP SOLID STATE LASERS. ALTHOUGH THE FLASHLAMPS CURRENTLY BEING USED ARE A WELL DEVELOPED TECHNOLOGY, THE SURFACE DISCHARGE HAS SEVERAL POTENTIAL ADVANTAGES. ONE THAT WOULD BE INVESTIGATED IN THIS WORK IS THE SPECTRAL ENHANCEMENT OF THE RAIDATION FROM THE SURFACE DISCHARGE BY MEANS OF THE CHOICE OF DISCHARGE SUBSTRATE. WE PROPOSE TO EXPERIMENTALLY MEASURE THIS ENHANCEMENT AT THE SURFACE DISCHARGE FACILITY LOCATED IN THE PROPOSER'S LABORATORY, USING SUBSTRATES WITH CONSTITUENTS HAVING STRONG EMISSION LINES IN THE ABSORPTION BANDS OF THE Ti:Al2O3 LASER. ALSO, DUE TO DIFFERENCES IN THE EMISSION PHYSICS OF THE SURFACE DISCHARGE, ITS SPECTRAL RADIANCE MAY BE GREATER THAN FOR A COMPARABLE FLASHLAMP. THUS, PROPOSED WORK INCLUDES AN EXPERIMENTAL INVESTIGATION OF THE DETAILED SPECTRAL CONTENT OF THE SURFACE DISCHARGE AND A COMPARISON WITH CORRESPONDING FLASHLAMP DATA. BASED ON THE EXPERIMENTAL RESULTS OF THESE TASKS, ESTIMATES OF OVERALL LASER EFFICIENCY WILL BE MADE AND A PRELIMINARY DESIGN FOR A SURFACE DISCHARGE LAMP FOR THE TiAl2O3 LASER WILL BE PREPARED.

SCHAFER W J ASSOCS INC — SDIO — $ 0
22222 SHERMAN WY - STE 205
CANOGA PARK, CA 91303
JEFFREY B SHELLAN
TITLE:
SPACE BASED LASER WITH REMOTE LIGHT WEIGHT BATTLE MIRRORS - A NOVEL SDI APPROACH
TOPIC: 17 OFFICE: IST

CURRENT SPACE BASED LASER CONCEPTS SUFFER FROM SEVERAL DIFFICULTIES

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WHICH THIS PROGRAM SEEKS TO ADDRESS. THESE ARE ABSENTEE RATIOS AND THE NECZESSITY TO FABRICATE AREAS OF OPTICAL SURFACES FOR THE TELESCOPE PRIMARIES ORDERS OF MAGNITUDE GREATER THAN CAN PRESENTLY BE PRODUCED. THE CONCEPT TO BE INVESTIGATED IN THIS STUDY WOULD REDUCE THE ABSENTEE RATIO THROUGH THE PROLIFERATION OF REMOTE LIGHT WEIGHT BATTLE MIRRORS TO BE ZUSED BY A SMALLER NUMBER OF LASERS THAN CALLED FOR IN CURRENT CONCEPTS. IN THIS WAY, LASERS THAT WOULD NORMALLY BE OUT OF RANGE OF THE TARGET COULD STILL BE USED BECAUSE OF BATTLE MIRRORS THAT WERE NEARER THE TARGET. A SIDE BENEFIT OF THE USE OF REMOTE BATTLE MIRRORS FOR SPACE BASED LASERS IS THAT THESE MIRRORS COULD BE NEARLY FLAT, AS COMPARED TO CURRENT CONCEPTS WHICH REQUIRE HIGHLY CURVED PRIMARY MIRRORS. THE NEARLY FLAT BATTLE MIRRORS COULD THUS BE FABRICATED FROM SEGMENTS OF FLAT MYLAR SHEETS, OR OTHER LIGHT WEIGHT MATERIAL.

SCHWARTZ ELECTRO-OPTICS INC — SDIO — $ 49,287
4806 N ORANGE BLOSSOM TRAIL
ORLANDO, FL 32810
DR PETER F MOULTON
TITLE:
TUNABLE SINGLE-FREQUENCY Nd:YAG LASERS FOR COHERENT LIDAR
TOPIC: 1 OFFICE: IST

SOME OF THE LASER RADARS PROPOSED FOR SPACE-BASED SENSORS ENGAGED IN SURVBEILLANCE, ACQUISITION AND TRACKING FOR THE STRATEGIC DEFENSE INITIATIVE MAY REQUIRE THE USE OF SINGLE-FREQUENCY LASERS FOR COHERENT, HETERODYNE DETECTION OF RETURN SIGNALS. IN SOME SENSOR CONFIGURATIONS THE RELATIVE VELOCITIES BETWEEN SOURCE AND TARGET MAY VARY WIDELY, REQUIRING WIDEBAND TUNABILITY OF THE LOCAL OSCILLATOR. THIS PROPOSAL CONCERNS THE FIRST PHASE OF AN EFFORT TO ADVANCE THE TECHNOLOGY OF TUNABLE, SINGLE-FREQUENCY Nd:YAG LASERS, A STEP TOWARDS MAKING THE Nd:YAG LASER SUITABLE FOR SPACE-BASED COHERENT LIDARS. THE WORK WOULD CONCENTRATE ON THE DESIGN, CONSTRUCTION AND CHARACTERIZATION OF DIODE-LASER-PUMPED, CW, LOW-POWER LASERS WITH SINGLE-FREQUENCY OUTPUT TUNABLE OVER A 30 GHZ RANGE.

SCIENCE & ENGINEERING ASSOCS INC — AF — $ 45,879
PO BOX 3722
ALBUQUERQUE, NM 87190
JAMES A KELLER
TITLE:
EXPLOSIVE EXCAVATION METHODS POTENTIAL IMPROVEMENTS
TOPIC: 106 OFFICE: AFBMO/PMX

AN EXTENSIVE REVIEW WILL BE MADE OF LITERATURE ON TECHNICAL DEVELOP-

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MENTS OR INNOVATIVE METHODS OF EXPLOSIVE EXCAVATION. THIS REVIEW WILL IDENTIFY ANY PROMISING CONCEPTS FOR REDUCING TIME REQUIRED OR IMPROVING PRODUCTIVITY IN DRILLING FOR BLASTS, LOADING BLAST HOLES, CHARGE DESIGN, VENTILATION AND FUME REMOVAL, AND MUCKING. THE GOAL OF THE STUDY IS TO IDENTIFY THOSE CONCEPTS WHICH MIGHT BE INTEGRABLE INTO THE POST ATTACK EGRESS SYSTEM FOR A DEEP UNDERGROUND BASE. IF SUCH IMPROVEMENTS CAN BE MADE, THEY COULD LEAD TO EXPLOSIVE EXCAVATION AS A SUPPLEMENT OR ALTERNATIVE TO TUNNEL BORING MACHINES. A FINAL REPORT WILL PRESENT THE RESULTS OF THE STUDY AND MAKE RECOMMENDATIONS FOR FURTHER DEVELOPMENT OF CANDIDATE CONCEPTS.

SCIENCE & ENGINEERING ASSOCS INC — AF — $ 47,500
PO BOX 3722
ALBUQUERQUE, NM 87190
JAMES A KELLER
TITLE:
NON-NUCLEAR HARD SILO KILL MECHANISMS INVESTIGATION
TOPIC: 119 OFFICE: AFBMO/PMX

A FAULT-TREE BASED ANALYSIS WILL BE MADE TO IDENTIFY INHERENT VULNERABILITIES OF A HARD SILO BASED BALLISTIC MISSILE. THESE VULNERABILITIES, IN FUNCTIONAL OR FAILURE MODE TERMS, WILL BE COMBINED WITH CONSTRUCTION ANALYSES OF SILO DESIGNS TO DETERMINE TARGET DAMAGE MODES, AND EFFECTS. A SERIES OF CONCEPTUAL NON-NUCLEAR KILL (NNK) MECHANISMS WILL BE EVALUATED, IN ORDER TO ESTABLISH THREAT INTENSITY LEVELS NECESSARY TO SECURE THE DAMAGE MODES PREVIOUSLY IDENTIFIED. ENGINEERING ESTIMATES AND INFORMED TECHNICAL OPINION WILL FORM THE BASIS OF FEASIBILITY ESTIMATES FOR MATURING THREAT TECHNOLOGY TO THE REQUIRED LEVEL BY THE 1990-2010 TIME FRAME. A FINAL REPORT DETAILS THE CURRENT AND PROJECTED POTENTIAL VULNERABILITIES, RECOMMENDS COUNTERMEASURES OR DESIGN CHANGES, AND OUTLINES ADDITIONAL RESEARCH NEEDS.

SCIENCE & ENGINEERING ASSOCS INC — AF — $ 49,644
2500 LOUISIANA NE - STE 610
ALBUQUERQUE, NM 87110
JOHN L DARBY
TITLE:
ICBM HARD MOBILE LAUNCHER SECURITY
TOPIC: 120 OFFICE: AFBMO/PMX

SEA, INC. PROPOSES THE DEVELOPMENT OF A METHODOLOGY TO DEFINE AND

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ASSESS POTENTIAL PHYSICAL SECURITY THREATS TO THE SMALL ICBM HARD MOBILE LAUNCHER (HML) AND TO DESIGN A COST EFFECTIVE SECURITY SYSTEM TO COUNTER THESE THREATS. THE METHODOLOGY WOULD ADDRESS SECURITY IMPLICATIONS DURING ALL OF THE PERTINENT ACTIVITIES THE HML EXPERIENCES DURING ITS LIFETIME. OPERATIONAL PHASES CONSIDERED RANGE FROM DURING CONSTRUCTION TO INSTALLATION TO ON STATION THROUGH RETIREMENT. THE GOAL OF THE METHODOLOGY WOULD BE TO PROVIDE AS ACCURATE A DEFINITION AS POSSIBLE OF THE ADVERSARY THREAT TO THE HML SYSTEM TOGETHER WITH AN EFFECITVE SECURITY SYSTEM TO THWART THIS ADVERSARY.

SCIENTIFIC COMPUTING ASSOCS INC AF $ 49,926
246 CHURCH ST - SUITE 408
NEW HAVEN, CT 06510
DR MARK W ANGEVINE
TITLE:
BUILDING A SOFTWARE PACKAGE FOR SOLVING LARGE SPARSE NONLINEAR SYSTEMS OF EQUATIONS
TOPIC: 199 OFFICE: AFOSR/XOT

WE PROPOSE TO BUILD A STATE-OF-THE-ART SOFTWARE PACKAGE FOR SOLVING GENERAL LARGE SYSTEMS OF NONLINEAR EQUATIONS. ALTHOUGH THERE ARE SEVERAL SOFTWARE PACKAGES FOR SOLVING LARGE SPARSE LINEAR SYSTEMS (SPARSEPACK, YSMP, HAREWELL, FOR EXAMPLE), SIMILAR PACKAGES FOR NONLINEAR SYSTEMS ARE ALMOST NONEXISTENT. WE PROPOSE TO CONSTRUCT A COLLECTION OF ROUTINES INCORPORATING WELL-ESTABLISHED VARIATIONS OF NEWTON'S METHOD AND THE LATEST RESEARCH DEVELOPMENTS IN NONLINEAR SYSTEMS SOLUTION. IN PARTICULAR, OUR PACKAGE WILL EMPLOY JACOBIAN-FREE METHODS. THESE ARE ESPECIALLY APPEALING BECAUSE OF THEIR FLEXIBILITY AND LOW MEMORY REQUIREMENTS. THE PACKAGE WILL BE EASY TO USE AND EFFICIENT.

SCIENTIFIC COMPUTING ASSOCS INC AF $ 47,248
246 CHURCH ST - STE 408
NEW HAVEN, CT 06510
DR MARK W ANGEVINE
TITLE:
MODIFICATION AND IMPROVEMENT OF SOFTWARE FOR MODELING MULTI-DIMENSIONAL REACTION FUEL FLOW
TOPIC: 64 OFFICE: AFWAL/PO

MODIFICATIONS OF EXISTING SOFTWARE EMPLOYED IN THE NUMERICAL MODELING

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OF MULTIDIMENSIONAL REACTING FUEL FLOWS ARE PROPOSED WHICH WOULD IMPROVE THE COMPUTATIONAL EFFICIENCY AND ROBUSTNESS OF SUCH METHODS AND ALLOW THE INCLUSION OF A MORE DETAILED REPRESENTATION OF THE CHEMICAL AND PHYSICAL PROCESSES INVOLVED. PRELIMINARY MODIFICATIONS WOULD PRESERVE THE GRIDDING AND DISCRETIZATION OF EXISTING CODES WHILE INCORPORATING THE FULL CHEMICAL KINETIC MECHANISM OF THE FLAME, AND REPLACING THE SOLUTION ALGORITHM FOR THE NONLINEAR DISCRETE SYSTEM WITH A MORE IMPLICIT VERSION EMPLOYING ROBUST VARIATIONS OF NEWTON'S METHOD FOR BETTER CONVERGENCE PROPERTIES. A SUBSTANTIAL NUMBER OF THE MODULES TO BE INCORPORATED ALREADY EXIST "IN HOUSE" AND HAVE BEEN SUCCESSFULLY USED ON ONE-DIMENSIONAL FULL CHEMISTRY PROBLEMS AND ON TWO-DIMENSIONAL IDEALIZED CHEMISTRY PROBLEMS. RESEARCH COMPARING THE EFFICIENCY OF VARIOUS SOLUTION ALGORITHMS FOR HIGHER-DIMENSIONAL FULL CHEMISTRY FLAMES IS STILL NEEDED BECAUSE OF THE TREMENDOUS NUMBER OF UNKNOWNS INVOLVED IN THE DISCRETIZATION. SUCH COMPARISONS WILL BE UNDERTAKEN UNDER PHASE I ON AN AXIALLY SYMMETRIC LAMINAR DIFFUSION FLAME. FURTHER MODIFICATIONS ARE PROPOSED CONCERNING THE COMPUTATIONAL GRID OVER WHICH THE SOLUTION IS DEFINED, WHICH WOULD ALLOW MORE ACCURATE AND MORE PHENOMENOLOGICALLY CORRECT MODELING IN PRACTICAL COMBUSTOR GEOMETRY AND IN TURBULENT FLOW.

SCIENTIFIC RESEARCH ASSOCS INC AF $ 69,766
PO BOX 498
GLASTONBURY, CT 06033
HAROLD L GRUBIN
TITLE:
NUMERICAL SIMULATION OF HIGH SPEED HETEROSTRUCTURE BIPOLAR TRANSISTORS
TOPIC: 19 OFFICE: AFWAL/AA

THIS DOCUMENT DISCUSSES A PROPOSED PROGRAM FOR THE TWO DIMENSIONAL NUMERICAL SIMULATION OF A HETEROJUNCTION AlGaAs/GaAs BIPOLAR TRANSISTOR WITH A WIDE-GAP EMITTER. HBT'S OFFER CONSIDERABLE REDUCTION IN SWITCHING SPEEDS AND IMPROVEMENTS IN CUT-OFF FREQUENCIES OVER THEIR HOMOJUNCTION COUNTERPARTS AND MAY ULTIMATELY PROVIDE SIGNIFICANT COMPETITION TO HIGH ELECTRON MOBILITY TRANSISTOR IN SWITCHING SPEEDS AT ROOM TEMPERATURE. HBT'S FABRICATED USING MBE TECHNOLOGY HAVE BEEN REPORTED TO OPERATE AT CUT-OFF FREQUENCIES ABOVE 10GHz, AND VALUES AS HIGH AS 100GHz, ARE EXPECTED FROM OPTIMIZED STRUCTURES. THE KEY TO ACHIEVING THE ANTICIPATED HIGH FREQUENCY PERFORMANCE IS THE ABILITY TO PROVIDE INFORMATION ON DEVICE CHARACTERISTICS AND

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OPTIMIZATION OF THE CONTROLLING PRIOR TO FABRICATION. THIS PROPOSAL ADDRESSES THE ABOVE NEEDS VIA NUMERICAL SIMULATION. IT IS PROPOSED TO EXAMINE THE ELECTRICAL CHARACTERISTICS OF AN AlGaAs/GaAs HBT VIA THE SOLUTION OF DRIFT AND DIFFUSION EQUATIONS IN TWO DIMENSIONS. ALSO ADDRESSED HERE, IS THE EFFECT OF GRADING THE HETEROSTRUCTURE BIPOLAR DEVICES.

SCIENTIFIC SYSTEMS INC — AF — $ 68,326
54 CAMBRIDGE PARK DR
CAMBRIDGE, MA 02140
WALLACE E LARIMORE
TITLE:
STATISTICAL METHODS USING PREDICTIVE INFERENCE AND ENTROPY DEVELOPMENT
TOPIC: 199 OFFICE: AFOSR/XOT

PREDICTIVE INFERENCE GIVES A NATURAL AND GENERAL TREATMENT OF MANY STATISTICAL INFERENCE PROBLEMS WHICH ARE DIFFICULT TO HANDLE OR EVEN FORMULATE USING TRADITIONAL METHODS. RECENT RESULTS SHOW THAT NEGATIVE ENTROPY IS THE NATURAL MEASURE OF MODEL APPROXIMATION ERROR WHICH FOLLOWS FROM FUNDAMENTAL PRINCIPLES OF INFERENCE. THE OBJECTIVE OF THE PROPOSED RESEARCH FOR PHASE I IS TO FURTHER EXTEND AND DEVELOP SPECIFIC PREDICTIVE INFERENCE METHODS USING THE NEGATIVE ENTROPY MEASURE IN THE AREAS OF (1) MODEL BUILDING INVOLVING DETERMINATION OF PARAMETRIC MODEL STRUCTURE AND ORDER IN THE GENERAL CASE OF MULTIPLE NONNESTED ALTERNATIVES, (2) TIME SERIES MODELING AND FORECASTING INVOLVING DETERMINATION OF PARAMETRIC MODEL STRUCTURE, AND (3) SMALL SAMPLE INFERENCE FOR MULTIVARIATE DISTRIBUTIONS OF THE EXPONENTIAL FAMILY. PHASE II WILL INVOLVE FURTHER DEVELOPMENT OF PREDICTIVE INFERENCE METHODS FOR OTHER STATISTICAL INFERENCE PROBLEMS SUCH AS MISSING DATA, NONPARAMETRIC INFERENCE, EXPERIMENTAL DESIGN, ETC. PHASE III WILL INVOLVE THE DEVELOPMENT AND IMPLEMENTATION OF COMPUTATIONAL METHODS AND ALGORITHMS FOR USE IN A STATISTICAL SOFTWARE PACKAGE.

SCOPE INC — AF — $ 49,712
1860 MICHAEL FARADAY DR
RESTON, VA 22090
DR JOHN F GREEN
TITLE:
DEVELOPING CONCEPTS FOR CUT-TO-CUT CORRELATION
TOPIC: 176 OFFICE: ESD/XRCT

SIGNAL PROCESSING CONCEPTS ARE PROPOSED TO BE DEVELOPED HERE TO

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IMPROVE PASSIVE IDENTIFICATION AND LOCALIZATION TO MULTIPLE SIMILAR EMITTERS. THESE CONCEPTS WILL BE DEVISED TO EXPLOIT AVAILABLE IDENTIFYING INTRINSIC AND EXTRINSIC EMITTER SIGNAL CHARACTERISTICS TO ENABLE ASSOCIATION OR CORRELATION OF COMMON SOURCE MEASUREMENTS FOR LOCALIZATION. INTRINSIC SIGNAL DISCRIMINATORS OF POTENTIAL INTEREST INCLUDE PHASE, INTERMODULATION ARTIFACTS, AND OTHER MODULATION NONLINEARITIES, AS WELL AS THE MORE COMMONLY ENCOUNTERED EMITTER PARAMETERS. THIS INVESTIGATION WILL EXAMINE THE POTENTIAL VALUE OF EXTRINSIC SIGNAL CHARACTERISTICS, SUCH AS PARASITIC MULTIPATHS, TO EFFECT EMITTER IDENTIFICATION IN THE PRESENT APPLICATION. QUALITATIVE AND QUANTITATIVE IDENTIFICATION PERFORMANCE ESTIMATES, IN THE CASE OF SELECTED EMITTERS, WILL BE GENERATED AS FAR AS POSSIBLE, FOR THE MORE PROMISING CONCEPTS. CRITICAL TECHNOLOGY AND INFORMATION FACTORS WILL BE SPECIFIED FOR THESE LATTER CONCEPTS.

SEA SPACE RESEARCH CO INC — NAVY — $ 48,043
1013 MANHATTAN BLVD - APT #8
HARVEY, LA 70058
PETER EDEL
TITLE:
USE OF HYDROGEN-OXYGEN AS A BREATHING GAS IN DEEP SEA DIVING EVALUATION
TOPIC: 53 OFFICE: NMC

THIS STUDY WOULD DEFINE THE STATE-OF-THE-ART FOR THE USE OF HYDROGEN-OXYGEN MIXTURES FOR DIVING OPERATIONS BY COMPILING INFORMATION RELATIVE TO PAST AND CURRENT RESEARCH EFFORTS IN THE U. S. AND FOREIGN COUNTRIES. THIS INFORMATION WOULD BE UTILIZED TO DEVELOP A RATIONALE FOR THE USE OF THIS MIXTURE FOR APPROXIMATE CONDITIONS AND DEFINE AREAS IN WHICH HYDROGEN-OXYGEN MIXTURES WOULD OFFER PHYSIOLOGICAL ADVANTAGES NOT POSSIBLE WITH CURRENTLY USED DIVING MIXTURES. FURTHER RESEARCH REQUIREMENTS PRIOR TO OPERATIONAL USE OF THIS MIXTURE WOULD BE INDICATED FROM THIS STUDY AND RECOMMENDATIONS FOR CURRENT AND FUTURE RESEARCH AND DEVELOPMENT NEEDS WOULD BE INCLUDED IN THE FINAL REPORT.

SECURITY VENTURES CORP — AF — $ 44,170
25 BLACK LATCH LANE
CHERRY HILL, NJ 08003
DR D ID SHEBY
TITLE:
BISPECTRUM FOR SPREAD SPECTRUM EMITTER FINGERPRINTING UTILIZATION
TOPIC: 176 OFFICE: ESD/XRCT

TECHNIQUES EXIST TO EXTRACT HARMONIC STRUCTURES UNDERLYING SPECIAL

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SIGNALS THAT ARE UNAVAILABLE FROM THE CONVENTIONAL FFT. THIS PROPOSAL, BASED ON INITIAL RESULTS, IDENTIFIES THOSE TECHNIQUES AND SUGGESTS HOW THEY MAY BE USED FOR SPECIAL TARGET RECOGNITION, AND CERTAIN TYPES OF SPREAD SPECTRUM DETECTION.

SEVEN MOUNTAINS SCIENTIFIC INC NAVY $ 30,000
PO BOX 650
BOALSBURG, PA 16827
DR E THOMAS CHESWORTH
TITLE:
COMPUTER SIMULATION OF ELECTRONIC COUNTERMEASURES (ECM)
TOPIC: 135 OFFICE: NPRDC

SEVEN MOUNTAINS SCIENTIFIC INC. PROPOSES A SIX-MONTH PHASE I EFFORT TO DEVELOP SIMULATED RADAR DISPLAYS ON HARDWARE COMPATIBLE WITH IBM PERSONAL COMPUTERS. THE DISPLAYS WILL BE REALISTIC REPLICAS OF RADAR DISPLAYS WHEN THE RADAR IS BEING INTERFERED WITH BY VARIOUS ELECTRONIC COUNTERMEASURES (ECM). THE RESULTANT SOFTWARE WILL BE USABLE ON A VARIETY OF INEXPENSIVE, READILY AVAILABLE PERSONAL COMPUTERS. THE PHASE I WORK WILL DEMONSTRATE THE FEASIBILITY OF USING INEXPENSIVE HARDWARE BY DISPLAYING A SMALL NUMBER OF ECM DISPLAYS. THE PHASE II WORK WILL EXPAND THIS FOLIO AND INTRODUCE MULTIPLE ECM TECHNIQUES AND TARGET SIMULATIONS.

SILICON CONNECTION INC NAVY $ 47,959
PO BOX 5118
PLEASANTON, CA 94566
JON M SCHROEDER
TITLE:
CONDUCTIVE POLYMER SYSTEM FOR MILITARY APPLICATIONS
TOPIC: 118 OFFICE: NWSC

THIS PROPOSAL DESCRIBES THE EVOLUTION OF A NEW ARCHITECTURE FOR THE CREATION OF ADVANCED ELECTRONIC SYSTEMS. THE CONCEPT INVOLVES THE USE OF CONDUCTING AND SEMICONDUCTING ORGANIC POLYMERS, WHICH ARE TREATED BY PROCESS, JUST AS INTEGRATED SILICON, TO FORM A THREE DIMENSIONAL, FINE PITCHED, LIGHTWEIGHT CONDUCTIVE NETWORK TO INTER-CONNECT VLSI/VHSIC CHIPS FOR MAXIMIZED PERFORMANCE. IT IS PROPOSED

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THAT PASSIVE COMPONENTS SUCH AS PULL UP AND TERMINATION RESISTORS BE INTEGRATED BY PROCESS (SIMILAR TO MOS) TO PRODUCE UPRECEDENTED PERFORMANCE AND CIRCUIT DENSITIES. I/O TUNED, DISTRIBUTED IMPEDENCE, SHIELDED, TRANSMISSION LINES WOULD RESULT FROM THIS DEVELOPMENT AND THE INCREASE IN SYSTEM SPEED WILL HAVE SIGNIFICANT MILITARY IMPACT.

SIMULA INC ARMY $ 50,000
2223 S 48TH ST
TEMPE, AZ 85282
JAMES C WARRICK
TITLE:
IMPROVED PRESSURE MANAGEMENT DEVICE FOR LANDING GEAR SHOCK-ABSORBING STRUTS DEVELOPMENT
TOPIC: 22 OFFICE: AVSCOM

MODERN MILITARY AIRCRAFT ARE EXPECTED TO PROTECT THEIR OCCUPANTS IN CRASHES OF UP TO 42-FT./SEC. SINK RATE, WHICH CAUSES VERY RAPID COMPRESSION OF THE LANDING GEAR SHOCK STRUTS. IN THIS CRASH CONDITION, ONE WAY TO PREVENT EXCESSIVE PRESSURE WITHIN A STANDARD AIR/OIL SHOCK STRUT IS TO DISCHARGE FLUID THROUGH A RELIEF VALVE. THE OBJECTIVE OF THIS PROPOSED EFFORT IS TO DEMONSTRATE FEASIBILITY BY DEVELOPING AND TESTING A SUITABLE RELIEF VALVE. THE DESIGN WILL BE REFINED BY A DYNAMIC COMPUTER SIMULATION WHICH WILL TREAT ALL RELEVANT AIRCRAFT AND SHOCK STRUT PARAMETERS, INCLUDING ALL FORCES, MASSES, AND MOTIONS WITHIN THE RELIEF VALVE ITSELF. HARDWARE WILL THEN BE BUILT AND DYNAMICALLY DROP TESTED.

SIMULA INC ARMY $ 49,500
2223 S 48TH ST
TEMPE, AZ 85282
S P DESJARDINS
TITLE:
CRASHWORTHY CREWSEAT ADVANCEMENT
TOPIC: 23 OFFICE: AVSCOM

A FEASIBILITY STUDY OF MEANS OF WEIGHT REDUCTION IN CRASHWORTHY ARMORED CREWSEATS OF THE TYPE USED IN NEWER ARMY HELICOPTERS. THE STUDY SHALL FOCUS PRIMARILY ON THREE APPROACHES TO WEIGHT REDUCTION: A LIGHTER ARMOR SYSTEM THROUGH ADVANCED MATERIALS AND/OR PROCESSES,

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A LIGHTER STRUCTURE THROUGH THE USE OF HIGH-STRENGTH FIBER COMPOSITE CONSTRUCTION, AND REDUCED PARASITIC WEIGHT THROUGH ADVANCED DYNAMIC ANALYSIS TECHNIQUES. THE FEASIBILITY STUDIES WILL BE SUPPORTED BY SAMPLE TESTS OF ARMOR AND COMPOSITES.

SIMULA INC — ARMY — $ 49,250
2223 S 48TH ST
TEMPE, AZ 85282
S P DESJARDINS
TITLE:
IMPROVED AIRCREW RESTRAINT SYSTEM DEVELOPMENT
TOPIC: 24 OFFICE: AVSCOM

A PROGRAM IS HEREIN DESCRIBED THAT WILL ESTABLISH THE POSSIBLE IMPROVEMENTS IN EXISTING RESTRAINT SYSTEMS AND THROUGH A CONCEPTUAL AND DEVELOPMENTAL TRADEOFF PHASE, ESTABLISH FEASIBILITY OF AT LEAST ONE CONCEPT THAT WILL REPRESENT A QUANTUM STEP IN THE PERFORMANCE OF CREW RESTRAINT SYSTEMS. THE PROGRAM CONSISTS OF CONCEPT TRADEOFF, OPERATIONAL AND STATIC AND DYNAMIC TESTING, AND SELECTION OF A CONCEPT OR CONCEPTS TO BE CARRIED INTO PHASE 2 FOR FURTHER EVALUATION AND DEVELOPMENT.

SKANTEK TECHNOLOGIES INC — NAVY — $ 68,605
150 MOUNT BETHEL RD
WARREN, NJ 07060
WILLIAM PFERD III
TITLE:
MAGNETO-OPTIC OPTICAL FIBER ELECTROPHOTOGRAPHIC PRINTER FEASIBILITY STUDY
TOPIC: 41 OFFICE: NSSC

THE OBJECTIVE OF THIS EXPLORATORY DEVELOPMENT PROPOSAL IS TO CHARACTERIZE THE TECHNICAL PERFORMANCE OF A MAGNETO-OPTIC/OPTICAL FIBER (MOOF) OPTICAL SYSTEM FOR USE IN ELECTROPHOTOGRAPHY. A MOOF TEST ASSEMBLY WILL BE CONSTRUCTED FOR MEASUREMENT PURPOSES AND STUDIES WILL BE UNDERTAKEN OF RELEVANT TECHNICAL ISSUES INVOLVED IN APPLYING THE MOOF TO A HIGH-SPEED MONOCHROMATIC ELECTROPHOTOGRAPHIC SYSTEM TO PRINT 40 INCH WIDE DOCUMENTS.

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SOURCE TECHNOLOGIES INC — AF — $ 48,627
280 INTERSTATE NORTH PKWY - STE 250
ATLANTA, GA 30339
BARRY G WAHLIG
TITLE:
HAND-HELD INTEGRATING DOSIMETER USING A COMPOUND SEMICONDUCTOR DETECTOR
TOPIC: 208 OFFICE: AMD/RDO

A HAND HELD, ELECTRONIC, INTEGRATING DOSIMETER PRODUCING A REAL TIME DISPLAY, AND USING A SOLID STATE DETECTOR, IS TO BE DEVELOPED FOR THE IMMEDIATE PURPOSE OF MEASURING ABSORBED DOSE DUE TO THE VARIETY OF DIRECTLY IONIZING RADIATIONS ENCOUNTERED IN HIGH ALTITUDE AND SPACE FLIGHTS. THE CHOSEN APPROACH IS TO USE A COMPOUND SEMICONDUCTOR DETECTOR, SUCH AS CADMIUM TELLURIDE, AS A SPECTROMETER, AND TO INTEGRATE THE CHARGE PRODUCED BY THE DETECTOR AS THE INDICATOR OF THE ENERGY ABSORBED. COMPOUND SEMICONDUCTOR DETECTORS ARE SMALL IN SIZE AND LOW IN POWER CONSUMPTION; THEY ALSO OFFER SPECTROSCOPIC PERFORMANCE WITH LOW NOISE AND ACCEPTABLE RESOLUTION WHEN OPERATED AT AMBIENT TEMPERATURE. PHASE I WILL BE CONCERNED PRIMARILY WITH THE DETERMINATION OF THE FEASIBILITY OF THE PROPOSED DETECTION METHOD. IT WILL INCLUDE A SEARCH OF THE LITERATURE FOR APPLICATIONS OF COMPOUND SEMICONDUCTORS TO DOSIMETRY; CHOICE OF A CANDIDATE DETECTOR; DESIGN, FABRICATION, AND INTEGRATION OF A TEST SYSTEM FOR THE DETECTOR; ACQUISITION OF DATA FOR THE EVAULATION OF THE DETECTOR AS A DOSIMETER FOR MULTIPLE IONIZING RADIATION TYPES; EVALUATION OF THE TEST DATA FOR REQUIRED IMPROVEMENTS; AND PRELIMINARY DESIGN OF THE PROTOTYPE DOSIMETER TO BE CONSTRUCTED IN PHASE II.

SOUTHWEST RESEARCH & DEVELOPMENT CO — NAVY — $ 47,066
4540 N ROCKY CREEK CIRCLE
TUCSON, AZ 85715
DR RICHARD ZITO
TITLE:
DRAM ALPHA PARTICLE EFFECTS
TOPIC: 122 OFFICE: NWSC

IN THE PROPOSED RESEARCH WE WILL BE DETERMINING THE BIT ERROR RATE FOR 64K AND 256K DRAM AS A FUNCTION OF ALPHA PARTICLE RADIATION DOSE. THREE PARAMETERS WILL BE VARIED: THE DEVICE (CHIPS FROM DIFFERENT

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MANUFACTURERS WILL BE CHOSEN), THE BOMBARDING PARTICLE ENERGY, AND THE BEAM CURRENT. THIS INFORMATION SHOULD ALLOW AN ACCURATE EVALUATION OF THE NUMBER OF SOFT FAILS DUE TO ALPHA PARTICLES FROM TERRESTRIAL RADIOACTIVITY.

SPACE POWER INC — SDIO — $ 0
253 HUMBOLDT CT
SUNNYVALE, CA 94089
JOSEPH R WETCH
TITLE:
COMPACT CLOSED CYCLE BURST POWER SYSTEMS
TOPIC: 2 OFFICE: IST

THIS PROPOSAL DESCRIBES AN INNOVATIVE THERMAL ENERGY ABSORPTION, STORAGE AND DISSIPATION CONCEPT THAT ENABLES THE DEVELOPMENT OF VERY COMPACT, MANEUVERABLE, CLOSED CYCLE, MULTIMEGAWATT SPACE BURST POWER SYSTEMS. THE CONCEPT CAN BEST BE APPLIED TO THE ADVANCED, HIGH POWER DENSITY, INCORE THERMIONIC BURST POWER SYSTEMS, TO THE POTASSIUM OR SODIUM RANKINE CYCLE REACTOR BURST POWER SYSTEMS; OR, POTENTIALLY, TO MHD BURST POWER SYSTEMS COUPLED TO PULSED GASEOUS CORE NUCLEAR REACTORS. THE CONCEPT FACILITATES REPETITIVE FIRING OF THE BURST POWER SYSTEM ON EACH SUCCESSIVE ORBIT. THE RESULTING POWER SYSTEM CAN BE TESTED AND DEMONSTRATED MANY TIMES AND CAN CONTINUE A STATE OF MAXIMUM READINESS WITHOUT LOGISTICAL SUPPORT. THE RESULTING POWER SYSTEMS CAN BE COMPACT FOR SINGLE VEHICLE LAUNCH WITH PAYLOAD, AND CAN BE SELF DEPLOYED AT OPERATIONAL OR PARKING ORBITS.

SPACE SCIENCE & ENGINEERING INC — AF — $ 49,980
UTAH STATE UNIV RSCH & TECH PK UMC 96
LOGAN, UT 84322
HAROLD J ENGEBRETSON
TITLE:
INERTIAL NAVIGATION UNIT FOR TACTICAL WEAPONS RESEARCH AND DEVELOPMENT
TOPIC: 190 OFFICE: AD/PRM

SPACE SCIENCE AND ENGINEERING (SSE) WILL STUDY CANDIDATE INSTRUMENTS AND HOSTING ENVIRONMENTS NECESSARY FOR AN INITIAL SYSTEM FOR ACCURATE TACTICAL WEAPONS. THE SSE INVESTIGATORS ARE FAMILIAR WITH THE LATEST

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INSTRUMENTS AND HAVE ANALYZED GIMBALED SYSTEMS FOR PRIME WEAPON SYSTEM. ACQUISITION COST, RELIABILITY, ACCURACY, RUGGEDNESS, LIFE CYCLE COST, AND SUPPORTABILITY WILL BE REVIEWED IN DEPTH. NEW INSTRUMENTS, CALIBRATION TECHNIQUES, ALIGNMENT PROCEDURES AND TACTICAL ENVIRONMENTS WILL BE CAREFULLY ANALYZED.

SPACE SCIENCE & ENGINEERING INC — ARMY — $ 51,177
UTAH STAT UNIV RSCH & TECH PK - UMC 96
LOGAN, UT 84322
LAMAR K TIMOTHY
TITLE:
INERTIAL INSTRUMENT/SYSTEM INITIALIZATION/CALIBRATION TECHNOLOGY
TOPIC: 62 OFFICE: MICOM

SSE WILL DEVELOP CALIBRATION AND INITIALIZATION TECHNIQUES FOR CANDIDATE LCI MISSILE SYSTEMS. INITIAL CONDITIONS WILL BE CHARACTERIZED WITH RESPECT TO EXPECTED ENVIRONMENTS, REACTION TIMES, ACCURACIES, AND RELIABILITY EXPECTATIONS. LIFE CYCLE COSTING WILL BE STRESSED. CANDIDATE OPTIONS WILL BE ANALYZED SPECIFICALLY FOR TRADEOFFS IN WEAPON SYSTEM EFFECTIVENESS INITIAL COSTS, MAINTAINANCE COSTS, READINESS AVAILABILITY, COMMONALITY OF SUBSYSTEMS FOR APPLICATIONS REQUIRING DIFFERENT LEVELS OF PERFORMANCE, AND TRAINING COSTS AND COMPLEXITY. POTENTIAL FOR UPGRADING WILL BE ADDRESSED TO ACCOMMODATE CHANGING REQUIREMENTS OVER LIFE OF THE WEAPON SYSTEM. OPTIONS USING THE SAME BASIS COMPONENTS FOR INTERCHANGEABILITY, ECONOMICS OF PRODUCTION AND SUPPLY, TESTING COMMONALITIES AND TRAINING SIMPLICITY. THE INVESTIGATORS AND UPGRADING MISSILE GUIDANCE SYSTEMS FOR THE DEFENSE DEPARTMENT. THEY HAVE BEEN ASSOCIATED WITH THE MAJOR MANUFACTERS OF INERTIAL INSTRUMENTS AND WILL REVIEW THE CURRENT CAPABILITY OF THE INDUSTRY. AN INTENSIVE EFFORT IS PLANNED THAT WILL LEAD TO COMPLETE DESIGN STUDIES IN THE LATER PHASES.

SPACE SYSTEMS ENGINEERING INC — AF — $ 69,460
UTAH STATE UNIV -RSCH & TECH PK/UMC 96
LOGAN, UT 84322
DORAN BAKER
TITLE:
TRANSATMOSPHERIC MISSION SENSOR TECHNOLOGY
TOPIC: 13 OFFICE: ASD/XR

IT IS PROPOSED TO SURVEY, CATEGORIZE AND SUMMARIZE INTO A MICROCOM-

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PUTER DATA BASE ATTRIBUTE INFORMATION ON SENSOR WITH APPLICATION ON AEROSPACE VEHICLES OPERATING IN TRANSATMOSPHERIC REGION. THE MOST PROMISING INNOVATIVE APPROACHES TO IMPROVING THE SENSOR TECHNOLOGY WILL BE IDENTIFIED, AND FEASIBILITY STUDIES ON THESE WILL BE PERFORMED. A DESIGN STUDY WILL BE MADE ON MICROMINIATURE RADIOMETER INCORPORATING MICROCIRCUITS, INBOARD/OUTBOARD TECHNIQUES AND ARTIFICIAL INTELLIGENCE.

SPACE TECH CORP AF $ 44,887
2324 MANCHESTER CT
FORT COLLINS, CO 80526
MICHAEL ANDREWS
TITLE:
ADAPTIVE ALGORITHMS FOR ADAPTIVE BEAM COMMUNICATION ANTENNAS ARCHITECTURAL STUDY
TOPIC: 178 OFFICE: RADC

AN ADAPTIVE ALGORITHM STUDY FOR ARRAY SIGNAL PROCESSORS IS SOUGHT. THE BASIC APPROACH IS TO STUDY THE HARDWARE/SOFTWARE TRADEOFFS OF CONVENTIONAL (VON NEUMANN) AND NON-VON (PARALLEL, PIPELINE, VECTOR, ARRAY, AND CUSTOM PROCESSORS) WITH NONCONVENTIONAL ARITHMETIC (SBNR) IN AN ATTEMPT TO IDENTIFY OPTIMAL ALGORITHMS (OF ORDER AREA X TIME) WHICH ARE COMPUTATIONALLY FAST YET FLEXIBLE. A TWO STEP PROCESS IS ASSUMED; FIRST THE SEQUENTIAL ALGORITHMS ARE TO BE SPEEDED-UP (SEEKING INHERENT PARALLELISM) AND SECOND, FAST ALGORITHMS ARE TO BE MAPPED ONTO NEW VLSI ARCHITECTURES (VIA RECURSION AND PIPELINING). THE PURPOSE OF THIS STUDY IS TO PROVIDE THEORETICAL DESIGN TOOLS AND INTERCONNECTION STRATEGIES CAPABLE OF ACHIEVING REAL-TIME IMPLEMENTATION OF SIGNAL PROCESSING ALGORITHMS VIA LIMITED USER-PROGRAMMABLE MECHANISMS (E.G., FIRMWARE). FLEXIBLE FIRMWARE-ORIENTED ARCHITEC TURES DEDICATED TO SIGNAL PROCESSING CAN THEN BE IDENTIFIED. A SYSTOLIC ARRAY FOR PERFORMING RECURSIVE LEAST-SQUARES MINIMIZATION IS PROPOSED. IT PERFORMS AN ORTHOGONAL TRIANGULARIZATION OF THE DATA MATRIX USING A PIPELINED SEQUENCE OF GIVENS ROTATIONS AND GENERATES THE REQUIRED RESIDUAL WITHOUT HAVING TO SOLVE THE ASSOCIATED TRIANGULAR LINEAR SYSTEM BY BACK-SUBSTITUTION.

SPARTA INC AF $ 48,915
23293 S POINTE DR
LAGUNA HILLS, CA 92653
PAUL J ROHDE
TITLE:
EFFECTS OF NOISE ON DISCRIMINATION OF DECOYS
TOPIC: 81 OFFICE: AFBMO/PMX

THE CONCEPT OF EMPLOYING REENTRY DECOYS IN ORDER TO CONFUSE THE

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DEFENSE AND INCREASE THE PROBABILITY OF RV PENETRATION IS AN ATTRACTIVE OFFENSIVE OPTION. THE SUCCESS OF A RESOURCE LIMITED DEFENSE AGAINST THIS OFFENSE TACTIC RESTS HEAVILY ON ITS CAPABILITY TO PERFORM THE DECOY/RV DISCRIMINATION FUNCTION WITH HIGH PERFORMANCE. THEREFORE, THE OFFENSE IN ASSESSING ITS EFFECTIVENESS REQUIRES A GOOD QUANTITATIVE MEASURE OF THE DEFENSE'S DISCRIMINATION CAPABILITY. THE OFFENSE IS ALSO INTERESTED IN ANY MEANS BY WHICH THIS DISCRIMINATION CAPABILITY CAN BE EFFECTIVELY REDUCED. THE USE OF A JAMMER ECM THREAT AGAINST THE RADAR IN CONJUNCTION WITH DECOYS HAS THE POTENTIAL TO BE MORE COST EFFECTIVE THAN DECOYS BY THEMSELVES. THE EFFECTIVENESS OF THE JAMMER TACTIC IS RELATED TO THE LEVEL OF DISCRIMINATION DEGRADATION PRODUCED BY THE JAMMER INDUCED RADAR NOISE. WE PROPOSE TO DEVELOP A METHODOLOGY FOR CREATING AND EVALUATING THE EFFECT OF A CLOUD OF JAMMERS ON A DEFENSIVE RADAR'S ABILITY TO DISCRIMINATE DECOYS FROM REENTRY VEHICLES. THE METHOD INCLUDES A MEANS OF DETERMINING, THROUGH SIMULATION, EQUIVALENT DISCRIMINATION K-FACTOR (K = DELTA MICRON/SIGMA) AS A FUNCTION OF RADAR SIGNAL TO NOISE RATIO. THE DISCRIMINATION DATA ALSO PERMITS A PERFORMANCE EVALUATION OF THE USE OF ALTERNATE MEANS FOR THRESHOLD SELECTION IN THE JAMMER SCENARIO.

SPARTA INC — AF — $ 48,915
23293 S POINTE DR - STE 250
LAGUNA HILLS, CA 92653
CHARLES M BISHOP
TITLE:
OPTIMUM NAVIGATION
TOPIC: 84 OFFICE: AFBMO/PMX

GUIDANCE LAWS THAT OPTIMALLY UTILIZE THE ENERGY AVAILABLE FROM DISTURBANCES TO AID THE GUIDANCE MAY MINIMIZE THE WEIGHT AND VOLUME OF THE GUIDANCE SYSTEM WHILE PROVIDING ACCURATE TERMINAL HOMING. CLASSICAL GUIDANCE LAWS, INCLUDING PROPORTIONAL NAVIGATION GUIDANCE (PNG) PROVIDE ACCURACY BUT DO NOT MINIMIZE OR UTILIZE DISTURBANCE EFFECTS. MODERN TECHNIQUES SUCH AS LINEAR-QUADRATIC-GAUSSIAN OPTIMAL CONTROL TREAT DISTURBANCES AS NOISE. THIS DOES NOT PROPERLY ACCOUNT FOR WAVEFORM DISTURBANCES, SUCH AS WIND, OFTEN RESULTING IN DEGRADED PERFORMANCE DURING REALISTIC DISTURBANCES. SPARTA PROPOSES TO STUDY TWO GUIDANCE TECHNIQUES, INTEGRAL GUIDANCE (IG), AND NOISY DISCRETE DISTURBANCE UTILIZING CONTROL (NDDUC), WHICH HAVE, IN PAST APPLICA-

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TIONS, PROVIDED EXCELLENT ACCURACY IN TERMINAL HOMING MISSILES WITH REALISTIC DISTURBANCES. IG IS SIMILAR TO PNG EXCEPT THAT A LINE-OF-SIGHT ANGLE TERM IS ADDED TO THE GUIDANCE LAW WHICH MINIMIZES THE EFFECTS OF DISTURBANCES. NDDUC IS AN IMPROVEMENT OVE LQG METHODS IN THAT WAVEFORM DISTURBANCES ARE CONSIDERED IN FORMULATION OF GUIDANCE LAWS AND PROCEDURES ARE STRUCTURED SO THAT FORCES CAUSED BY DISTURBANCES ARE OPTIMALLY UTILIZED IN PROVIDING CONTROL FORCES, THUS MINIMIZING THE ENERGY REQUIRED FOR GUIDANCE.

SPARTA INC AF $ 61,607
PO BOX 713
REDONDO BEACH, CA 90277
DR HARRY B DYNER
TITLE:
EXPERIMENT DESIGN FOR ANTENNA WINDOW INTERACTION AND PLASMA ATTENUATION
TOPIC: 96 OFFICE: AFBMO/PMX

ADVANCED REENTRY VEHICLES ARE BEING PROPOSED THAT USE ON-BOARD ELECTROMAGNETIC SYSTEMS FOR ACCURACY IMPROVEMENT (TERMINAL HOMING AND TERRAIN SENSORS) AND ECM APPLICATION. THE PERFORMANCE OF THESE SYSTEMS IS DEGRADED BY THE EFFECTS OF NON-UNIFORM ANTENNA WINDOW ABLATION AND THE BOUNDARY LAYER AND SHOCK LAYER PLASMA WHICH FORM DURING ATMOSPHERIC REENTRY. THE COMPLEXITY OF THIS PROBLEM IS BEYOND THE SCOPE OF PRESENT DAY ANALYTICAL METHODS. GROUND TESTS ARE REQUIRED TO COMPLEMENT THE ANALYSES. APPROPRIATE SIMULATION MUST BE ACHIEVED FOR THE TESTS TO BE USEFUL. WE PROPOSE TO DESIGN INNOVATIVE GROUND TESTS USING EXISTING FACILITIES TO PROVIDE THE DATA FOR THE ASSESSMENT OF REENTRY VEHICLE ELECTROMAGNETIC SIGNAL PROPAGATION.

SPARTA INC AF $ 73,155
23293 S POINTE DR - STE 250
LAGUNA HILLS, CA 92653
DR HARVEY M BERKOWITZ
TITLE:
FLEXIBLE OVERLAYS FOR INFLATABLE DECOYS
TOPIC: 98 OFFICE: AFBMO/PMX

SPARTA, INC. HEREIN PROPOSES A SBIR PHASE I PROGRAM THAT WILL

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ANALYTICALLY ESTABLISH THE TECHNICAL MERIT AND FEASIBILITY OF DEVELOPMENT OF FLEXIBLE OVERLAY CONCEPTS FOR USE IN MaRV-COMPATIBLE INFLATABLE DECOYS. THE PROPOSED EFFORT WILL (1) IDENTIFY AND ANALYTICALLY QUANTIFY THE MATERIAL PROPERTIES REQUIRED FOR SUCESSFUL FUNCTIONING OF THE FLEXIBLE OVERLAYS, (2) DEVISE CANDIDATE MATERIALS CONCEPTS THAT APPEAR TO SATIFY THE IDENTIFIED PROPERTY REQUIREMENTS, (3) ESTABLISH THE MATERIALS PROPERTIES AND/OR FUNCTIONAL PERFORMANCE DATA BASES EXISTING FOR SUCH CONCEPTS, AND (4) DEVELOP PLANS FOR CONCEPTS DESIGN AND ANALYSIS, CONCEPTS MATERIALS PROPERTIES TESTING, CONCEPTS FABRICATION AND CONCEPTS VERIFICATION TESTING THAT WOULD BE CONDUCTED DURING THE FOLLOW-ON SBIR PHASE II DEVELOPMENT EFFORT.

SPARTA INC — AF — $ 73,362
23293 S POINTE DR - STE 250
LAGUNA HILLS, CA 92653
DR HARVEY M BERKOWITZ
TITLE:
LASER DAMAGE TO REENTRY VEHICLE ANTENNA WINDOWS
TOPIC: 100 OFFICE: AFBMO/PMX

SPARTA, INC. PROPOSES AN ANALYTICAL AND EXPERIMENTAL STUDY TO DETERMINE THE VULNERABILITY AND HARDNESS (V&H) OF TYPICAL RV ANTENNA WINDOWS AND COMPONENTS TO LASER EXPOSURE, AND TO IDENTIFY HARDENING TECHNIQUES IF NEEDED. PHASE I WILL (1) ESTABLISH THE DATA BASE EXISTING FOR V&H ANALYSES AND IDENTIFY DATA GAPS, (2) IDENTIFY POTENTIAL VULNERABILITIES OF ANTENNA DESIGNS REPRESENTATIVE OF CURRENT AND FUTURE SYSTEMS AND ESTABLISH THE MODES AND MAGNITUDES OF DAMAGE REQUIRED TO IMPACT MISSION PERFORMANCE, (3) ESTIMATE THE MAGNITUDES OF THE CW, RP AND SP THREAT PARAMETERS THAT WILL INDUCE SUCH DAMAGE, (4) DEVISE CANDIDATE HARDENED MATERIALS AND/OR TECHNIQUES AND ESTIMATE THEIR HARDNESS LEVELS, (5) RECOMMEND SPECIFIC PHASE II TESTING TO OBTAIN MISSING PROPERTIES, (6) IDENTIFY REQUIRED ANALYTICAL MODELING AND ESTABLISH THE ASSOCIATED ANALYSIS PLANS FOR DETAILED V&H ANALYSES TO BE CONDUCTED DURING PHASE II, AND (7) RECOMMEND TESTING OF HARDNESS OF UNHARDENED DESIGNS AND EVALUATION TESTING OF HARDENED MATERIALS AND/OR HARDENING TECHNIQUES DEVISED DURING THE PHASE I STUDY DESCRIBED HEREIN.

SPARTA INC — AF — $ 48,813
4901 CORPORATE DR - STE 102
HUNTSVILLE, AL 35805
DR F P GIBSON
TITLE:
IMPACT OF DIRECTED ENERGY WEAPON (DEW) DEPLOYMENT ON PENETRATION AIDS
TOPIC: 107 OFFICE: AFBMO/PMX

THE ADVENT OF DIRECTED ENERGY WEAPON (DEWs) HAS GENERATED NEW POSSI-

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BILITIES FOR HIGH TECHNOLOGY WARFARE. THESE NEW WEAPON CONCEPTS, RANGING FROM HIGH ENERGY LAERS TO NEUTRAL PARTICLE BEAMS, WILL, UNDOUBTEDLY HAVE A MAJOR IMPACT ON THE SHAPE OF FUTURE STRATEGIC MISSILE OFFENSE AND DEFENSE. WHILE DEWs SHOW LITTLE PROMISE AS A DEFENSE AGAINST ATTACKING REENTRY VEHICLES, THE DEPLOYMENT OF A SYSTEM OF DEFENSIVE DEWs BY THE SOVIET UNION MAY SERIOUSLY DEGRADE MISSION EFFECTIVENESS OF U.S. PENETRATION AIDS. THIS IS DUE NOT ONLY TO VULNERABILITY OF CERTAIN PENAIDS TO DIRECTED ENERGY BUT ALSO THE POSSIBLE USE OF DIRECTED ENERGY TO DISCRIMINATE BETWEEN RVs AND PENETRATION AIDS. WE PROPOSE TO ESTABLISH U.S. PENAID VULNERABILITY TO DESTRUCTION AS WELL AS TO DISCRIMINATION BY THREAT DIRECTED ENERGY WEAPONS AND ANALYZE THE IMPACT ON PENAID EFFECTIVENESS. WE WILL THEN EXAMINE THE EFFECTIVENESS OF INVENTIVE COUNTERMEASURES TO THESE WEAPONS. TO ACCOMPLISH THESE TASKS, WE WILL CONSTRUCT FIRST ORDER COMPUTER MODELS OF POSSIBLE WEAPON-TARGET INTERACTIONS AND INSERT THEM INTO AN EXISTING HIGH LEVEL SPACE-BASED DIRECTED ENERGY SYSTEMS SIMULATIONS.

SPARTA INC — AF — $ 73,370
23293 S POINTE DR - STE 250
LAGUNA HILLS, CA 92653
DR LOWELL D MCMILLEN
TITLE:
COMPOSITE EROSION TEST AND MODEL DEVELOPMENT
TOPIC: 122 OFFICE: AFBMO/PMX

A STUDY IS PROPOSED TO DEVELOP A FIRST-ORDER MODEL FOR ASSESSING COUPLED ABLATION/EROSION RESPONSE OF COMPOSITE MATERIALS USED FOR NOSETIPS AND HEATSHIELDS ON VARIOUS VEHICLES. THIS MODEL WILL BE DEVELOPED FROM AVAILABLE EROSION DATA AND SELECTED SINGLE IMPACT EROSION DATA OBTAINED ON VIRGIN AND CHARRED MATERIALS. UNCERTAINTY BOUNDS FOR VARIOUS MATERIAL AND ENVIRONMENTAL INFLUENCE VARIABLES WILL BE ESTABLISHED AND THEIR CONTRIBUTION TO VEHICLE PERFORMANCE ASSESSED. A FOLLOW-ON PROGRAM WILL BE FORMULATED TO PROVIDE THE DEVELOPMENT OF A COMPREHENSIVE COUPLED ABLATION/EROSION MODEL ON SELECTED STATE OF THE ART AND ADVANCED MATERIALS FOR THREAT VEHICLES.

SPARTA INC — ARMY — $ 49,997
23293 S POINTE DR
LAGUNA HILLS, CA 92653
DONALD E SCHUMACHER
TITLE:
CO-CHANNEL INTERFERENCE REJECTION DIRECTION FINDING (DF) PROCESSING TECHNIQUES
TOPIC: 35 OFFICE: CECOM/EWL

DIRECTION FINDING OF SIGNALS OF INTEREST IN THE PRESENCE OF CO-CHANNEL

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INTERFERING SIGNALS, WHICH MAY VARY IN PULSE WIDTH, MODULATION TECHNIQUE OR BE CONTINUOUS WAVE (CW), REQUIRES AN OPTIMIZED RECEIVER AND SIGNAL PROCESSING SYSTEM. THE INCREASING DENSITY OF THREAT EMITTERS COUPLED WITH THE EMPLOYMENT OF MORE COMPLEX WAVE FORMS (PULSE COMPREHENSION, AND PULSE CODING, ETC.) MADE POSSIBLE BY ADVANCING TECHNOLOGY, MAKES DETECTION, PROCESSING AND ACCURATE DIRECTION FINDING EXTREMELY DIFFICULT. SPARTA, PROPOSED TO ANALYZE THE SUBJECT PROBLEM APPLYING THE LATEST IN TECHNOLOGY EVALUATING, CHANNELIZED AND COMPRESSIVE TECHNIQUES AS WELL AS DIGITAL FILTERING AND TIME DIFFERENCE OF ARRIVAL TECHNIQUES. THESE TECHNIQUES MUST IN THE AGGREGATE EFFECTIVELY DETECT, PRESERVE PHASE, ASSIGN TIME OF ARRIVAL TO REJECT INTERFERENCE AND ASSIGN DIRECTION TO PULSES OR SIGNALS OF INTEREST. SPARTA INTENDS TO CARRY THESE ALTERNATE SOLUTIONS EITHER PART WAY OR THROUGHOUT PHASE ONE (DEPENDING ON THE CUSTOMER'S DIRECTION) IN ORDER TO ENSURE ADEQUATE EVALUATION OF THE PROBLEM AND PROVIDE COMPARATIVE AND PARAMETRIC ANALYSIS.

SPARTA INC — AF — $ 49,034
7926 JONES BRANCH DR - STE 1070
MCLEAN, VA 22102
DOUGLAS L HOGAN
TITLE:
INTELLIGENT NOISE STRIPPING FOR SPEECH ENHANCEMENT
TOPIC: 173 OFFICE: RADC/DORM

THIS PROJECT WILL INVESTIGATE THE FEASIBLITY AND BENEFITS OF AN EXPERT SYSTEMS APPROACH TO NOISE STRIPPING. IN A COMMUNICATION ENVIRONMENT THAT CONSISTS OF A LIMITED VOCABULARY AND LIMITED INFORMATION EXCHANGE, ADVANTAGE CAN BE TAKEN OF PRIOR KNOWLEDGE OF THE ENVIRONMENT IN ORDER TO "GUESS" AT THE CONTENT OF A MESSAGE. THE FOCUS OF THIS PROJECT WILL BE TO INVESTIGATE THE FEASIBILITY AND BENEFITS OF UTILIZING AN EXPERT SYSTEM TO PREDICT THE CONTENT OF A MESSAGE AT THE WORD LEVEL AND THEM MAKE USE OF THE PREDICTION IN NOISE ESTIMATION AND REMOVAL. PHASE I WOULD INVESTIGATE THE UTILITY OF SUCH A NOISE REMOVAL METHOD. IF THE METHOD IS FOUND USEFUL PHASE II WOULD SEE A FURTHER EVALUATION OF PHASE I RESULTS OVER A LARGER RANGE OF APPLICATIONS AND THE DEVELOPMENT OF AN ARCHITECTURE AND DESIGN FOR THE IMPLEMENTATION OF THE METHOD.

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SPARTA INC — AF — $ 49,316
23293 S POINTE DR
LAGUNA HILLS, CA 92653
HERSCHEL R MELTON
TITLE:
AERONAUTICAL SYSTEM/SUBSYSTEM INNOVATIVE CONCEPTS
TOPIC: 10 OFFICE: ASD/XR

IN THIS PROPOSAL A CONCEPT, InMASS, IS DESCRIBED AS A MEANS TO INCREASE THE SURVIVABILITY OF TACTICAL AIRCRAFT PERFORMING AIR-TO-GROUND MISSIONS. InMASS EMPLOYS A SHORT-RANGE, COVERT DATA LINK TO TIGHTLY NET A FORMATION OF TACTICAL AIRCRAFT ALLOWING THE FORMATIONS TO FLY AND FIGHT AS A SINGLE UNIT. THE WORKLOAD IS SHARED, IN AN OPTIMUM WAY, AMONG ALL THE MEN AND COMPUTERS WITHIN THE SET OF AIRCRAFT. FOR EXAMPLE, SEVERAL MEN MAY PERFORM EW FUNCTIONS, ONE OR TWO IN THE FRONT OF THE FORMATION MAY PERFORM TARGET ACQUISITION AND SEVERAL AT THE REAR OF THE FORMATION MAY FIRE WEAPONS. THIS APPROACH MAKES MAXIMUM USE OF AVAILABLE RESOURCES AND WITH SEPARATED AIRCRAFT FOR TARGET ACQUISITION AND WEAPON DELIVERY ALLOWS LOW-LEVEL GROUND ATTACK WITHOUT THE NEED FOR AIRCRAFT POP-UP. THE SURVIVABILITY OF THIS APPROACH IN COMPARISON WITH A CONVENTIONAL CONCEPT SUCH AS LANTIRN WILL BE DETERMINED BY MEANS OF SIMULATION ANALYSIS.

SPARTA INC — SDIO — $ 0
23293 S POINTE DR
LAGUNA HILLS, CA 92653
DR PHILIP D HENSHAW
TITLE:
AGILE LASER IMAGER
TOPIC: 1 OFFICE: IST

ACTIVE OPTICAL IMAGING SENSORS HAVE BEEN CONSIDERED FOR STRATEGIC DEFENSE MISSIONS, INCLUDING TRACKING, DISCRIMINATION, AND AIMPOINT SELECTION. IN EACH OF THESE SYSTEM CONCEPTS, FOUR OUTSTANDING PROBLEMS HAVE BEEN PRESENT. THESE ARE: THE EXTREMELY LARGE OPTICS SIZE REQUIRED, THE ANGULAR AGILITY REQUIRED FOR BOTH THE TRANSMITTER AND THE RECEIVER, SYSTEM SURVIVABILITY, AND THE SHORT-WAVELENGTH HIGH POWER LASER SOURCES REQUIRED. COHERENTLY-COMBINED MULTIPLE APERTURE SYSTEMS CAN PROVIDE A NUMBER OF UNIQUE ADVANTGES FOR VERY LONG RANGE

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ANGLE-ANGLE OPTICAL IMAGING SYSTEMS. THESE ADVANTAGES INCLUDE HIGH ANGULAR RESOLUTION USING RELATIVELY SMALL, EASY TO FABRICATE OPTICAL ELEMENTS, A SOLUTION OF THE AGILE RECEIVER PROBLEM, AND THE POSSIBILITY OF OBTAINING ROTATION RATE AND AXIS INFORMATION ABOUT SPINNING OBJECTS. THE ABILITY TO OPERATE AT VERY LONG RANGES MAY ENHANCE SYSTEM SURVIVABILITY. THUS, MULTIPLE APERTURE SYSTEMS MAY PROVIDE A SOLUTION TO THREE OF THE FOUR OUTSTANDING PROBLEMS ASSOCIATED WITH LONG-RANGE IMAGING SENSORS. IN THIS PROPOSAL, WE HAVE LAID OUT A PLAN TO INVESTIGATE A NEW APPLICATION OF PHASE RETRIEVAL TECHNIQUES TO USE THE INFORMATION IN THE SPECKLE PATTERN REFLECTED FROM A LASER-ILLUMINATED OBJECT TO RECONSTRUCT A HIGH-RESOLUTION IMAGE OF THE OBJECT.

SPECTRAL SCIENCES INC — AF — $ 73,964
111 S BEDFORD ST
BURLINGTON, MA 01803
DR JAMES W DUFF
TITLE:
FUEL DUMPS AS AN OPTICAL OBSCURANT
TOPIC: 79 OFFICE: AFBMO/PMX

THE VENTING OF ROCKET FUEL (OR OTHER SUITABLE LIQUIDS) IS PROPOSED AS A TECHNIQUE FOR OPTICAL OBSCURATION AT HIGH ALTITUDES. AS A LIQUID IS RELEASED IN SPACE, IT UNDERGOES A FLASH EVAPORATION AND SUBSEQUENT COOLING WHICH RESULTS IN A CLOUD OF VAPOR AND PARTICLES. RADIATION CAN POTENTIALLY RESULT FROM: (1) VIBRATIONALLY EXCITED MOLECULES RESULTING FROM COLLISIONS WITH THE ATMOSPHERE AND CHEMILUMINESCENT REACTIONS, AND (2) SCATTERING OF SOLAR OR EARTHSHINE RADIATION BY PARTICLES. THE PHASE I OBJECTIVE IS TO MODIFY AN EXISTING COMPUTER MODEL DESCRIBING THE HIGH ALTITUDE (150 TO 500 KM) RELEASE OF LIQUIDS TO ALLOW THE PREDICTION OF SPECTRAL, TEMPORAL, AND SPATIAL RADIATION SIGNATURES OF FUEL PUMPS FOR REALISTIC OPERATIONAL SCENARIOS. IN PHASE II, LABORATORY AND FIELD MEASUREMENT PROGRAMS WOULD BE CARRIED OUT AS A MEANS OF MODEL VALIDATION.

SPECTRON DEVELOPMENT LABS INC — AF — $ 48,500
3303 HARBOR BLVD - STE G3
COSTA MESA, CA 92626
DENNIS R KRAUSE
TITLE:
TRANSPIRATION COOLED NOSETIP FLOW CALIBRATION
TOPIC: 97 OFFICE: AFBMO/PMX

A TRANSPIRATION COOLED NOSETIP (TCNT) CONTAINS A LARGE NUMBER OF

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SMALL PORTS DISTRIBUTED OVER ITS SURFACE THROUGH WHICH A COOLANT FLUID IS EJECTED. THE OVERALL OBJECTIVE OF THE PROPOSED STUDY IS TO DEVELOP A FLOW MEASUREMENT SYSTEM WHICH WILL PROVIDE DETAILED DATA ON THE DISTRIBUTION OF THIS FLOW FROM A TCNT'S SURFACE. IN PHASE I, THE OBJECTIVE WILL BE TO VERIFY THE FEASIBILITY OF DEVELOPING THIS TOOL AND IN DETERMINING ITS PERFORMANCE LIMITATIONS. A LIGHT EXTINCTION TECHNQIUE IS PROPOSED AS THE FLOW MEASURMENT APPROACH TO BE DEVELOPED. THIS TECHNIQUE AND THE HARDWARE CONFIGURATION ENVISIONED WILL ALLOW OBTAINING FLOW MEASUREMENTS IN VERY SMALL AREAS. IT WILL ALSO PROVIDE THE NONINTRUSIVE, NONDESTRUCTIVE, AND EFFICIENT MEASURMENT APPROACH NEEDED IN THIS APPLICATION. THE FABRICATION OF A MOCK-UP OF THE FLOW MEASURMENT SYSTEM AND LABORATORY TESTING WITH THIS HARDWARE WILL BE ACCOMPLISHED.

SPECTRON DEVELOPMENT LABS INC — ARMY — $ 56,038
3303 HARBOR BLVD - STE G3
COSTA MESA, CA 92626
DR C F HESS
TITLE:
OPTICAL DUST DETECTOR TO PROTECT ENGINES OF COMBAT AND TACTICAL VEHICLES
TOPIC: 68 OFFICE: TACOM

THE PRESENCE OF SOLID PARTICULATES ENTAINED IN THE AIR ENTERING THE ENGINE OF MILITARY VEHICLES CAN BE DETECTED BY MEASURING THEIR SCATTERED LIGHT AND THE OVERALL LIGHT EXTINCTION. VERY SENSITIVE EXTINCTION MEASUREMENTS CAN BE PERFORMED WITH TRANSMISSOMETRY. AMONG THE MOST PROMISING AND SIMPLE TRANSMISSOMETERS ARE THE MAXIMUM TURBIDITY METHOD, DISPERSION QUOTIENT METHOD, AND THE TWO-COLOR TRANSMISSOMETER. FOR REASONABLY CLEAR AIR WITH SLIGHT DUST CONTAMINATION, MORE SENSITIVITY CAN BE OBTAINED BY LOOKING AT THE CHARACTERISTICS OF THE SCATTERED LIGHT. A MORE ELABORATE TECHNIQUE BASED ON A PULSE HEIGHT ANALYZER COMBINED WITH LASER DOPPLER VELOCIMETRY WILL PROVIDE THE SIZE AND VELOCITY DISTRIBUTION OF THE PARTICULATES ENTRAINED IN THE AIR. IT IS THE OBJECTIVE OF THIS WORK TO EVALUATE THE ABOVE METHODS TO ESTABLISH THEIR SENSITIVITY TO SIZE AND CONCENTRATION, THEIR INSENSITIVITY TO VARIATIONS IN INDEX OF REFRACTION, THEIR INSENSITIVITY TO THE SHAPE OF THE PARTICULATES, AND THEIR POTENTIAL WITH SIMPLE WHITE LIGHT SOURCES. A METHOD FOR PROTOTYPE IMPLEMENTATION WILL BE ESTABLISHED.

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SPECTRON DEVELOPMENT LABS INC — AF — $ 54,611
3303 HARBOR BLVD - STE G3
COSTA MESA, CA 92626
DR C F HESS
TITLE:
LIGHT SCATTERING TECHNIQUE TO MEASURE THE SIZE DISTRIBUTION OF PARTICLES IN LASER VELOCIMETERS
TOPIC: 38 OFFICE: AFWAL/FI

A PARTICLE SIZING TECHNIQUE THAT OPERATES IN CONJUNCTION WITH LASER VELOCIMETRY (LV) IS PROPOSED. THE TECHNIQUE USES A NONINTRUSIVE SINGLE PARTICLE COUNTER BASED ON THE RATIO OF THE INTENSITY OF THE SCATTERED LIGHT AT TWO DIFFERENT ANGLES. IT IS EXPECTED THAT THE REQUIRED SIZE RANGE OF 0.3 MICROMETERS TO 3 MICROMETERS WILL BE ATTAINABLE. THE TECHNIQUE WILL ALSO IDENTIFY PARTICLES LARGER THAN 3 MICROMETERS WHICH CAN PRODUCE VELOCITY ERRORS. LOWER SIZE LIMITS WOULD REQUIRE ENSEMBLE MEASUREMENTS WHICH CANNOT BE READILY USED WITH LASER VELOCIMETRY, SINCE THE SIZE OF EACH PARTICLE IS NECESSARY. THE INTENSITY RATIO TECHNIQUE HAS BEEN SUCCESSFULLY USED WITH A SINGLE LASER BEAM TO MEASURE SOOT AND LATEX PARTICLES IN THE 0.2 TO 3 MICROMETER RANGE. IT IS EXPECTED THAT WITH PROPER DEVELOPMENT, IT WILL WORK WITH THE TWO LASER BEAMS NORMALLY USED IN LV SYSTEMS, MEASURING ALSO THE IRREGULARLY SHAPED PARTICLES NORMALLY FOUND IN LASER VELOCIMETRY.

SPEECH SYSTEMS INC — ARMY — $ 49,140
18356 OXNARD ST
TARZANA, CA 91356
WILLIAM S MEISEL
TITLE:
LIMITED ENROLLMENT LARGE VOCABULARY SPEECH RECOGNITION SYSTEM
TOPIC: 27 OFFICE: CECEOM

TO THE EXTENT THAT FUTURE WEAPON SYSTEMS RELY ON NATURAL-LANGUAGE INTERFACES, THEY MUST OVERCOME THE BARRIER OF KEYBOARD ENTRY. SINCE A NATURAL-LANGUAGE OR ARTIFICAL-INTELLIGENCE INTERFACE INVOLVES AMBIQUITY AND IMPRECISION, THE MAN-MACHINE DIALOGUE TO RESOLVE QUESTIONS WILL BECOME EXCESSIVELY ONEROUS IF CONDUCTED BY KEYBOARD. A CONTINUOUS-SPEECH, REAL-TIME, SPEECH RECOGNITION INTERFACE CAN SOLVE THIS PROBLEM. CURRENT SPEECH-RECOGNITION TECHNOLOGIES ARE CHARAC-

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TERIZED BY LIMITED VOCABULARY, RESTRICTED SYNTAX, EXTENSIVE SPEAKER-ENROLLMENT REQUIREMENTS, WORD ISOLATION, OR SEVERAL OF THE ABOVE. SUCH RESTRICTIONS MAKE THEM INAPPROPRIATE FOR MILITARY COMMAND INTERFACES. THIS STUDY WILL TEST THE FEASIBILITY OF APPLYING AN ALREADY-DEVELOPED, REAL-TIME, LARGE-VOCABULARY, CONTINUOUS-SPEECH, RAPID-SPEAKER-ENROLLMENT, COMMAND-PROCESSING LANGUAGE BASED ON THE PROPOSER'S EXISTING PROPRIETARY PHONEME-CLASSIFICATION TECHNOLOGY. MOST WORDS CAN BE DISTINGUISHED SIMPLY BY CODING THEM INTO STRINGS OF A SMALL NUMER OF PHONEME CLASSES. THIS RESEARCH WILL DETERMINE WHETHER A WORKING PHONEME CLASSIFICATION METHOD CAN BE EXTENDED TO A LARGE-VOCABULARY COMMAND LANGUAGE WITHOUT INCREASING CONFUSABILITY BEYOND ACCEPTABLE LIMITS.

SPIRE CORP — AF — $ 68,636
PATRIOTS PARK
BEDFORD, MA 01730
PIRAN SIOSHANSI
TITLE:
SELF-LUBRICATING DIAMOND-LIKE COATINGS BY A SIMULTANEOUS SPUTTER-DEPOSITION/ION IMPLANTATION PROCESS
TOPIC: 53 OFFICE: AFWAL/ML

THE USE OF ION BEAMS AS A MEANS OF ENHANCING THE PROPERTIES OF DEPOSITED THIN FILMS HAS ATTRACTED CONSIDERABLE INTEREST IN THE LAST FEW YEARS. THE FURTHER DEVELOPMENT OF ENERGETICALLY-ENHANCED ION DEPOSITION TECHNIQUES IS EXPECTED TO RESULT IN A NEW GENERATION OF EXOTIC COATINGS WITH NEAR-THEORETICAL DENSITIES, VERY HIGH HARDNESS, AND, AT THE SAME TIME, A CAPACITY OF SELF-LUBRICATION. SPIRE CORPORATION PROPOSES TO DEVELOP A SIMULTANEOUS SPUTTER-COATING ION IMPLANTATION TECHNIQUE FOR CREATION OF DIAMOND-LIKE THIN FILMS WITH EXCELLENT ADHESION AND PARAMETERS CLOSE TO THOSE OF THE BULK MATERIAL. IN THIS APPROACH A THIN LAYER OF MATERIAL (FOR EXAMPLE, BORON), IS ION-SPUTTERED ONTO A SURFACE THAT IS CONCURRENTLY IMPLANTED WITH A STEADY BEAM OF IONS (FOR EXPAMPLE, NITROGEN). THE COATINGS SYNTHESIZED BY THIS TECHNIQUE (FOR EXAMPLE, i-BN) ARE EXPECTED TO BE HARD AND WEAR-RESISTANT BUT TO TRANSFORM TO A SELF-LUBRICATING FORM UNDER LOAD. THIS NOVEL TECHNIQUE IS EXPECTED TO BE USEFUL FOR DEPOSITION OF DIAMOND-LIKE COATINGS SUCH AS i-CARBON AND i-BORON NITRIDE, AND ALOS SUCH REFRACTORY MATERIAS AD B4C, TiN, TiC AND TiB2.

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SPIRE CORP
PATRIOTS PARK
BEDFORD, MA 01730
DR PIRAN SIOSHANSI
DEPT: AF
AWARDED AMOUNT: $ 75,000
TITLE:
ION IMPLANTATION FOR CONTROLLED FLUORINATION OF PLASTICS
TOPIC: 56 OFFICE: AFWAL/ML

ACRYLICS AND POLYCARBONATES ARE WIDELY USED AS AIRCRAFT WINDOWS AND WINDSHIELDS. THESE PLASTICS CRAZE AND CRACK WHEN EXPOSED TO LONG TERM SUNLIGHT AND ATMOSPHERIC CONDITIONS. SURFACE FLUORINATION IS KNOWN TO BE AN EFFECTIVE METHOD FOR PASSIVATING AND PROTECTING THESE PLASTICS. SPIRE CORPORATION PROPOSES TO USE THE ION IMPLANTATION PROCESS AS A CONTROLLED METHOD FOR INTRODUCING FLUORINE INTO THE SURFACE OF THESE PLASTICS. THE FLUENCE OF THE FLUORINE IONS AND THEIR ENERGY WILL BE VARIED IN ORDER TO OBTAIN THE OPTIMUM SURFACE ENHANCEMENT. THE PERFORMANCE OF THE IMPLANTED SURFACE WILL BE EVALUATED THROUGH EXPOSURE TO ULTRA-VILOT RICH ILLUMINATION, OZONE, HUMIDITY AND VARIOUS SOLVENTS. OTHER TESTS WILL BE PERFORMED TO MEASURE THE IMPROVED MECHANICAL PROPERTIES OF THE SURFACE SUCH AS HARDNESS, IMPACT RESISTANCE (RAIN EROSION), STRESS CRAZING AND CRAKING. THE OPTICAL TRANSPARENCY OF THE SURFACE IS NOT EXPECTED TO BE DEGRADED AS A RESULT OF THE ION IMPLANTATION PROCESS.

SPIRE CORP
PATRIOTS PARK
BEDFORD, MA 01730
ROBERT G WOLFSON
DEPT: AF
AWARDED AMOUNT: $ 70,000
TITLE:
SUPERLATTICE BUFFER LAYERS FOR LOW-DEFECT GaAs EXPOTAXIAL FILMS ON IMPERFECT GaAs SUBSTRATES
TOPIC: 59 OFFICE: AFWAL/ML

THE LACK OF REPRODUCIBLY UNIFORM, LOW-DEFECT GaAs MATERIAL REMAINS A MAJOR OBSTACLE TO THE DEVELOPMENT OF ADVANCED MICROWAVE DEVICE TECHNOLOGIES, ESPECIALLY DIGITAL AND MONOLITHIC MICROWAVE INTEGRATED CIRCUITS. SPIRE PROPOSES TO CIRCUMVENT THE SHORTCOMINGS OF MELT-GROWN GaAs WAFERS BY MEANS OF SUPERLATTICE BUFFER LAYERS, WHICH WOULD ACT AS BARRIERS TO THREADING DISLOCATIONS IN ADDITION TO PROVIDING UNIFORM AND DAMAGE-FREE SURFACES. SPECIFICALLY, THE PHASE I PROJECT OB-

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JECTIVE IS TO FABRICATE GaAs/AlAs AND LOW-MISFIT GaAs/Ga(As,P) SUPER-LATTICES AND TO ASSESS THEIR EFFECTIVENESS AS DISLOCATION BARRIERS. THE SUPERLATTICES WILL BE GROWN BY METALORGANIC CHEMICAL VAPOR DEPOSITION (MO-CVD) UPON GaAs WAFERS, WITH THE COMPOSITION OF THE SUPERLATTICE AS THE SOLE PARAMETER TO BE VARIED. THE DISLOCATION DENSITIES IN THE SUBSTRATES AND IN GaAs EPITAXIAL FILMS DEPOSITED ON THE SUPERLATTICE STRUCTURES WILL BE DETERMINED BY ETCH-PIT COUNT AND BY TRANSMISSION ELECTRON MICROSCOPY (TEM). THE INTERACTION OF THREADING DISLOCATIONS WITH THE SUPERLATTICES WILL ALSO BE OBSERVED BY CROSS-SECTION TEM, AND THE NUMBER OF INTERFACES PENETRATED BEFORE DIVERSION WILL BE DETERMINED. BOTH SETS OF DATA WILL BE USED TO DERIVE COMPARABLE FIGURES OF MERIT FOR THE DISLOCATION BARRIERS. FINALLY, THE RESULTS WILL BE USED TO DEMONSTRATE THE FEASIBILITY OF SUPER-LATTIC BUFFER LAYERS.

SPRINGBORN LABS INC — NAVY — $ 49,891
10 SPRINGBORN CENTER
ENFIELD, CT 06082
DR BERNARD BAUM
TITLE:
REPAIR KIT FOR NAVY CHEMICAL WARFARE PROTECTIVE OUTERGARMENT
TOPIC: 43 OFFICE: NSSC

SMALL TEARS IN MODACRYLIC/NYLON CHEMICAL WARFARE PROTECTIVE OVERGARMENTS CAN BE REPAIRED WITHOUT HEAT, BY USE OF A PATCH OF THE SAME MATERIAL, BONDED BY AN ADHESIVE WHICH IS PRESSURE-SENSITIVE, LATEX-BASED, SOLVENT-ACTIVATED, 2-PART REACTIVE SYSTEM, OR MICROENCAPSULATED REACTIVE SYSTEM.

SPRINGBORN LABS INC — ARMY — $ 47,152
10 SPRINGBORN CENTER
ENFIELD, CT 06082
JAMES P GALICA
TITLE:
PIPELINE CORROSION AND FRICTION REDUCTION COATINGS
TOPIC: 59 OFFICE: BRDC

THE OBJECTIVE OF THIS PROGRAM IS TO DETERMINE THE FEASIBILLITY OF

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COATING MILITARY PIPELINES WITH LOW FRICTION AND CORROSION INHIBITING COATINGS. CORROSION INHIBITIVE COATINGS WILL BE IDENTIFIED AND INVESTIGATED FOR APPLICATIONS TO BOTH INTERNAL AND EXTERNAL SURFACES OF THE PIPELINE. THE INTERNAL PROTECTIVE COATING OR LINER WILL BE BIFUNCTIONAL IN THAT IN ADDITION TO CORROSION PROTECTION, IT WILL ACT AS A LOW FRICTION COATING DURING PRODUCT TRANSPORT THROUGH THE PIPELINE. COATING MATERIALS WILL BE EVALUATED IN ACCELERATED CORROSIVE AGING ENVIRONMENTS. FOLLOWING AGING, ACCEPTABLE COATINGS WILL BE EVALUATED FOR FRICTION REDUCTION. IDEALLY, COATINGS OR MATERIALS POSSESSING LOW SURFACE ENERGY WILL OFFER THE MOST ADVANTAGE FOR REDUCED FRICTION. THESE LOW FRICTION COATINGS WILL BE EXAMINED FOR THEIR INTERNAL PROTECTION. REFORMULATION OF THE BEST CANDIDATES THROUGH THE ADDITION OF MODIFIERS AIDING IN IMPROVED SURFACE TEXTURE AND LUBRICITY WILL ACT TO REDUCE FRICTION AT THE SURFACE. FOLLOWING MODIFICATION, ACCELERATED AGING AND FRICTION MEASUREMENTS WILL BE DETERMINED. SURFACE FLUORINATION WILL ALSO BE EXAMINED AS A MEANS OF REDUCING SURFACE ENERGY AND PRODUCING A LOW FRICTION SURFACE.

SPRINGBORN LABS INC ARMY $ 0
10 SPRINGBORN CENTER
ENFIELD, CT 06082
WILLIAM H HOLLEY
TITLE:
ELASTOMER/PLASTIC LAMINATES FOR MORE RUGGED BLOOD BAGS DEVELOPMENT
TOPIC: 89 OFFICE: MED FT. DET

INCREASINGLY, AIR DELIVERY IS BEING USED FOR FIELD DISTRIBUTION OF BLOOD AND BLOOD PRODUCTS. THE MECHANICAL BUFFETING THAT THE UNITS EXPERIENCE ON IMPACT HAS RESULTED IN FREQUENT DAMAGE, USUALLY TO THE PLASTIC BAGS. THIS PROBLEM IS MOST PRONOUNCED WITH THE DELIVERY OF FROZEN BLOOD PRODUCTS, WHERE THE PLASTIC BAG HAS BECOME EMBRITTLED BY THE COLD. THE PURPOSE OF THIS PROPOSED EFFORT IS TO DEVELOP MORE RUGGED PLASTIC SHEET LAMINATES USING AN ELASTOMERIC IMPACT ABSORBING LAYER. THESE LAMINATES WILL BE TRANSPARENT, FLEXIBLE, STRONG, AND HEAT-SEALABLE AND OTHERWISE SUITABLE FOR THE FABRICATION OF MIL-B-36939 TYPE BLOOD BAGS. THIS PROGRAM WILL INVOLVE THE PREPARATION AND TEST OF SELECTED PLASTIC/ELASTOMER LAMINATES USING PLASTICIZED PVC AS THE BLOOD-CONTACTING SURFACE. THESE LAMINATES WILL BE SUBJECTED TO IMPACT, MOISTURE TRANSMISSIVITY, TENSILE STRENGTH AND OTHER TESTS. THE TWO BEST CANDIDATES WILL BE USED TO FABRICATE SIMULATED BAGS WHICH

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WILL BE FILLED AND DROP TESTED. THE OUTCOME OF THE PHASE I PROGRAM WILL BE THE RECOMMENDATION OF ONE OR TWO LAMINATE CONSTRUCTIONS TO BE USED IN PILOT PRODUCTION OF MIL-B-36969 STYLE BLOOD BAGS.

SRS TECHNOLOGIES AF $ 49,871
1811 QUAIL ST
NEWPORT BEACH, CA 92660
ROBERT C EVANS
TITLE:
ANTI-SIMULATION TECHNIQUES APPLICABLE TO BALLISTIC AND MANEUVERING REENTRY VEHICLES AND ASSOCIATED PENETRATION AIDS STUDY
TOPIC: 77 OFFICE: AFBMO/PMX

THE DESIGNATION OF RVs AMONG A PAYLOAD OF LETHAL RVs, DECOYS, AND CHAFF REQUIRES REFERENCE FUNCTIONS DERIVED FROM UNIQUE FEATURES OF THE RVs AND, PERHAPS DECOYS. ANTI-SIMULATION SMEARS, OR DEGRADES, THE REFERENCE FUNCTIONS OF BOTH THE RVs AND DECOYS USING MODIFICATIONS TO THE SURFACE AND SHAPE SUCH AS PAINTS AND FAIRINGS. THE OBSERVER WOULD HAVE A FAR MORE DIFFICULT TIME DESIGNATNG THE RV WHICH IS SMEARED TO MORE CLOSELY RESEMBLE THE PENETRATION AIDS. THE PHASE I PROGRAM DESCRIBED IN THIS SBIR WILL DEFINE THE TARGET FEATURES THAT CAN BE MEASURED BY THE ANTICIPATED DISCRIMINATION SENSORS. THE ANTI-SIMULATION TECHNIQUES THAT COULD BE USED TO ALTER THE RV AS WELL AS THE PENETRATION AID SIGNATURES WILL BE INVESTIGATED IN SUFFICIENT DETAIL TO DEMONSTRATE THE FEASIBILITY OF THIS APPROACH TO INCREASE THE REENTRY SYSTEM EFFECTIVENESS. A PHASE II DEMONSTRATION PROGRAM INCLUDING SUBSCALE AND FULL SCALE TARGET MEASUREMENTS IN A RADAR ANECHOIC CHAMBER OR AN OPTICAL SPACE CHAMBER WILL BE PROPOSED AND THE COSTS DEFINED IN SUFFICIENT DETAIL TO PROVIDE A BASIS FOR A PHASE II PROGRAM.

SRS TECHNOLOGIES AF $ 49,860
1811 QUAIL ST
NEWPORT BEACH, CA 92660
DR MONIEM EL-SHERBINY
TITLE:
ACTIVE CHAFF
TOPIC: 82 OFFICE: AFBMO/PMX

PASSIVE CHAFF, COMPOSED OF HALF WAVELENGTH STRIPS, TENDS TO SLOW DOWN

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UPON REENTRY INTO THE ATMOSPHERE, LEADING TO A DOPPLER SHIFT FROM THE TARGET SIGNAL. TARGETS CAN THUS BE DETECTED BY RADARS THROUGH DOPPLER DISCRIMINATION AND THE CHAFF EFFECTIVENESS IS SUBSTANTIALLY REDUCED. ACTIVE CHAFF MAINTAINS ITS EFFECTIVENESS BY SPREADING ITS SIGNAL RETURN OVER A WIDER SPECTRAL BANDWIDTH THROUGH RADAR CROSS SECTION MODULATION OF INDIVIDUAL CHAFF STRIPS. THE TARGET RADAR RETURN IS THUS KEPT HIDDEN IN THE JAMMING SIGNAL SPECTRUM. THE PROPOSAL OUTLINES SOME APPROACHES TO ACHIEVE THIS EFFECT THROUGH DYNAMIC ACTIVE TERMINATION OF THE DIPOLES. THE CHARACTERISTICS OF CHAFF CLOUD RADAR RETURNS ARE DISCUSSED AND USED TO DETERMINE THE JAMMING SPECTRAL REQUIREMENTS. SEVERAL ALTERNATIVES ARE ANALYZED, INCLUDING MAKE-BREAK, VARIABLE REACTANCE LOADS AND TUNNEL DIODE-BASED ACTIVE CIRCUITS. PRACTICAL ISSUES INCLUDING POWER SOURCES, PACKAGING AND MEANS OF ACTIVATION ARE DISCUSSED IN DETAIL, TAKING INTO CONSIDERATION THE ANTICIPATED DEPLOYMENT ENVIRONMENT.

SRS TECHNOLOGIES AF $ 48,930
555 SPARKMAN DR - STE 1406
HUNTSVILLE, AL 35805
DR RICHARD D KRAMER
TITLE:
FAST LAUNCH ICBM TECHNOLOGY REQUIREMENTS
TOPIC: 114 OFFICE: AFBMO/PMX

THE POTENTIAL DEVELOPMENT AND DEPLOYMENT OF SPACE-BASED SURVEILLANCE, BOOST-PHASE AND MIDCOURSE BALLISTIC MISSILE DEFENSE SYSTEMS BY ADVERSARY NATIONS HAS PROMPTED THE STUDY OF POTENTIAL RESPONSE TO INHIBIT BOOST AND MIDCOURSE PHASE TARGETING AND ENGAGEMENT BY HOSTILE SPACE SURVEILLANCE AND WEAPON SYSTMES. A PROPOSED RESPONSE TO HOSTILE SPACE SURVEILLANCE, TARGETING, AND ENGAGEMENT OF ICBMs AND/OR THEIR LAUNCHERS, TO ACHIEVE BOTH BASING AND REENTRY VEHICLE SURVIVABILITY IN THE BOOST OR MIDCOURSE PHASES, IS THE USE OF SHORT-BURN-TIME TACTICS TO INHIBIT OR PREVENT ICBM LAUNCH DETECTION AND TRACKING FROM ORBIT. SHORT-BURN-TIME TACTICS COULD REDUCE THE TIME A SPACE SURVEILLANCE SYSTEM COULD DETECT, TRACT AND TARGET A THRUSTING ICBM ABOVE THE ATMOSPHERE/CLOUD COVER. THIS STUDY IDENTIFIES TECHNOLOGY DEVELOPMENT REQUIREMENTS FOR SHORT-BURN-TIME ICBMs USING ULTRA-HIGH BURNING RATE SOLID ROCKET PROPELLANTS, MUCH LIKE THOSE USED IN CURRENT STATE-OF-THE-ART ANTIBALLISTIC MISSILE (ABM) INTERCEPTOR SOLID ROCKET MOTORS. APPLICATIONS OF OTHER ABM INTERCEPTOR TECHNOLOGY

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SUCH AS STRUCTURES, MATERIALS AND THRUST VECTOR CONTROL SYSTEMS, TO SHORT-BURN-TIME ICBMs IS ALSO IDENTIFIED, AS ARE CRITICAL TECHNOLOGIES AND TECHNOLOGY ISSUES.

SRS TECHNOLOGIES — ARMY — $ 99,124
1811 QUAIL ST
NEWPORT BEACH, CA 92660
NORMAN F BATES
TITLE:
OWN JAMMING EXCISION
TOPIC: 50 OFFICE: CECOM/SWL

THE OBJECTIVE OF THIS EXPLORATORY DEVELOPMENT IS TO PROVIDE A PROOF OF CONCEPT WITH ANALYSIS AND SIMULATION OF A TRANSMIT AND RECEIVER SYSTEM USING A COMMON ANTENNA THAT CAN BE USED FOR JAMMING WHILE SIMULTANEOUSLY TRACKING AND SEARCHING FOR THREATS. THE JAMMER MAY TRANSMIT MANY KILOWATTS WHICH INEVITABLY RESULTS IN CONSIDERABLE POWER LEAKAGE AT THE RECEIVER INPUT. WITH CURRENT JAMMING SYSTEM, THIS CAUSES RECEIVER SATURATION AND POTENTIAL DAMAGE TO THE LOW LEVEL AMPLIFIERS AND MIXERS OF THE RECEIVER. THE RECEIVER MUST THEREFORE BE MADE INOPERATIVE DURING PERIODS OF JAMMING. THE PROPOSED CONCEPT USES SPREAD SPECTRUM TECHNIQUES TO REDUCE THE JAMMER POWER SPECTRAL DENSITY AT THE RECEIVER INPUT. THE JAMMER LEAKAGE AT THE RECEIVER INPUT IS SPREAD IN FREQUENCY BY A PSEUDO NOISE (PN) CODE AND IS CORRELATED WITH A TRANSMITTER REFERENCE THAT IS SPREAD BY AN ORTHOGONAL PN CODE, RESULTING IN VERY LOW CROSS-CORRELATION LEVELS. THE THREAT SIGNAL IS ALSO SPREAD AT THE RECEIVER INPUT AND IS CORRELATED WITH A REPLICA WAVEFORM IN THE RECEIVER, THUS COLLAPSING ITS BANDWITH. CORRELATION OF THE SPREAD THREAT SIGNAL AND A REPLICA, WHEN INTEGRATED OVER THE PN SEQUENCE TIME, PROVIDES AN AUTO-CORRELATION PEAK FOR THRESHOLD DETECTION.

SRS TECHNOLOGIES — ARMY — $ 55,000
1811 QUAIL ST
NEWPORT BEACH, CA 92660
ROBERT C EVANS
TITLE:
SONOBUOY TRACKING SYSTEM
TOPIC: 110 OFFICE: BMD

IMPACT SCORING OF MISSILES, BOMBS AND TORPEDOES IS MOST ACCURATELY

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DONE USING A SONOBUOY MISSILE IMPACT LOCATION SYSTEM (SMILS). CURRENTLY, EACH SONOBUOY USES A DEEP OCEAN TRANSPONDER (DOT) AS A GEODETIC REFERENCE WHICH LIMITS THE FLEXIBILITY OF THEIR LOCATIONS. THE TECHNIQUE PROPOSED FOR THIS SBIR UTILIZES A RADAR TRANSMITTER AND AN INTERFEROMETRIC RECEIVER TO DETERMINE THE PRECISE LINE OF SIGHT AND RANGE TO EACH SONOBUOY. POSITION ACCURACIES OF LESS THAN 1 METER SHOULD BE ACHIEVABLE. MANY SONOBUOYS CAN BE TRACKED WITH THE SAME TRACKING SYSTEM. THESE SONOBUOYS WOULD NEED NO OCEAN REFERENCE; THEREFORE, THEY COULD BE DEPLOYED OVER THE OCEAN IMPACT AREA FROM AN AIRCRAFT OR A SHIP WITHIN RF RANGE OF THE SHORE TRACKING SYSTEM. THE PRIMARY EFFORT DURING THIS PHASE I STUDY IS TO DEMONSTRATE THE FEASIBILITY OF THE PROPOSED SONOBUOY TRACKING SYSTEM. TRADEOFF ANALYSES WILL BE CONDUCTED TO DEFINE THE BEST CONCEPT. THE SYSTEM REQUIREMENTS AND PERFORMANCE WILL BE DETERMINED IN SUFFICIENT DETAIL TO PROVIDE THE BASIS FOR A PHASE II PROOF OF CONCEPT DEMONSTRATION PROGRAM. A TEST PLAN WITH SUBSCALE TESTS TO DEMONSTRATE SYSTEM PERFORMANCE AND COMPONENT TESTS TO DEMONSTRATE THE HARDWARE FEASIBILITY WILL BE COMPLETED DURING THE PHASE I PROGRAM.

SRS TECHNOLOGIES SDIO $ 0
1811 QUAIL ST
NEWPORT BEACH, CA 92660
R C EVANS
TITLE:
INTERFEROMETRIC BOOST PHASE DISCRIMINATION SYSTEM
TOPIC: 1 OFFICE: IST

A BOOST PHASE DISCRIMINATION SENSOR WILL BE ENABLE TO DISCRIMINATE RVs NOT ONLY ON THE BASIS OF THEIR SELF-RADIATION SIGNATURE, BUT ALSO ON THE BASIS OF THE DEPOLYMENT SYSTEM CHARACTERISTICS. DISCRIMINATION DURING BOOST PHASE WILL ALSO PROVIDE MUCH GREATER BATTLESPACE FOR THE DEFENSE THAN ANY OTHER SYSTEM. A PASSIVE INTERFEROMETER CAN PRECISELY TRACK THE BOOSTER DEPLOYMENT STAGE AND DETECT THE DEPLOYMENT OF RVs AND PENETRATION AIDS BEFORE ANY EFFECTIVE COUNTERMEASURES CAN BE EMPLOYED. AFTER RV AND DECOY SEPARATION FROM THE STAGE, THE INTERFEROMETER CAN ALSO PRECISELY TRACK THE TARGETS FOR HANDOVER TO THE DEFENSE SYSTEM. THE PASSIVE INTERFEROMETER REQUIRES NO ACTIVE SOURCE SUCH AS A UV LASER TO BE DIRECTED AT THE TARGET; IS EQUALLY EFFECTIVE FOR NIGHT AS WELL AS DAYLIGHT CONDITIONS; AND, CAN HAVE A WIDE FIELD OF VIEW SO THAT PRECISE POINTING OF THE SENSOR IS NOT REQUIRED. THE

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INTERFEROMETER CAN ALSO TRACK MULTIPLE DEPLOYMENT STAGES THAT ARE SIMULTANEOUSLY DEPLOYING THEIR PAYLOADS IF THEY ARE WITHIN THE SENSOR TOTAL FIELD OF VIEW.

ST*AR CORP — AF — $ 49,370
PO BOX 3385
LAWRENCE, KS 66044
DR K SAM SHANMUGAN
TITLE:
PACKET COMMUNICATIONS NETWORKS SYNTHESIS AND ANALYSIS SYSTEM (PHASE I: STUDY OF ROUTING ALGORITHMS)
TOPIC: 167 OFFICE: RADC/DORM

COMMUNICATIONS NETWORKS ARE EVOLVING FROM PREDOMINANT CIRCUIT SWITCHED TECHNOLOGY TO PACKET SWITCHED SYSTEMS. THIS EVOLUTION IS OCCURRING FOR BOTH DATA AND VOICE FOR BOTH MILITARY AND COMMERCIAL APPLICATIONS. THE DESIGN AND ANALYSIS OF PACKET COMMUNICATIONS NETWORKS (PCN) FOR A TACTICAL ENVIRONMENT IS DIFFICULT BECAUSE OF ELECTRONIC COUNTER MEASURES (ECM), UNIT MOBILITY, THE NEED FOR RAPID NETWORK RECONFIGURATION, VARYING SIGNAL QUALITY, AND THE LOSS OF COMMUNICATIONS LINKS BECAUSE OF PHYSICAL ATTACK OR HARDWARE FAILURE. THE MAIN LONG TERM OBJECTIVE OF THIS EFFORT IS TO DEVELOP A COMPUTER-AIDED ANALYSIS AND DESIGN TOOL THAT CAN BE USED TO EVALUATE THE PERFORMANCE OF PCN'S AS A FUNCTION OF LINK AVAILABILITY, LINK QUALITY, LINK CAPACITY, NETWORK PROTOCOL, NETWORK ROUTING, AND FLOW CONTROL ALGORITHMS. IN PHASE I OF THE PROPOSED EFFORT, WE WILL DEFINE THE REQUIREMENTS FOR A PACKET COMMUNICATIONS NETWORK SYNTHESIS AND ANALYSIS SYSTEM (PCNSAS), AND IDENTIFY THE RESEARCH ISSUES THAT NEED TO BE ADDRESSED IN PHASE II. FURTHER, IN PHASE I WE WILL DEVELOP THE FRAMEWORK FOR PCNSAS AND IMPLEMENT A SMALL SEGMENT OF IT TO DEMONSTRATE ITS FEASIBILITY. THE UNIQUE ASPECTS OF THE ROUTING PROBLEM WILL SPECIFICALLY BE ADDRESSED IN PHASE I. IN PHASE II WE WILL COMPLETE THE RESEARCH AND FULLY DEVELOP PCNSAS.

STANFORD TELECOMMUNICATIONS INC — AF — $ 71,486
6888 ELM ST
MCLEAN, VA 22101
DR RICHARD S ORR
TITLE:
SYSTEM DESIGN REQUIREMENTS TOOL FOR SATELLITE COMMUNICATIONS THROUGH NUCLEAR-INDUCED SCINTILLATION
TOPIC: 128 OFFICE: AFBMO/PMX

A STUDY I PROPOSED TO BEGIN THE DEVELOPMENT OF A SOFTWARE-BASED TOOL

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THAT WILL BE USEFUL IN THE SPECIFICATION AND/OR DESIGN OF SATELLITE COMMUNICATIONS AT SHF AND EHF THROUGH NUCLEAR-INDUCED SCINTILLATION. THE TWO PRIME OBJECTIVES OF THE STUDY ARE (1) TO CHARACTERIZE THE SCINTILLATION ENVIRONMENT VIA MATHEMATICAL MODELS AND PARAMETER VALUES, AND (2) TO DEVELOP PRELIMINARY SYSTEM DESIGN REQUIREMENTS FOR SATELLITE COMMUNICATIONS SYSTEMS THROUGH A SCINTILLATION MEDIUM. STEP 1 IS TO BE ACHIEVED BY THE COLLECTION OF DATA (EXPERIMENTAL AND MODEL) OBTAINED IN OTHER STUDIES, THE ORGANIZATION OF THAT DATA IN SUCH A WAY THAT DISCREPANCIES AND INCONSISTENCIES CAN BE RESOLVED BY ANALYSIS AND ELEMENTARY COMPUTATION. FROM THIS WILL RESULT A MODEL AND DATA BASE WHICH HAS INDEPENDENT UTILITY AND UPON WHICH A COMPUTER SIMULATION TOOL CAN BE DESIGNED. THIS TOOL WOULD PERMIT SIMULATION OF GROUND-TO-SATELLITE-TO-GROUND COMMUNICATIONS THROUGH SCINTILLATION AND WOULD SERVE AS THE BASIS TO FINALLY ACHIEVE STEP 2 ABOVE, THE FULL DETERMINATION OF SYSTEM DESIGN REQUIREMENTS FOR SUCH SYSTEMS. DURING PHASE I, THE SIMULATOR WOULD BE COMPLETED THROUGH THE PRELIMINARY DESIGN STAGE. THE ACTUAL SIMULATOR WOULD BE DEVELOPED UNDER A PHASE II EFFORT AND USED TO COMPLETE THE CAPABILITY FROM WHICH FULL COMMUNICATION SYSTEM DESIGN REQUIREMENTS CAN BE GENERATED.

STANFORD TELECOMMUNICATIONS INC AF $ 46,000
2421 MISSION COLLEGE BLVD
SANTA CLARA, CA 95054
D THOMAS MAGILL
TITLE:
ADAPTIVE BEAM ANTENNA COMMUNICATION NETWORKS
TOPIC: 178 OFFICE: RADC

A RESEARCH STUDY IS PROPOSED THAT WILL LEAD TO THE DEVELOPMENT OF A ROBUST, SURVIVABLE TACTICAL COMMUNICATION NETWORK BASED ON AN ADAPTIVE BEAM ANTENNA SYSTEM. THE PERFORMANCE OF SUCH A NETWORK WILL BE DETERMINED AND ALGORITHMS FOR BEAM ACQUISITION AND TRACKING DEVELOPED FOR POINT-TO-POINT (LINK) AND NETWORK ENVIRONMENTS. ANTENNA ARRAY CONFIGURATIONS WILL BE SELECTED AS A FUNCTION OF FREQUENCY FROM VHF TO MILLIMETER WAVE. THE SYSTEM IMPACT OF SUCH PRACTICAL FACTORS AS COMBINER LOSS AND BEAM SIDELOBE LEVELS WILL BE DETERMINED. THE INTERACTION OF THE ANTENNA SYSTEM WITH COMMUNICATION EQUIPMENT IN GENERAL, WILL BE INVESTIGATED AND THE APPLICABILITY OF ADAPTIVE BEAM SYSTEMS OF SEVERAL SPECIFIC TACTICAL COMMUNICATIONS SYSTEMS ASSESSED IN MORE DETAIL. A PLAN FOR A DEMONSTRATION SYSTEM ILLUSTRATING

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OPERATION OF A SELF ORGANIZING AJ, LPI ANTENNA SYSTEM WILL BE DEVELOPED. THE RESULTING ADAPTIVE ANTENNA COMMUNICATION NETWORK WILL HAVE EXCEPTIONALLY GOOD AJ AND LIP PERFORMANCE WHILE PROVIDING THE FLEXIBILITY OF AN OMNIDIRECTIONAL BEAM SYSTEM TO ACCOMMODATE MOBILE AND TRANSPORTABLE NODES.

STANFORD TELECOMMUNICATIONS INC AF $ 49,953
6888 ELM ST
MCLEAN, VA
EDWIN ZAKRZEWSKI
TITLE:
SATELLITE SURVIVABILITY METHODOLOGY DEVELOPMENT
TOPIC: 142 OFFICE: AFSTC/XNI

A METHODOLOGY FOR EVALUATING SATELLITE SYSTEM SURVIVABILITY (AS A FUNCTION OF CONTROL AUTONOMY) IS PROPOSED. THE METHODOLOGY COMBINES THE PROVEN EFFECTIVENESS OF ANALYSIS AND SIMULATION TECHNIQUES FOR ASSESSING JAMMING, NUCLEAR SCINTILLATION AND PHYSICAL THREATS UNDER CONTROL AND GUIDANCE OF AN EXPERT SYSTEM. THE KEY TO THIS PROPOSED CONCEPT IS THE APPLICATION OF INNOVATIVE LINKAGE TECHNIQUES TO ALLOW A SINGLE, EASILY-MANIPULATED, NETWORK DESCRIPTION FILE TO DRIVE MULTIPLE EVALUATION PROCEDURES/TECHNIQUES IN A SINGLE COORDINATED SUPPORT PACKAGE. TO GUIDE THE ANALYST IN CREATING THE CONTROL OPTIONS FILES AND IDENTIFYING POTENTIALLY ROBUST SYSTEM AUTONOMY OPTIONS, ARTIFICAL INTELLIGENCE TECHNIQUES WILL BE STUDIES TO PROVIDE THE FILE EDITOR. THE RESULTANT AUTONOMY EXPERT SYSTEM PLAYS THE ROLE OF AN EXPERT ADVISOR TO THE ANALYST AND INSTRUCTS HIM IN THE USE OF THE MULTIPLE EVALUATION TECHNIQUES. THIS CONCEPT WOULD PROVIDE AN ANALYSIS APPROACH SPECIFICALLY TAILORED TO THE GENERATION OF TECHNICAL PERFORMANCE MEASURES FOR QUANTIFYING THE COMPLEX RELATIONSHIP AMONGST AUTONOMY, GROUND SUPPORT, CONTROL DECENTRALIZATION, MISSION PERFORMANCE AND SURVIVABILITY. THE APPROACH IS FULLY GENERALIZED AND WILL ALLOW ONE TO EVALUATE THE ANTICIPATED SURVIVABILITY AND PERFORMANCE LEVELS OF ANY CANDIDATE SATELLITE NETWORK CONTROL STRUCTURE.

STANFORD TELECTOMMUNICATIONS INC NAVY $ 49,080
6888 ELM ST
McLEAN, VA 22101
AARON WEINBERG
TITLE:
NOVEL SIGNAL PROCESSING AND IMPLEMENTATION TECHNIQUES FOR INTERFERENCE DETECTION AND CHARACTERIZATION
TOPIC: 28 OFFICE: NESC

THERE IS A GROWING NEED TO ACTIVELY MONITOR RADIO COMMUNICATION CHAN-

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NELS AND RECEIVER CIRCUITS FOR THE PRESENCE OF INTENTIONAL OR UNINTENTIONAL INTERFERENCE THAT MAY DEGRADE LINK QUALITY. THE MULTIPLICITY OF SIGNAL FORMATS AND INTERFERENCE TYPES MAKES THE TASK OF DEVELOPING ROBUST MONITORING TECHNIQUES A DIFFICULT ONE. IT MUST ALSO BE RECOGNIZED THAT SUCH MONITORING TECHNIQUES SHOULD IDEALLY BE IMPLEMENTED IN A FASHION WHICH MAXIMIZES COMPACTNESS, COST EFFECTIVENESS AND OPERATOR EFFICIENCY, PRECLUDES THE NEED FOR ALTERATION OF EXISTING EQUIPMENT BY SERVING AS MODULAR ADDITIONS ONLY, FACILITATES UTILIZATION BY MOBILE PLATFORMS, AND, IF POSSIBLE, SUPPORTS NOT ONLY INTERFERENCE DETECTION BUT CHARACTERIZATION AS WELL. TOWARD THIS END, THE GOALS OF THE PROPOSED RESEARCH ARE TO DEVELOP NOVEL TECHNIQUES AND CONCEPTUAL EQUIPMENT DESIGNS FOR INTERFERENCE DETECTION/CHARACTERIZATION OVER A BROAD RANGE OF SIGN AND INTERFERENCE TYPES OF INTEREST; THE DESIGNS SHOULD REFLECT BOTH NOVEL APPLICATIONS OF ADVANCING TECHNOLOGIES AND AN APPROPRIATE MIX OF HARDWARE AND SOFTWARE PROCESSING. AN INITIAL PERFORMANCE ASSESSMENT -- VIA ANALYSIS AND SIMULATION -- IS TO BE CONDUCTED TO THEORETICALLY DEMONSTRATE THE VIABILITY OF THE PROPOSED APPROACHES IN TERMS OF ACCURACY AND SPEED OF THE DETECTION/CHARACTERIZATION PROCESS.

STAR MICROWAVE — AF — $ 49,658
546 DIVISION ST
CAMPBELL, CA 9508
ROBERT M PHILLIPS
TITLE:
MODULATABLE THIN FILM FIELD EMISSION SPACE GUN
TOPIC: 174 OFFICE: RADC/DORM

STAR MICROWAVE HAS DESIGNED A SPACE GUN WHICH IS BASED ON THE USE OF THE SPINDT THIN FILM FIELD EMISSION CATHODE DEVELOPED BY SRI. A TWO INCH DIAMETER ELECTRON BEAM IS MADE UP OF AN HEXAGONAL ARRAY OF 100 ROUND BEAMLET WHICH ARE PRODUCED BY FIELD EMISSION FROM A SINGLE WAFER. EACH BEAMLET CARRIES 1/2 AMP OF CURRENT, FOR A MAXIMUM TOTAL OF 50 AMPS, AT THE MODEST EMISSION DENSITY OF 5 AMPS/SQ CM. THE BEAMLETS ARE FOCUSED INTO SPACE THROUGH A GRIDDED NON-INTERCEPTING ANODE. THE GUN REQUIRES NO FILAMENT POWER. FULL BEAM MODULATION (0 TO 5 AMPS/SQ CM) REQUIRES A TOTAL VOLTAGE SWING OF ABOUT 40 VOLTS. THE GUN CAN BE DESIGNED TO ACCOMODATE AN ANODE VOLTAGE OF TENS OF kV. THE OBJECTIVES OF PHASE I ARE TO FIRST ESTABLISH A SPECIFICATION FOR THE GUN AND DEFINE ITS OPERATING ENVIRONMENT. THE DESIGN WILL THEN

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BE REFINED, THROUGH USE OF COMPUTER SIMULATION, TO MEET THE SPECIFICATION. FEASIBILITY AND SPECIFICATION COMPLIANCE WILL THEN BE DEMONSTRATED THROUGH TESTING OF A BEAMLET ARRAY USING A STANDARD SRI FIELD EMISSION WAFER.

STEINBRECHER CORP — ARMY — $ 49,770
185 NEW BOSTON ST
WOBURN, MA 01801
DR DEAN F PETERSON
TITLE:
EFFICIENT WIDEBAND IMPATT-DIODE POWER COMBINERS FOR EHF APPLICATIONS
TOPIC: 33 OFFICE: LABCOM

THE OBJECTIVE OF THIS PROGRAM WILL BE TO DEVELOP CIRCUIT LEVEL IMPATT-DIODE COMBINERS AT EHF WHICH HAVE THE BANDWIDTH AND STABILITY PROPERTIES AVAILABLE FROM CONVENTIONAL HYBRID ARRAYS WHILE PROVIDING THE SIZE AND COMBINING EFFICIENCY ATTRIBUTES ASSOCIATED WITH N-WAY KUROKAWA-TYPE RESONANT CAVITIES. CONCEPTS FOR UNIQUE, BROADBAND TWO-AND FOUR-DIODE CIRCUIT LEVEL COMBINERS WHICH MAKE OPTIMUM USE OF SYMMETRY FOR MODE STABILIZATION AND REDUCED LOSS ARE EXPECTED TO HAVE BOTH THE SIZE AND WEIGHT OF EXISTING DESIGNS, PERMITTING HIGHER POWER PER UNIT VOLUME, REDUCING MANUFACTURING COSTS WITH FEWER HIGH TOLERANCE PARTS AND ENHANCING RELIABILITY THROUGH INCREASED COMBINING EFFICIENCY. THESE IMPROVEMENTS WILL PROVIDE LOW COST, HIGH PERFORMANCE, RELIABLE MILLIMETER-WAVE COMMUNICATIONS FOR CURRENT AND PLANNED COMMERCIAL AND MILITARY SYSTEMS. THE PHASE I EFFORT WOULD BUILD ON OUR CURRENT EHF COMBINING TECHNOLOGY WHICH HAS PROVIDED HIGH POWER STABLE AMPLIFICATION FROM HYBRID-COMBINED, EFFICIENT IMPATT CIRCUITS OVER A 5 PERCENT BANDWIDTH AROUND 44 GHZ.

SUNBURST TECHNOLOGY INC — AF — $ 54,158
700 RIDGECREST DR SE
ALBUQUERQUE, NM 87108
MARVIN L ALME
TITLE:
PLASMA/SOLID INTERACTION A COMPUTATIONAL INVESTIGATION
TOPIC: 146 OFFICE: AFWL/PRP

SUNBURST TECHNOLOGY, INCORPORATED PROPOSES TO MODEL THE INTERACTION

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OF LOW DENSITY, HIGH VELOCITY PLASMA WITH SOLID DENSITY ALUMINUM. THESE COMPUTATIONAL HYDRODYNAMICAL STUDIES ARE INTENDED TO (A) IDENTIFY AND CHARACTERIZE THE DOMINANT PHYSICAL PROCESSES IN THE PLASMA/SOLID INTERACTION, AND TO (B) BE A PRELIMINARY ASSESSMENT OF THE EFFECTIVENESS OF THE DAMAGE MECHANISM ASSOCIATED WITH THIS INTERACTION. THE INNOVATIVE FEATURE OF THE PROPOSED RESEARCH EFFORT IS THE USE OF THE ADAPTIVE-GRID RADIATION HYDRODYNAMICS CODE WH80S. THIS IMPLICIT CODE WAS DEVELOPED BY DR. KARL-HEINZ WINKLER.

SUNOL SCIENCES CORP — AF — $ 64,250
11887 BUBLIN BLVD - STE B-135
DUBLIN, CA 94568
DR MICHAEL O SCHICK
TITLE:
MULTICOLOR OPTICAL PYROMETRY AT AEDC RANGE G
TOPIC: 92 OFFICE: AFBMO/PMX

SURFACE TEMPERATURE MEASUREMENTS OF REENTRY VEHICLE MATERIALS AT AEDC RANGE G HAVE SHOWN LARGE UNCERTAINTIES IN SOME CASES DUE TO BOUNDARY LAYER EMISSION/ABSORPTION, BACKGROUND RADIATION, AND POSSIBLY VARIATIONS IN EMISSIVITY WITH TEMPERATURE AND WAVELENGTH. MULTICOLOR PYROMETRY OFFERS CONSIDERABLE PROMISE FOR REDUCING TEMPERATURE/EMISSIVITY MEASUREMENT UNCERTAINTIES. AN APPROACH IS SUGGESTED FOR OPTIMIZING A MULTICOLOR PYROMETER DESIGN TO MEET THE SPECIFIC REQUIREMENTS OF AEDC SURFACE TEMPERATURE DIAGNOSTICS. THE PROPOSED WORK INCLUDES THE DEVELOPMENT OF ALGORITHMS TO CALCULATE TEMPERATURE AND EMISSIVITY, AND THE UNCERTAINTIES IN THESE QUANTITIES, FOR AN N-COLOR IMAGING PYROMETER.

SUNOL SCIENCES CORP — AF — $ 49,950
11887 DUBLIN BLVD - STE B-135
DUBLIN, CA 94568
DR P S SPANGLER
TITLE:
HARDENED LIGHTWEIGHT AFT COVER DESIGN
TOPIC: 112 OFFICE: AFBMO/PMX

THE PHASE I PROGRAM WILL DEFINE CRUCIAL AFT COVER DESIGN PARAMETERS

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FOR MEETING THE HIGHER NUCLEAR HARDNESS AND SURVIVABILITY (NH&S) REQUIREMENTS OF ADVANCED REENTRY VEHICLES (RVs). COMPARED TO THE RV SHELL, AFT COVERS MUST SURVIVE LOWER NON-NUCLEAR REENTRY ENVIRONMENTS BUT POSSIBLY HIGHER NUCLEAR ENVIRONMENTS. AFT COVERS MUST ALSO ACCOMODATE DISCONTINUITIES, SUCH AS ATTACHMENT POINTS AND FEEDTHROUGHS. DESIGNS TO MINIMIZE THE AFT COVER WEIGHT, COST, AND DEVELOPMENT RISK WILL BE SOUGHT USING (1) MATERIALS AND DESIGN CONCEPTS ALREADY VERIFIED TO MEET NH&S REQUIREMENTS IN OTHER PROGRAMS AND (2) MATERIALS/CONCEPTS CURRENTLY AVAILABLE OR IN DEVELOPMENT WHOSE PROPERTIES SUGGEST HIGH HARDNESS. CROSS PLOTS OF WEIGHT AND COST VERSUS MATERIAL AND DESIGN PARAMETERS WILL BE USED TO IDENTIFY THE CRUCIAL PARAMETERS.

SUSQUEHANNA RESOURCES & ENVIRONMENT INC NAVY $ 75,718
305 MAIN ST - STE 104
JOHNSON CITY, NY 13790
TIMOTHY D MASTERS
TITLE:
EXPERT SYSTEMS TO AUTOMATIC DIGITAL SCENE MATCHING AREA CORRELATOR (DSMAC) SCENE SELECTION AND SCENE ENHANCEMENT
TOPIC: 136 OFFICE: JCM

CURRENT DSMAC SYSTEM USES SPATIAL-BINARY PATTERN TO PERFORM SCENE MATCHING. SUCCESS DEMANDS CERTAIN RELIABLE TERRAIN CHARACTERISTICS BE PRESENT AND EXTRACTABLE. ERGO, THE PRESENT OF CERTAIN OTHER TERRAIN CHARACTERISTICS MIGHT PRECLUDE SUCCESS, SUCH AS LINEAR FEATURES LIKE ROADS AND STREAMS. THIS IS THE SCENE AVAILABILITY PROBLEM. FURTHERMORE, FEATURES SELECTED FOR MATCHING ANALYSIS SHOULD BE IMMUNE TO SUDDEN ENVIRONMENT/WEATHER CHANGES; OTHERWISE, FEATURES IN THE REFERENCE SCENE MAY NOT EXIST IN THE SENSE SCENE. THIS IS THE FEATURE SET RELIABILITY PROBLEM. ACCORDINGLY, THESE TASKS ARE PROPOSED TO PROVIDE DSMAC WITH ADDITIONAL CAPABILITIES BY SOLVING THESE TWO PROBLEMS: (1) TO INVESTIGATE VARIOUS COMPETING TECHNIQUES TO ENHANCE DSMAC REFERENCE SCENE PREPARATION; (2) TO TEST COMPETING TECHNIQUES AGAINST SR & E'S ALGORITHMS BASED STABLE STRUCTURE THEORY; (3) TO INVESTIGATE ADVANCED ALGORITHMS TO EXTRACT LINEAR FEATURES TO ENHANCE DSMAC CAPABILITY; (4) TO COMPARE HUMAN EXPERT KNOWLEDGE AGAINST THE STABLE STRUCTURE THEORY AND ITS ALGORITHMS; (5) TO INVESTIGATE HARDWARE AND SOFTWARE INTEGRATION FOR DEVELOPING AN EXPERT SYSTEM. WITH SR & E EXPERIENCE IN THESE AREAS, AND THE FACT THAT THE MAJORITY OF THE ALGORITHMS HAVE BEEN DEVELOPED, THESE TASKS ARE ACHIEVABLE.

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FURTHERMORE, EXPERT KNOWLEDGE OF DSMAC WILL BE PROVIDED BY J. FELTENBERGER OF SAIC AS CONSULTANT TO SR & E.

SWEENEY ENGINEERING CORP — NAVY — $ 49,865
17224 GRAMERCY PLACE
GARDENA, CA 90247
STALEY KONIN
TITLE:
LOW COST EXPENDABLE FUEL TANKS FOR CARRIER AIRCRAFT
TOPIC: 40 OFFICE: NSSC

TYPICAL LOW COST, DENSELY PACKAGED, EXPENDABLE FUEL TANKS ARE DIFFICULT TO ASSEMBLE AND REQUIRE LARGE ASSEMBLY AREAS. THIS WOULD MAKE DEPLOYMENT ON A CARRIER IMPRACTICAL. A TANK DESIGN IS PROPOSED THAT COLLAPSES INTO 1/3 THE VOLUME OF ITS DEPLOYED VOLUME AND CAN BE ASSEMBLED IN LESS THAN ONE HOUR. MANUFACTURING METHODS TO ACHIEVE SIGNIFICANT COST REDUCTIONS ARE INVESTIGATED.

SYNERTECH INC — ARMY — $ 49,852
1011 E MAIN ST
RICHMOND, VA 23219
DR T S SUDARSHAN
TITLE:
COMPUTERIZED DATA BASE TO MONITOR WHEEL VEHICLE CORROSION
TOPIC: 70 OFFICE: TACOM

A GROWING NEED EXISTS FOR A DYNAMIC COMPUTERIZED DATA BASE THAT WILL EFFECTIVELY MONITOR CORROSION DAMAGE TO THE ARMY'S TACTICAL WHEEL VEHICLE FLEET. THIS DATA BASE SHOULD BE DESIGNED TO FACILITATE BOTH THE ADDITION OF NEW DATA SETS AND THE UPDATE AND CORRECTION OF THOSE PREVIOUSLY ENTERED. ADDITIONALLY, IT MUST HAVE THE CAPABILITY TO ANALYZE THE DATA FOR TRENDS INCLUDING THE SPECIFIC AFFECTS OF TIME, GEOGRAPHIC LOCATION, VEHICLE AGE AND MAINTENANCE, REPAIR, MILAGE, EVOLVING TECHNOLOGICAL CORROSION COATINGS, TYPE AND SEVERITY OF CORROSION. SYNERTECH, ITS PRINCIPAL INVESTIGATOR, AND THEIR CONSULTANTS HAVE EXTENSIVE RESEARCH BACKGROUNDS IN SURFACE MODIFICATION TECHNOLOGY (TRIBOLOGY), CORROSION AND DATA BASE DESIGN. THIS EXPERIENCE WILL ENABLE THEM TO DEVELOP A QUERY AND MENU DRIVEN SYSTEM THAT WILL MEET

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THE NEEDS DESCRIBED ABOVE. IN THIS PROPOSAL, A METHODOLOGY FOR DYNAMIC CLASSIFICATION OF CORROSION RELATED INFORMATION WILL BE DEVE-ED. INFORMATION FOR THE SYSTEM WILL BE ACQUIRED FROM SIMPLIFIED FIELD INSPECTION PROCEDURES AND THE USE OF THE SYSTEM WILL ALLOW CORROSIVE PROBLEMS TO BE DETECTED AND SOLUTIONS RECOMMENDED AS EARLY AS POSSIBLE.

SYNETICS CORP — NAVY — $ 50,563
100 MAIN ST
READING, MA 01867
WILLIAM F O'HALLORAN
TITLE:
VOICE RECOGNITION/SYNTHESIS TECHNOLOGY
TOPIC: 37 OFFICE: NSSC

THE TACTICAL ACTION OFFICER (TAO) OR BATTLE GROUP COMMANDER (BGC) IS FACED WITH MAKING DECISIONS IN REAL-TIME WITH A HEAVY RELIANCE ON TACTICAL DISPLAYS AND ONBOARD COMPUTERS FOR TACTICAL COMMAND CONTROL. EMERGING TECHNOLOGIES SUCH AS AUTOMATIC SPEECH RECOGNITION (ASR) AND COMPUTER VOICE RESPONSE (CVR) ARE BECOMING INCREASINGLY SOPHISTICATED AND COST EFFECTIVE. THIS PROPOSAL ADDRESSES THE USE OF ASR AND CVR FOR NAVAL COMMAND AND CONTROL. SPECIFICALLY, IT ADDRESSES THESE TECHNOLOGIES TO ENHANCE THE EFFECTIVENESS OF THE DECISION MAKING FUNCTIONS OF THE TAO AND BGC VIA THE SHIPBOARD SCREEN DISPLAY. TO THIS END, THE STATE-OF-THE-ART IN ASR AND CVR ARE PRESENTED AND IT IS SHOWN HOW THESE TECHNOLOGIES COULD BE USED TO ENHANCE C2 FUNCTIONS. A PLAN TO UTILIZE THESE TECHNOLOGIES WITH EMPHASIS ON TRAINING AND PERFORMANCE MONITORING AS APPLIED TO A SPECIFIC C2 FUNCTIONS IS CONTAINED HEREIN. IT IS ALSO SHOWN HOW A FACET OF AI (NATURAL LANGUAGE) COULD BE ALSO UTILIZED WITH ASR AND CVR. FINALLY, A PLAN TO DEVELOP A DETAILED SPECIFICATION FOR DEMONSTRATION IS PRESENTED.

SYSTEMS APPLICATIONS INC — NAVY — $ 50,000
23811 CHAGRIN PLAZA EAST - #305
BEACHWOOD, OH 44122
DOUGLAS BAHNIUK
TITLE:
TRIBOLOGY OF NONSKID HEELS AND SOLES
TOPIC: 45 OFFICE: NSSC

A TREMENDOUS NUMBER OF INJURIES OCCUR EACH YEAR DUE TO SLIPPING AND

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FAILLING ON WET SURFACES. SERIOUS INJURIES CAN RESULT FROM SUCH FALLS, RESULTING IN COSTS FOR HOSPITALIZATION AND LOSS OF PRODUCTIVITY. PROPERLY DESIGNED SHOES WITH NONSKID HEELS AND SOLES CAN CONTRIBUTE TO REDUCING THESE INJURIES. THE PROBLEM OF DESIGNING NONSKID HEEL AND SOLES WILL BE APPROACHED BY USING IDEAS DEVELOPED FOR LUBICATION OF COMPLIANT BEARINGS. HOWEVER, INSTEAD OF DESIGNING THE HEEL AND SOLE TO PRODUCE A LUBRICATING FILM WE WILL DESIGN THEM SO THAT THEY CANNOT PRODUCE A LUBRICATING FILM. THIS WILL BE ACCOMPLISHED THROUGH THE SELECTION OF MATERIAL PROPERTIES (FOR THE HEEL AND SOLE) AND BY INCORPORATING A PERMANENT SURFACE ROUGHNESS IN THE HEEL AND SOLE MATERIALS.

SYSTEMS ENGINEERING FOR POWER INC — ARMY — $ 49,919
7833 WALKER AVE
GREENBELT, MD 20770
DR WILLIAM BENNETT
TITLE:
DISTRIBUTED COMMAND AND CONTROL APPLICATIONS - CECOM/CENCOMS
TOPIC: 26 OFFICE: CECOM

ARMY AVIATION (HELICOPTERS) REPRESENT AN INCREASINGLY CRITICAL COMPONENT IN FUTURE AIRLAND BATTLES AND THEREFORE A MORE INTENSIVE, EFFICIENT AND RESPONSIVE OPERATIONS MANAGEMENT SYSTEM IS REQUIRED. WITHOUT AN EFFICIENT DISTRIBUTED COMMAND AND CONTROL SYSTEM THESE OBJECTIVES CANNOT BE MET. WE PROPOSE TO DEVELOP DISTRIBUTED AUTOMATED DECISION AIDS FOR MANAGEMENT AND CONTROL OF ARMY HELICOPTERS OPERATIONS. THE METHODOLOGY PROPOSED UTILIZES A COMBINATION OF ADVANCED SCHEDULING ALGORITHM, DATABASE MANAGEMENT, PRODUCTION RULE-BASED, EXPERT SYSTEMS AND INTERACTIVE SOFTWARE SYSTEMS. THE RESULTING SCHEDULING SYSTEM IS MANAGED BY SEVERAL AGENTS, CORRESPONDING TO MOBILE NODES OF THE COMMUNICATION NETWORK, WHICH ALLOCATE AND SCHEDULE HELICOPTER MISSIONS INDEPENDENTLY, WHILE INFORMING THE COMMON DATABASE OF THEIR ACTIONS AND STATUS OF THE RESOURCE. IN THE EVENT THAT THE HELICOPTER RESOURCE REACHES A CRITICAL STATE, DETERMINED BY A HIGHER LEVEL, COORDINATING AGENT, HELICOPTER OPERATIONS ARE CENTRALLY COORDINATED BY A SUPERVISORY AGENT IN COLLABORATION WITH THE OTHER MANAGING AGENTS.

TACAN AEROSPACE CORP — AF — $ 48,792
2111 PALOMAR AIRPORT RD - STE 100
CARLSBAD, CA 92008
MICHAEL M SALOUR
TITLE:
OPTICAL SIGNAL PROCESSING TECHNOLOGY SURVEY
TOPIC: 130 OFFICE: AFSTC

WE PROPOSE TO STUDY AND DEVELOP SPACE QUALIFIED ELECTRO-OPTICAL

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DEVICES THAT ARE CAPABLE OF ULTRA HIGH SPEED SIGNAL PROCESSING AND LOGIC OPERATION AND ARE COMPATIBLE WITH THE PULSE-POWER AND REPETITION RATES AVAILABLE WITH PICOSECOND PULSES FROM A MODE-LOCKED SEMICONDUCTOR DIODE LASER, WHICH WE HAVE DEVELOPED OVER THE PAST FEW YEARS. SUCH OPTICAL LOGIC DEVICES, BASED ON PICOSECOND PROBLEMS RELATED TO THE COUPLING OF HIGH-SPEED SIGNALS TO AND FROM THE GaAs CHIP (AND THE RELATED PROBLEMS OF PARASITICS AND LOADING), BUT ALSO PROVIDE AN UNAMBIGUOUS DETERMINATION OF THE GATE DELAY (IN CONTRAST WITH THE CONVENTIONAL RING OSCILLATOR AND GIGAHERTZ RATE "DIVIDED-BY-TWO" TECHNIQUES). NUMEROUS VARIATIONS OF THESE OPTICAL TECHNIQUES WILL BE IMPLEMENTED IN OUR LABORATORIES FOR THE DIRECT MEASUREMENT OF ON-CHIP PROPAGATION DELAYS AND WAVEFORMS IN GIGAHERTZ LOGIC CIRCUITS WITH UNPRECEDENTED (~ 10 PS) RESOLUTION AND ACCURACY. THE POTENTIAL FOR SUCH CONCEPTS FOR NOVEL DESIGNS OF COMPUTER ARCHITECTURE WILL BE EXPLORED. AS CONTINUED IMPROVEMENTS IN ELECTRONIC SPEED AND POWER BEGIN TO SLOW, OPTICS WILL ASSUME A ROLE OF INCREASING IMPORTANCE IN OUR QUEST TO MAINTAIN COMPUTATIONAL SUPERIORITY IN THE U.S. OVER OUR RIVALS IN BOTH THE ECONOMIC AND NATIONAL SECURITY REALMS.

TACAN AEROSPACE CORP — NAVY — $ 50,000
2111 PALOMAR AIRPORT RD - STE 100
CARLSBAD, CA 92008
MICHAEL M SALOUR
TITLE:
IMPROVED TEMPERATURE SENSING SYSTEMS/INSTRUMENTATION
TOPIC: 126 OFFICE: NWSC

WE PROPOSE A NOVEL TRANSMISSION FIBER OPTIC TEMPERATURE SENSOR CONSISTING OF A SEMICONDUCTOR PLATELET SANDWICH BETWEEN TWO PARALLEL FIBER ENDS. A NEW MEASUREMENT CONFIGURATION ELIMINATES NOT ONLY THE INFLUENCE OF THE FIBER ABSORPTION BUT ALSO THE INFLUENCE OF THE COUPLING FACTOR OF THE FIBER COUPLER ON THE MEASUREMENT RESULT. BECAUSE OF ITS INHERENT GEOMETRIC VERSATILITY, COMPACTNESS, SENSITIVITY, SIMPLICITY, AND ITS IMMUNITY FROM ELECTROMAGNETIC INTERFERENCE, THIS SENSOR HAS POTENTIAL APPLICATIONS IN MANY FIELDS. THE SYSTEM, UTILIZING SAPPHIRE FIBER AND A HIGH TEMPERATURE POLYMERIC PLATELET, SHOULD OPERATE IN THE RANGE OF THE AMBIENT TO 1500 DEG F TEMPERATURE ENVIRONMENT. THE ELECTRONIC DIGITAL READOUT SYSTEM SHOULD PROVIDE REAL-TIME READOUT ASSOCIATED WITH TEMPERATURE CHANGES OF HUNDREDS OF

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DEGREES FAHRENHEIT IN LESS THAN ONE MILLISECOND. A FURTHER EXPERIMENTAL CONFIGURATION TOTALLY ELIMINATES THE INFLUENCE OF INTENSITY FLUCTUATION OF THE LIGHT SOURCES AND THAT OF THE FIBER ABSORPTION AND THE COUPLING FACTOR OF THE FIBER COUPLER. IF OTHER TYPES OF PLATELETS, TRANSDUCER MATERIALS AND FIBERS ARE USED, ITS OPERATION CAN BE EXTENDED FOR HIGH AND LOW TEMPERATURE APPLICATIONS.

TACAN AEROSPACE CORP — SDIO — $ 0
2111 PALOMAR AIRPORT RD - STE 100
CARLSBAD, CA 92008
MICHAEL M SALOUR
TITLE:
COMPUTER ARCHITECTURE/ARTIFICIAL INTELLIGENCE TO SUPPORT C3
TOPIC: 4 OFFICE: IST

WE PROPOSE TO STUDY AND DFVELOP SPACE QUALIFIED ELECTRO-OPTICAL DEVICES THAT ARE CAPABLE OF ULTRA HIGH SPEED SIGNAL PROCESSING AND LOGIC OPERATION AND ARE COMPATIBLE WITH THE PULSE-POWER AND REPETITION RATES AVAILABLE WITH PICOSECOND PULSES FROM A MODE-LOCKED SEMICONDUCTOR DIODE LASER, WHICH WE HAVE DEVELOPED OVER THE PAST FEW YEARS. SUCH OPTICAL LOGIC DEVICES, BASED ON PICOSECOND PROBLEMS RELATED TO THE COUPLING OF HIGH-SPEED SIGNALS TO AND FROM THE GaAs CHIP (AND THE RELATED PROBLEMS OF PARASITICS AND LOADING), BUT ALSO PROVIDE AN UNAMBIGUOUS DETERMINATION OF THE GATE DELAY (IN CONTRAST WITH THE CONVENTIONAL RING OSCILLATOR AND GIGAHERTZ RATE "DIVIDE-BY-TWO" TECHNIQUES). NUMEROUS VARIATIONS OF THESE OPTICAL TECHNIQUES WILL BE IMPLEMENTATED IN OUR LABORATORIES FOR THE DIRECT MEASUREMENT OF ON-CHIP PROPAGATION DELAYS AND WAVEFORMS IN GIGAHERTZ LOGIC CIRCUITS WITH UNPRECEDENTED (APPROX 10 ps) RESOLUTION AND ACCURACY. THE POTENTIAL FOR SUCH CONCEPTS FOR NOVEL DESIGNS OF COMPUTER ARCHITECTURE WILL BE EXPLORED. AS CONTINUED IMPROVEMENTS IN ELECTRONIC SPEED AND POWER BEGIN TO SLOW, OPTICS WILL ASSUME A ROLE OF INCREASING IMPORTANCE IN OUR QUEST TO MAINTAIN COMPUTATIONAL SUPERIORITY IN THE U.S. OVER OUR RIVALS IN BOTH THE ECONOMIC AND NATIONAL SECURITY REALMS.

TECHNICAL RESEARCH ASSOCS INC — AF — $ 53,048
410 CHIPETA WAY - STE 222
SALT LAKE CITY, UT 84108
JOSEPH K WEEKS JR
TITLE:
METALLOPHILIC COLLOIDAL OXIDES IN ALUMINUM-IRON CASTINGS
TOPIC: 42 OFFICE: AFWAL/ML

WITH RAPID SOLIDIFICATION, IT IS POSSIBLE TO PRODUCE ALUMINUM-IRON

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ALLOYS WHICH HAVE USABLE STRENGTHS AT 500 DEG F. HOWEVER, AT 650 DEG F, THESE ALLOYS UNDERGO REARRANGEMENT AND LOSE STRENGTH. THIS PROPOSAL SUGGESTS THE UNIQUE COMBINATION OF OXIDE DISPERSION STRENGTHENING WITH COLLOIDAL OXIDES WHICH ARE WETTED BY THE MOLTEN ALUMINUM-IRON ALLOYS. BECAUSE THE OXIDES ARE METALLOPHILIC, IT WILL BE POSSIBLE TO MELT THE ALLOYS WHILE STILL MAINTAINING THE OXIDE DISPERSION, AND THEREAFTER RAPID SOLIDIFY. WITH THIS COMBINATION STRENGTH WILL BE PRESERVED TO MUCH HIGHER TEMPERATURES AND PERHAPS THE RS MICROSTRUCTURE WILL ALSO BE PRESERVED.

TECHNICAL SOLUTIONS INC — ARMY — $ 53,125
PO BOX 1148
MESILLA PARK, NM 88047
DR ALTON L GILBERT
TITLE:
CONTOUR DESCRIPTIONS FOR MACHINE VISION
TOPIC: 14 OFFICE: ARDC

NORMALIZED INTERVAL/VERTEX DESCRIPTORS (NI/VD) ALLOW A SIMPLE, YET EXACT REPRESENTATION OF A CONTOUR BY CODING THE LENGTH OF STRAIGHT LINE SEGMENTS AND THE ANGLE CONNECTING THESE SEGMENTS INTO A CHAIN CODE. BY NORMALIZING THE LENGTHS THE REPRESENTATION IS MADE SCALE INVARIANT. BY CHOICE OF A STARTING SEGMENT, IT IS ROTATIONALLY INVARIANT. THEREFORE A "LIBRARY" REPRESENTATION OF THE CONTOUR IS COMPACT AND ROBUST OVER TWO IMPORTANT SOURCES OF CLASSIFICATION ERROR. PARTIAL CONTOURS ARE ACCURATELY REPRESENTED (TO A SCALING ERROR) BY THE LIBRARY. THE NI/VD IS USEFUL IN DEFINING A "COMPLEXITY MEASURE" OF THE CONTOUR, DEFINED AS THE SUM OF THE MAGNITUDE OF THE ANGLES BETWEEN SEGMENTS. CONTOURS AND LIBRARY DESCRIPTORS CAN BE CLASSIFIED SIMPLY BY THEIR COMPLEXITY. THEREFORE, CONTOURS MAY BE QUICKLY SORTED INTO CLASSES OF COMPARABLE COMPLEXITY, INCREASING THE EFFICIENCY OF CONTOUR IDENTIFICATION. SEGMENTATION OF IMAGES MAY PROCEED FROM A VARIETY OF PRE-PROCESSING ALGORITHMS. SCENE TYPES ARE APPROPRIATELY SEGMENTED BY CHANGES IN INTENSITY, DIFFERENCES IN TEXTURE, OR BY COLOR BOUNDARIES. NO MATTER WHICH PREPROCESSING ALGORITHM IS APPLIED, THE RESULT IS A COLLECTION OF CONTOUR LINES REPRESENTING THE RESULTS OF THE SEGMENTATION PROCESS, UPON WHICH THE NI/VD IS APPLIED.

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TECHNIWEAVE INC
PO BOX 314
E ROCHESTER, NH 03867
JAMES A CRAWFORD JR
DEPT: NAVY
AWARDED AMOUNT: $ 45,750
TITLE:
MATERIAL AND PROCESS DEVELOPMENT FOR THE AYPEX BRAIDING METHOD
TOPIC: 94 OFFICE: NSWC

THIS PROPOSAL DESCRIBES AN EFFORT TO IMPLEMENT THE AYPEX BRAIDING PROCESS. WORK TO BE CONDUCTED INCLUDES WEAVE DESIGN, FABRICATION DEMONSTRATION, IMPREGNATION AND TEST AND EVALUATION.

TECHNOLOGY ASSESSMENT & TRANSFER INC
2002 HUNTWOOD DR
GAMBRILLS, MD 21054
LARRY L FEHRENBACHER
DEPT: AF
AWARDED AMOUNT: $ 49,820
TITLE:
IMPROVED THERMAL OXIDATIVE-DEPOSITION SCREENING TESTS FOR TURBINE LUBRICANTS
TOPIC: 70 OFFICE: AFWAL/PO

CURRENT MIL-SPEC OXIDATION-CORROSION AND HIGH TEMPERATURE DEPOSITION TESTS DO NOT ADEQUATELY DIFFERENTIATE BETWEEN THE PERFORMANCE CHARACTERISTICS THAT MIL-SPEC LUBRICANTS EXPERIENCE IN OPERATIONAL ENGINES. A RAPID SIMPLE AND NOVEL TGA TEST METHOD COUPLED WITH DSC AND CHEMILUMINESCENCE TESTS ARE PROPOSED AS METHODS THAT COULD ACCURATELY SIMULATE THE BEHAVIOR OF MIL-SPEC LUBRICANTS IN THE COMBINED THERMAL-OXIDATIVE CORROSIVE ENVIRONMENT OF REAL ENGINES.

TECHNOLOGY DEVELOPMENT ASSOCS INC
PO BOX 624
EXTON, PA 19341
NICHOLAS J DISPENZIERE
DEPT: AF
AWARDED AMOUNT: $ 66,130
TITLE:
HARDENED LIGHTWEIGHT AFT COVER DESIGN
TOPIC: 112 OFFICE: AFBMO/PMX

THE PHASE I PROGRAM SHALL IDENTIFY REENTRY VEHICLE AFT COVER DESIGNS

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THAT INCORPORATE MATERIALS AND DESIGN FEATURE WHICH OFFER INCREASED HARDNESS AGAINST NUCLEAR EFFECTS WHILE RETAINING LOW WEIGHT. PROGRAM FEASIBILITY WILL BE DEMONSTRATED BY CONDUCTION OF NUCLEAR HARDNESS AND SURVIVABILITY (NH&S) SHOCK WAVE AND STRUCTURAL RESPONSE ANALYSIS ON UNIQUELY DEVELOPED INNOVATIVE AFT COVER DESIGN CONCEPTS.

TECHNOLOGY DEVELOPMENT ASSOCS INC — DNA — $ 62,117
PO BOX 624
EXTON, PA 19341
NICHOLAS J DISPENZIERE
TITLE:
OVERLAY/UNDERLAY NH AND S STUDY
TOPIC: 5 OFFICE: OAAM

ADVANCED MISSILE AND REENTRY VEHICLE SYSTEMS FOR WHICH INCREASED NUCLEAR HARNESS REQUIREMENTS WILL BE IMPOSED CURRENTLY HAVE NO CLEAR CUT SOLUTION AS TO HOW THEY WILL SUSTAIN THE INCREASED REQUIREMENTS. VOLUMETRIC, WEIGHT, AND SYSTEM PERFORMANCE CONSTRAINTS MAKE "BRUT FORCE" HARDENING DESIGN SOLUTIONS UNACCEPTABLE AND COSTLY. THE OBJECTIVE OF THIS PHASE I STUDY IS TO REVIEW AND CORRELATE THE RESULTS OF TECHNOLOGY PROGRAMS ON OVERLAY AND UNDERLAY MATERIAL DEVELOPMENT INCLUDING APPLICABLE TEST DATA. USING THIS DATA DERIVED CIRCA MID 1970'S, THE PHASE I STUDY WILL ASSESS THE MATERIALS APPLICABILITY TO THE ADVANCED SYSTEMS AND DEFINE THESE RESULTS AND NEEDS TO THE NH&S COMMUNITY.

TECHNOLOGY FOR ENERGY CORP — ARMY — $ 48,374
1 ENERGY CENTER - PELLISSIPPI PKWY
KNOXVILLE, TN 37922
DR ROBERT S HOWELL
TITLE:
FIELD MONITORING OF WATER SUPPLIES FOR RADIOACTIVITY FEASIBILITY STUDY
TOPIC: 58 OFFICE: BRDC

A STUDY IS PROPOSED TO DETERMINE THE FEASIBILITY OF A NEW MEASUREMENT SYSTEM FOR DETERMINATION OF RADIOACTIVE CONTAMINATION IN WATER UNDER BATTLEFIELD CONDITIONS. THE PROPOSED SYSTEM HAS THE ADVANTAGES OF AN EASY TO USE, LIGHTWEIGHT, COMPACT, AND RUGGEDIZED MONITORING SYSTEM

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FOR DIRECT MEASUREMENT OF FISSION PRODUCT CONTAMINATION IN WATER. IT IS ANTICIPATED THAT THE SYSTEM WILL BE CAPABLE OF DETECTING 1000 pCi/l OF MIXED FISSION PRODUCTS IN THE PRESENCE OF 100 mR/hr RADIATION BACKGROUND. THE MEASURMENT TECHNIQUE IS BASED ON DIRECT MEASUREMENT OF BETA PARTICLES EMITTED BY NUCLIDES WITHIN THE WATER WHILE THE DETECTOR AND SOURCE ARE HELD IN A FIXED CONSISTENT GEOMETRY WITHIN A COLLAPSABLE WATER CONTAINER. THE WATER UNDER INTERROGATION WILL ACT AS A SHIELD AGAINST BETA FROM OUTSIDE THE COLLAPSABLE CONTAINER.

TERRAGRAF INC AF $ 53,827
1430 N 6TH ST
TUCSON, AZ 85705
DR CHARLES E GLASS
TITLE:
HIGH-RESOLUTION GEOTECHNICAL EXPLORATION USING WAVE-DIFFUSION GEOTOMOGRAPHY
TOPIC: 88 OFFICE: AFBMO/PMX

RESEARCH IS PROPOSED TO DEVELOP ITERATIVE RECONSTRUCTION ALGORITHMS AND COMPUTER PROGRAMS TO PERMIT RAPID, HIGH-RESOLUTION (LESS THAN ONE METER) WAVE-DIFFUSION GEOTOMOGRAPHY RECONSTRUCTIONS OF ROCK MASS FRACTURE SYSTEMS AND HYDROLOGIC PROPERTIES. RESEARCH WILL ALSO INVESTIGATE THE MATHEMATICS OF WAVE-DIFFUSION RECONSTRUCTIONS IN THE FREQUENCY DOMAIN. THE ACCURACY AND RESOLUTION OF ALL ALGORITHMS WILL BE EVALUATED USING COMPUTER-GENERATED DATA FROM KNOWN ANOMALIES. THE CARDINAL FOCUS OF THIS RESEARCH PROPOSAL IS TO FIND AN ECONOMICAL AND HIGH-RESOLUTION METHOD TO REMOTELY DEFINE SUBSURFACE ROCK MASS CHARACTERISTICS FOR DEEP CONSTRUCTION AND GROUND WATER MANAGEMENT.

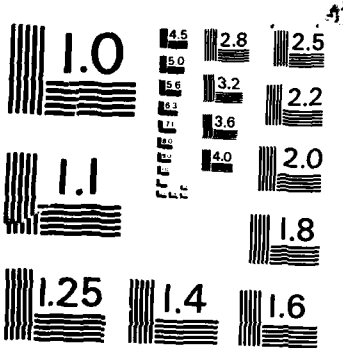
TETRA CORP AF $ 53,803
1325 SAN MATEO SE
ALBUQUERQUE, NM 87108
WILLIAM M MOENY
TITLE:
ELECTRONIC FUSE TRANSFORMERS RESEARCH AND DEVELOPMENT
TOPIC: 185 OFFICE: AD/PMR

IN THIS WORK, WE PROPOSE TO IDENTIFY, DESIGN, AND EVALUATE OPTIMUM

AD-A166 900 DEFENSE SMALL BUSINESS INNOVATION RESEARCH PROGRAM (SBIR) ABSTRACTS OF PHASE I AWARDS 1985(U) DEPARTMENT OF DEFENSE WASHINGTON DC 1985 4/4

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GREAT POTENTIAL AS A MEANS OF GREATLY ENHANCING THE PERFORMANCE OF GAS TURBINE AIRCRAFT ENGINES. PAYOFFS FROM THEIR USE WOULD INCLUDE MAJOR INCREASES IN THRUST-TO-WEIGHT RATIOS, INCREASED DESIGN DUE TO ENHANCED EFFICIENCY, INCREASED ENGINE ENDURANCE, AND SIMPLIFICATION OF ENGINE DESIGN DUE TO A REDUCTION IN THE NUMBER OF PARTS. IF COMPOSITE MATERIALS ARE TO BE EFFECTIVELY APPLIED TO TURBINE ENGINES, IT WILL BE ESSENTIAL TO SELECT THE MOST SUITABLE WEAVING PROCESS FOR EACH APPLICATION. THIS PROGRAM IS DESIGNED TO ASSESS THE UTILITY OF THE BROAD RANGE OF WEAVING PROCESSES AVAILABLE IN THE TEXTILE INDUSTRY. IT WILL BE DIRECTED TOWARDS THREE GENERAL CATEGORIES OF MATRICES: CERAMIC, CARBON, POLYMERIC. WEAVING TECHNOLOGIES WILL BE ASSESSED BASED ON: WEAVING COSTS, PERFORM PROCESSING COSTS, COMPOSITE PROPERTIES, PROCESS FLEXIBILITY, PROCESS LIMITATIONS, ABILITY TO PRODUCE COMPLEX SHAPES. BASED ON THIS ANALYSIS, AT LEAST ONE PROCESS WILL BE IDENTIFIED AS APPLICABLE TO EACH MATRIX CATEGORY. A WEAVING PLAN WILL BE DEVELOPED FOR EACH PROCESS INCLUDING A COST ANALYSIS FOR REPRESENTATIVE PARTS. PRODUCTION BARRIERS WILL BE CLEARLY IDENTIFIED. A FINAL REPORT WILL BE PROVIDED TO SUMMARIZE THIS EFFORT AND PROVIDE GUIDELINES FOR FURTHER PHASE II DEVELOPMENT.

THE ASSOCIATED CORP — NAVY — $ 49,135
19 SPRING ST
NEWPORT, RI 02840
JOHN M FORMWALT
TITLE:
SURF ZONE AND SHALLOW WATER OBJECT DETECTION STUDY
TOPIC: 130 OFFICE: NCSC

TAC PROPOSES TO STUDY THE FEASIBILITY OF DETECTION AND LOCALIZING OIL DRUM SIZE OBJECTS ON/IN THE BOTTOM OF SURF ZONES. THE APPROACH IS TO ANALYZE THE PERFORMANCE PROBABILITIES AND DESIGN FEASIBILITY OF LOW FREQUENCY (20 TO 500 Hz) ACTIVE ELECTROMAGNETIC DESIGNS IN A TOWABLE, SUBMERGED HYDROFOIL CONFIGURATION. DETECTION SYSTEMS WOULD BE SUPPLEMENTED FOR LOCALIZATION BY EITHER NAVIGATIONAL FIX METHODS OR RELEASABLE MARKER BUOYS. DETECTION SLANT RANGES OF 10 TO 30 METERS FROM THE HELICOPTER OR SMALL SHIP TOWED HYDROFOIL AND LOCALIZATION TO WITHIN LESS THAN 2 METERS ARE REASONABLE GOALS FOR SUCH A SYSTEM FOR SHALLOW (1-2 METERS) BURIAL DEPTHS. MULTIPLE FOIL-SENSOR ARRAYS WITH TOWING BRIDLES COULD BE EMPLOYED TO INCREASE THE SWEEP RATE AND/OR DETECTION PROBABILITY BUT WITH INCREASE IN SYSTEM COST.

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ACOUSTIC OR LASER SENSORS DO NOT APPEAR PROMISING BECAUSE OF THE HIGH DISPERSION AND ATTENUATION IN TURBID CONDITIONS AND AGGREGATE BOTTOMS CONTAINING LARGE AMOUNTS OF CORAL OR SHELLS. THE STUDY IS ENVISIONED AS A SIX MONTH EFFORT CONSISTING OF: COORDINATION WITH NCSL AND DEFINITION OF PERFORMANCE, ENVIRONMENT AND CONFIGURATION REQUIREMENTS (START TO 2 MOS), PERFORMANCE EFFECTIVENESS PROBABILITY ANALYSIS FOR MORE DETAILED DESIGNS (1ST THRU 4TH MO) AND PROBABILITIES FOR MOST PROMISING OPTIONS (3RD TO 5TH MO) CULMINATING IN A FINAL REPORT (6 MONTHS).

THEORY & APPLICATIONS UNLIMITED CORP — ARMY — $ 49,899
10 JACKSON ST - STE 101
LOS GATOS, CA 95030
RICHARD V DENTON
TITLE:
INTERACTIVE PERSPECTIVE VIEW MISSION PLANNING AID
TOPIC: 67 OFFICE: TACOM

THIS ACTIVITY ADDRESSES USE OF ARTIFICIAL INTELLIGENCE SEARCH TECHNIQUES TO AUTOMATICALLY DETERMINE A MISSION PATH FOR A TANK COMMANDER. THE PLANNING IS BASED ON EITHER A STANDARD TOPOGRAPHIC MAP OR ON A DIGITAL DATA BASE. ONCE THE PATH IS GENERATED, PERSPECTIVE VIEW GRAPHICS ARE USED TO PERMIT THE COMMANDER TO CORRELATE THE TOP-DOWN MAP AND ROUTE INFORMATION WITH THE ACTUAL SCENE AS SEEN FROM THE TANK DRIVER'S PERSPECTIVE. AN EXPERT SYSTEM IS USED TO PROVIDE ADVISORY INFORMATION, AND AN EFFICIENT INTERFACE IS PROVIDED TO PERMIT APPROPRIATE ALTERATIONS TO THE AUTOMATICALLY GENERATED PATH.

THERMACORE INC — ARMY — $ 49,982
780 EDEN RD
LANCASTER, PA 17601
G YALE EASTMAN
TITLE:
ENVIRONMENTAL CONTROL PACKAGES USING BELOW AMBIENT THERMAL STORAGE
TOPIC: 56 OFFICE: BRDC

FOR EXTENDED SILENT OPERATION, MILITARY COMPACT VEHICLES REQUIRE AN ACTIVE ENVIRONMENTAL CONTROL SYSTEM WHICH OPERATES ON NEGLIGIBLE

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POWER. SMALL SUBAMBIENT THERMAL STORAGE SERVICES MAY BE SUITABLE FOR SUCH USE. THIS PROPOSAL IS PHASE I OF A PROGRAM TO DEVELOP A FAMILY OF THERMAL STORAGE DEVICES WHICH USES HEAT PIPES AS A MEANS OF TRANSFERRING HEAT INTO AND OUT OF STORAGE.

THERMACORE INC — SDIO — $ 0
780 EDEN RD
LANCASTER, PA 17601
ROBERT M SHAUBACH
TITLE:
SPACECRAFT HEAT REJECTION METHODS
TOPIC: 2 OFFICE: IST

MANY NEAR-FUTURE MILITARY SATELLITES WILL HAVE POWER REQUIREMENTS OF FIVE TO TEN KILOWATTS. THIS REQUIREMENT IS EXPECTED TO GROW TO 100 kW OR MORE DURING THE NEXT TWENTY YEARS. THE MUCH HIGHER HEAT LOADS EXPECTED ON FUTURE SATELLITES WILL CAUSE THE RADIATOR PANELS TO BECOME A LARGE PART OF THE TOTAL SATELLITE MASS AND THEIR SIZE WILL AFFECT SPACECRAFT STABILITY AND CONFIGURATIONS. THIS PROPOSAL IDENTIFIES A METHOD TO REDUCE RADIATOR SIZE BY A FACTOR OF 10 OR MORE USING HEAT PUMP TECHNOLOGY. THE PROPOSAL COVERS WORK TO EVALUATE ALTERNATIVE SYSTEM CYCLES, MATERIALS, RELIABILITY, AND OVERALL SYSTEM COMPLEXITY. THE MOST ATTRACTIVE ALTERNATIVE WILL BE IDENTIFIED.

TRACER TECHNOLOGIES — ARMY — $ 48,074
2120 W MISSION RD - STE M
ESCONDIDO, CA 92025
STEPHEN L KERRIN
TITLE:
PORTABLE DEVICE FOR DETERMINING SORPTION OF CHEMICAL PROTECTIVE GARMENT MATERIALS IN THE FIELD
TOPIC: 82 OFFICE: NRDC

THE PROPOSED EFFORT WOULD BE DIRECTED TOWARD PROVIDING A PROTOTYPE PORTABLE DEVICE FOR DETERMINATION OF SORBTION BY CHEMICAL PROTECTIVE GARMENT MATERIALS IN THE FIELD. THE DEVICE IS BASED ON SOLID STATE GAS SENSOR TECHNOLOGY. RESULTS OF PRELIMINARY EXPERIMENTS ARE PROVIDED AND A PROPOSED WORK STATEMENT IS OFFERED TO FURTHER CHARACTERIZE THE PROPOSED SYSTEM AND TO BUILD A PROTOTYPE INSTRUMENT FOR

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EVALUATION PURPOSES.

TRACER TECHNOLOGIES — AF — $ 49,743
2120 W MISSION RD - STE M
ESCONDIDO, CA 92025
WALTER G ENGLAND
TITLE:
AIRCRAFT FIRE SUPPRESSION REQUIREMENTS MODELING
TOPIC: 218 OFFICE: AFESC

THIS PROPOSED STUDY IS TO EXPLORE THE FEASIBILITY OF DEVELOPING GENERALIZED MODELS THAT CAN BE USED TO EXTRAPOLATE THE RESULTS OF SMALL-SCALE AIRCRAFT FIRE SUPPRESSION TESTS TO LARGER FIRES. BECAUSE FIRE SUPPRESSION IS A COMPLEX PHENOMENON THAT IS HIGHLY DEPENDENT ON THE TYPE OF SUPPRESION AGENT, FIRE CONFIGURATION, FUEL TYPE, RATE AND METHOD OF APPLICATION AND OTHER FACTORS, IT IS DOUBTFUL THAT A SINGLE MODEL WILL APPLY TO ALL SITUATIONS. IN PHASE I, DATA FROM PREVIOUS TESTS WILL BE COLLECTED AND USED TO DEVELOP MODELS FOR HALON/UNOC-CUPIED COMPARTMENT FIRES, DRY CHEMICAL/AIRCRAFT WING FIRES AND FOAM/ FUEL SPILL FIRES. IF SUCCESSFUL, ADDITIONAL MODELS WILL BE DEVELOPED FOR OTHER AGENT/FIRE CONFIGURATIONS IN PHASE II. THESE MODELS WILL BE VERIFIED USING SMALL AND LARGE SCALE FIRE TESTS TO BE DESIGNED AND CARRIED OUT IN PHASE II.

TRIAD MICROSYSTEMS INC — AF — $ 54,149
540 N GOLDEN CIRCLE DR - STE 210
SANTA ANA, CA 92705
JAY W WAGER
TITLE:
SURVEILLANCE INFORMATION CYCLE TIME FOR SMALL MOBILE SYSTEMS ASSESSMENT
TOPIC: 124 OFFICE: AFBMO/PMX

FOR THE SMALL, MOBILE, ICBM SYSTEM TO ACHIEVE THE DESIRED MISSION ENDURANCE, IT MUST SURVIVE VARIOUS FORMS OF ATTACK. SINCE ITS SUR-VIVABILITY IS BASED ON MCBILITY, IT IS NECESSARY THAT MOVEMENT TIME-LINES BE DEVELOPED FOR THE VARIOUS EXISTING AND PROJECTED SURVEIL-LANCE/RECONNAISSANCE AND WEAPONS THREATS AND THEIR TIME LAGS. THIS PROPOSED STUDY WILL DEVELOP THE CRITERIA FOR ESTABLISHING SMALL MIS-

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SILE MOVEMENT TIMELINES AS A FUNCTION OF THREAT PARAMETERS. THE THREATS CONSIDERED WILL INCLUDE NOT ONLY SURVEILLANCE/RECONNAISSANCE, WITH THEIR ASSOCIATED C3 TIMELINES, BUT ALSO THE WEAPONS WHICH WOULD BE EMPLOYED AGAINST THE SMALL MISSILE SYSTEM. THE OBJECTIVES OF THIS PHASE I EFFORT WILL BE TO SURVEY THE EXISTING THREAT TIMELINES, FORECASE THE THREAT ENVIRONMENT FOR THE MID-1990 TO 2000 TIME FRAME, ESTABLISH LAUNCHER DETECTABILITY, DEVELOP PROBABILITY OF SURVIVAL VERSUS MOVEMENT TIMELINES, DEVELOP A TYPICAL MOVEMENT TIMELINE, AND PREPARE A COMPUTER MODEL TO BE DEVELOPED DURING PHASE II WHICH WILL ASSESS A WIDE VARIETY OF PROPOSED THREAT SUITES AGAINST THE MOBILE SYSTEM FORCE.

TRIANGLE RESEARCH & DEVELOPMENT CORP AF $ 48,363
PO BOX 12696
RESEARCH TRIANGLE, NC 27709
DR DAVID P COLVIN
TITLE:
SPACECRAFT HEAT REJECTION METHODS: ACTIVE AND PASSIVE HEAT TRANSFER FOR ELECTRONIC SYSTEMS
TOPIC: 35 OFFICE: AFWAL/FI

IT IS PROPOSED TO INVESTIGATE THE APPLICATION OF AN INNOVATIVE METHOD FOR SPACECRAFT THERMAL ENERGY MANAGEMENT AS WELL AS ENHANCED HEAT TRANSFER AND STORAGE IN ELECTRONIC SYSTEMS USING A TWO-COMPONENT SLURRY CONTAINING A MICROENCAPSULATED, PHASE-CHANGE MATERIAL (PCM). A DEMONSTRATION MODEL OF A THERMAL MANAGEMENT SYSTEM CONTAINING BOTH A PRIMARY BUSS AND A SECONDARY LOOP WILL BE DESIGNED, FABRICATED, AND USED TO EVALUATE A PROTOTYPE ISOLATING, HIGH HEAT FLUX THERMAL CONNECTOR AS WELL AS A SLURRY SUITABLE FOR MICROELECTRIC COOLING. IN ADDITION, SOME NOVEL MATERIALS CONTAINING A MICROENCAPSULATED PCM WILL BE PREPARED TO INVESTIGATE BOTH ENHANCED PASSIVE THERMAL MANAGEMENT IN ELECTRONIC COMPONENTS AS WELL AS LAMINTED THERMAL SHIELDING FOR POTENTIAL PROTECTION FROM PULSED DIRECT LASER ENERGY RADIATION. THIS PROJECT WILL UTILIZE TECHNOLOGY ALREADY UNDER DEVELOPMENT UNDER A NASA PHASE II SBIR FOR HEAT TRANSFER AND STORAGE FROM SPACECRAFT.

TUBOUT ELECTRONICS LABS INC AF $ 47,100
PO BOX 775
GROTON, CT 06340
ZACK J BECKWITH
TITLE:
SURFACE ACOUSTIC WAVE DEVICES FOR ELECTRONIC COUNTERMEASURES
TOPIC: 181 OFFICE: AD/PMR

THIS PROPOSAL WILL DEMONSTRATE THAT TUBOUT ELECTRONICS LABS., IS

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CAPABLE OF PROVIDING THE TECHNOLOGY, SKILLS, KNOWLEDGE AND SERVICE TO PERFORM THE NECESSARY RESEARCH AND FEASIBILITY STUDY TO LEAD TO A THOROUGH, ACCURATE AND VERIFIABLE REPORT WITH RECOMMENDATION. IN THIS PROPOSAL IT WILL BE SEEN THAT THE TYPE OF STUDY REQUIRED AND REPORTED HAVE BEEN PERFORMED BY US FOR OTHER FIRMS ON A CONTRACT BASIS.

ULTRAMET DARPA $ 49,893
12173 MONTAGUE ST
PACOIMA, CA 91331
RICHARD B KAPLAN
TITLE:
ARC-RESISTANT COATINGS FOR RAIL GUN COMPONENTS
TOPIC: 12 OFFICE: DARPA

AN INNOVATIVE APPLICATION OF CHEMICAL VAPOR DEPOSITION TO PREVENT ARC DAMAGE TO RAIL GUN COMPONENTS IS PROPOSED. SUCH A TUNGSTEN COATED COPPER RAIL GUN CONDUCTOR HAS BEEN SHOWN TO SUFFER NO SURFACE DEGRADATION IN ARC TESTS PERFORMED AT THE UNIVERSITY OF TEXAS CENTER FOR ELECTROMECHANICS (CEM) IN 1984. THE EFFECTS OF VARYING SURFACE MORPHOLOGY, ADDITION OF RHENIUM, COATING THICKNESS ETC. ON ARC RESISTANCE OF RAILS AND SWITCHES IS PROPOSED FOR EXPERIMENTAL STUDY. ULTRAMET WILL DEVELOP THE COATING TECHNOLOGY WITH CEM, AS SUBCONTRACTOR, PERFORMING THE ARC TESTING AND EVALUATION.

ULTRAMET AF $ 49,921
12173 MONTAGUE ST
PACOIMA, CA 91331
RICHARD B KAPLAN
TITLE:
METAL-LOADED GRAPHITE FOR PROTECTION AGAINST HEL'S
TOPIC: 108 OFFICE: AFBMO/PMX

ONE OF THE MECHANISMS WHICH HARDENS A MATERIAL AGAINST HEL RADIATION IS THE PRESENCE OF A SURFACE REFLECTING LAYER. A PROMISING CANDIDATE IN THIS REGARD IS CARBON FELT LOADED WITH A REFRACTORY METAL OR COMPOUND WHOSE SURFACE MELTS UNDER HEL MELTS UNDER HEL RADIATION. WE HAVE SUCCESSFULLY INFILTRATED CARBON FELT WITH REFRACTORY MATERIALS BY MEANS OF CHEMICAL VAPOR DEPOSITION. WE PROPOSE AN INNOVATIVE

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TECHNIQUE FOR ACHIEVING A UNIFORM LOADING OF TUNGSTEN CARBIDE WITHIN A LAYER OF CARBON FELT, WHICH PERFORMS THE MULTIPLE FUNCTIONS OF RIGIDIZING AND STRENGTHENING THE FELT, PROVIDING A HIGH REFLECTIVE MELT SURFACE AND HIGH HEAT CAPACITY AND MINIMIZING THERMAL CONDUCTIVITY.

ULTRAMET AF $ 47,645
12173 MONTAGUE ST
PACOIMA, CA 91331
RICHARD B KAPLAN
TITLE:
ARC-RESISTANT COATINGS FOR RAIL GUN COMPONENTS
TOPIC: 188 OFFICE: AD/PRM

AN INNOVATIVE APPLICATION OF CHEMICAL VAPOR DEPOSITION TO PREVENT ARC DAMAGE TO RAIL GUN COMPONENTS IS PROPOSED. SUCH A TUNGSTEN COATED COPPER RAIL GUN CONDUCTOR HAS BEEN SHOWN TO SUFFER NO SURFACE DEGRADATION IN ARC TESTS PERFORMED AT THE UNIVERSITY OF TEXAS CENTER FOR ELECTROMECHANICS (CEM) IN 1984. THE EFFECTS OF VARYING SURFACE MORPHOLOGY, ADDITION OF RHENIUM, COATING THICKNESS ETS. ON ARC RESISTANCE OF RAILS AND SWITCHES IS PROPOSED FOR EXPERIMENTAL STUDY. ULTRAMET WILL DEVELOP THE COATING TECHNOLOGY WITH CEM, AS SUBCONTRACTOR, PERFORMING THE ARC TESTING AND EVALUATION.

ULTRAMET AF $ 49,767
12173 MONTAGUE ST
PACOIMA, CA 91331
RICHARD B KAPLAN
TITLE:
HfO2 AND ZrO2 OVERCOATING OF SiC FOR EXTENDING THE OXIDATION PROTECTION OF CARBON COMPOSITES TO 3500F
TOPIC: 43 OFFICE: AFWAL/ML

SiC COATINGS CAN PROTECT CARBON COMPOSITES FROM OXIDATION UP TO ABOUT 3000F. ZrO2 AND HfO2 HAVE BEEN APPLIED AS OVERCOATINGS TO EXTEND OXIDATION PROTECTION TO 3500F, BUT THESE LAYERS TEND TO SPALL. WE PROPOSE HERE AN INNOVATIVE METHOD OF GRADING THE COATING FROM PURE SiC AT THE C/C INSIDE SURFACE TO PURE Hf (OR Zr) OXIDE AT THE OUTSIDE SURFACE. THIS IS THE MOST EFFECTIVE WAY TO ELIMINATE THERMAL STRESS

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CONCENTRATION AND OVERCOME THE CRACKING AND SPALLING PROBLEM.

UNIQUE MOBILITY INC — NAVY — $ 49,883
3700 S JASON ST
ENGLEWOOD, CO 80110
DAVID WRIGHT
TITLE:
RESONANT STIRLING ENGINE GENERATOR
TOPIC: 85 OFFICE: NSWC

THIS PROPOSAL DESCRIBES THE DEVELOPMENT OF A NEW CONCEPT IN SELF CONTAINED ELECTRIC POWER GENERATORS IN THE AVERAGE POWER RANGE FROM 7 - 30 KILOWATTS. A DESIGN FOR A 10 KILOWATT UNIT SHOWS CONTINUOUS AVERAGE POWER CAPABILITY BETWEEN 2 AND 10 KILOWATTS WITH A FULL 50 KILOWATT SURGE CAPABILITY FOR FOUR SECONDS. THIS CONCEPT IS A HYBRID SYSTEM COMPOSED OF AN ADVANCED GAS CYCLE (STIRLING) ENGINE, LINEAR ALTERNATOR, ELECTROMECHANICAL SURGE POWER SOURCE, AND SOLID STATE POWER CONTROLLER. THERE ARE SEVERAL ADVANTAGES OVER CONVENTIONAL UNITS INCLUDING GREATLY REDUCED WEIGHT AND VIRTUALLY SILENT OPERATION. THE ENGINE SHOULD DELIVER HIGH FUEL EFFICIENCY AND IS ADAPTABLE TO A WIDE VARIETY OF FUELS WITH MINIMAL OR NO MODIFICATIONS. WE EXPECT EXCELLENT LONG TERM RELIABILITY AS THE ENGINE/ALTERNATOR UNIT HAS ONLY TWO MOVING PARTS WHICH ARE NOT HEAVILY STRESSED. THE ENGINE AND ALTERNATOR ARE CONTAINED IN ONE COMPACT HERMETICALLY SEALED PACKAGE. THE SURGE POWER UNIT IS ALSO HERMETICALLY SEALED WITH ONLY ELECTRICAL INPUT AND OUTPUT LINES. ALL DETAILS OF THE DESIGN ARE PROPRIETARY TO UNIQUE MOBILITY.

UNITED INTERNATIONAL ENGINEERING INC — AF — $ 67,816
6809 BRANDYWINE LOOP NE
ALBUQUERQUE, NM 87111
DR DAVID C CHOU
TITLE:
TURBULENCE STRUCTURING IN HIGH REYNOLDS NUMBER FLOW FIELDS
TOPIC: 145 OFFICE: AFWL/PRP

THE DISCOVERY OF LARGE-SCALE COHERENT STRUCTURES AND THEIR RECENT EMPHASIS IN RESEARCH INTRODUCES THE NOTION THAT TURBULENT SHEAR AND

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BOUNDARY LAYER FLOWS CONSIST OF QUASI-DETERMINISTIC STRUCTURE AND THE TRANSPORT AND ENTRAINMENT ARE MOSTLY INDUCTION DRIVEN RATHER THAN DUE TO GRADIENT DIFFUSTION. TURBULENCE CONTROL SUCH AS SUPPRESSION OF TURBULENCE AND DRAG REDUCTION, JET NOISE PRODUCTION AND BROADBAND NOISE AMPLIFICATION ARE A FEW IMPORTANT APPLICATIONS WHICH DEMAND THOROUGH UNDERSTANDING OF THE PHYSICS. THE PRIMARY SPECIFIC OBJECTIVE OF THIS PHASE I EFFORT WILL BE TO DETERMINE THE MOST EFFECTIVE AND EFFICIENT APPROACHES TO GENERATE OR REINFORCE LARGE-SCALE, PERIODIC STRUCTURES IN TURBULENT SHEAR AND BOUNDARY LAYER FLOWS. A SECONDARY OBJECTIVE WILL BE TO INVESTIGATE WAYS TO ALSO SHIFT THE TURBULENT DYNAMIC ENERGY TO REDUCE THE INTENSITY OF THE BACKGROUND SMALL-SCALE OR ISOTROPIC TURBULENCE. ACCOMPLISHING THESE OBJECTIVES WILL ALLOW TURBULENT FLOWS TO BE MANIPULATED IN ORDER TO REDUCE OPTICAL ABERRATIONS DUE TO SCATTERING BY REMOVING LOW ORDER ZERNIKE TERMS WITH STATE-OF-THE-ART ADAPTIVE OPTICS CORRECTION SYSTEMS.

UNIVERSAL ENERGY SYSTEMS INC — NAVY — $ 49,977
4401 DAYTON-XENIA RD
DAYTON, OH 45432
PETER P PRONKO
TITLE:
MONOLITHIC INTEGRATION OF OPTICAL STRUCTURES IN SUPERLATTICES BY MeV ION IMPLANTATION
TOPIC: 61 OFFICE: NASC

INTEGRATED OPTICS IS THE ANALOG OF INTEGRATED ELECTRONICS IN SEMICONDUCTOR CIRCUITS USED FOR COMMUNICATIONS PURPOSES. INTEGRATED OPTICS HAS BEEN DEMONSTRATED WITH COMPONENTS THAT ARE COMBINED INTO SIMPLE HYBRID CIRCUITS, HOWEVER MONOLITHIC OPTICS HAS BEEN IMPEDED THROUGH DIFFICULTIES IN CONSTRUCTING COMPONENTS IN A SINGLE MATERIALS SYSTEM. GaAs AND ITS ALLOYS HOLD PROMISE AS CANDIDATES FOR MONOLITHIC INTEGRATED OPTICAL CIRCUITS. THESE SYSTEMS WILL INVOLVE, IN ONE FASHION OR ANOTHER, THE USE OF III-V SEMICONDUCTOR SUPERLATTICE AND MULTILAYER SYSTEMS. THE ELECTRICAL AND OPTICAL PROPERTIES OF SEMICONDUCTOR SUPERLATTICES ARE FOUND TO BE SENSITIVE TO ION BOMBARDMENT AND IMPLANTATION. THE ALTERATION OF THEIR MATERIALS PROPERTIES THROUGH THE USE OF ION BEAMS MAKES IT POSSIBLE TO MODIFY THESE STRUCTURES, THROUGH SELECTIVE MASKING SO THAT WAVE GUIDING, DEVICE ISOLATION AND DEVICE FABRICATION CAN BE ACCOMPLISHED. IT IS PROPOSED IN THIS RESEARCH PROGRAM THAT STUDIES BE MADE TO CORRELATE OPTICAL PROPERTY CHANGES WITH

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ION BOMBARDMENT IMPLANTATION, AND ANNEALING TREATMENTS.

UNIVERSAL ENERGY SYSTEMS INC — ARMY — $ 0
4401 DAYTON-XENIA RD
DAYTON, OH 45432
DR ROBERT D O'DONNELL
TITLE:
BEHAVIORAL AND PHYSIOLOGICAL MONITORING AND PREDICTION OF OPERATOR STATUS AND CAPABILITY
TOPIC: 94 OFFICE: MED FT. DET

THE GOAL OF THIS EFFORT IS TO PRODUCE AN INTEGRATED BEHAVIORAL/ PHYSIOLOGICAL TEST BATTER USABLE IN COMBAT SYSTEMS, AND LINKED THEORETICLLY TO THE TASK DEMANDS OF THE SYSTEM. A BASIC THEORETICAL FRAMEWORK INCORPORATING RELEVANT ASPECTS OF SEVERAL CURRENT THEORIES (PERFORMANCE RESOURCES, DECISION MAKING, MANUAL CONTROL, ETC.) WILL BE FORMULATED TO PROVIDE A BASIS FOR BEHAVIORAL AND PHYSIOLOGICAL TEST SELECTION. A SET OF NON-INVASIVE, NON-OBTRUSIVE MEASURES WILL BE UTILIZED, INCLUDING EMBEDDED SECONDARY TASKS AND CORTICAL EVOKED RESPONSE, AMONG OTHERS. A PILOT STUDY TESTING THE PREDICTIVE VALIDITY OF THESE MEASURES IN IDENTIFYING DEGRADED PERFORMANCE CAPABILITY WILL BE CARRIED OUT. IN THIS STUDY, A SIMULATED OPERATIONAL TASK WILL BE ANALYZED FOR PERFORMANCE DEMANDS, AND THE MOMENT-TO-MOMENT STATUS OF THE OPERATOR WILL BE ASSESSED BY THE BEHAVIORAL AND PHYSIOLOGICAL PREDICTOR TESTS. THESE WILL BE COMPARED TO THE SET OF TASK DEMANDS. THIS STUDY WILL ESTABLISH THE FEASIBILITY OF THE APPROACH AND PROVIDE PRELIMINARY DATA ON THE SPECIFIC TASKS OF GREATER VALUE.

UNIVERSAL ENERGY SYSTEMS INC — AF — $ 51,895
4401 DAYTON-XENIA RD
DAYTON, OH 45432
A K RAI
TITLE:
TECHNIQUE TO CHARACTERIZE THE INTERFACES PRESENT IN SEMICONDUCTOR SUPERLATTICES
TOPIC: 21 OFFICE: AFWAL/AA

THE ELECTRONIC AND OPTICAL PROPERTIES OF DEVICES BASED ON SEMICONDUCTOR SUPERLATTICES ARE FOUND TO BE SENSITIVE TO THE ATOMIC ARRANGEMENT AT OR NEAR THE INTERFACE OF THE COMPOSITIONAL MODULATION. THE

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EXAMINATION OF THE MATERIAL STATE OF THESE INTERFACES IS THEREFORE AN ESSENTIAL TASK. WE PROPOSE TO APPLY TRANSMISSION ELECTRON MICROSCOPY (TEM) TO THIS PROBLEM. WITH THIS TECHNIQUE, IT IS POSSIBLE TO STUDY THE NATURE OF THE DEFECTS PRESENT AT THE INTERFACE. IN ADDITION, THE ELECTRON MICROSCOPE CAN BE OPERATED UNDER A HIGH RESOLUTION SCALE WHEREBY PHASE CONTRAST MICROSCOPY CAN BE USED TO STUDY INTERFACE ON A MICROSCOPIC SCALE (APPROX 3A). AN ESSENTIAL PART OF ANY ELECTRON MICROSCOPIC STUDY IS THE PREPARATION OF THIN SPECIMENS. IN PHASE I ACTIVITIES WILL BE DIRECTED AT DEVELOPING TECHNIQUES FOR MAKING TWO DIFFERENT TYPES OF SPECIMEN, NAMELY (A) PLAN VIEW AND (B) CROSS(X)-SECTIONAL VIEW SAMPLES. IN THE PLAN VIEW CASE IT IS POSSIBLE TO SEE THE CHARACTERISTICS OF THE TOP LAYER OF A DEVICE, WHEREAS WITH THE X-SECTIONAL TECHNIQUES IT WOULD BE POSSIBLE TO SEE THE INTERFACE DIRECTLY. ATTEMPTS WILL BE MADE IN PHASE I TO STUDY INTERFACES WITH HIGH RESOLUTION PHASE CONTRAST ELECTRON MICROSCOPY. THE MATERIAL CHARACTERISTICS OF INTERFACE CAN THEN BE RELATED TO THE ELECTRONIC AND OPTICAL PROPERTIES OF DEVICES.

UNIVERSAL ENERGY SYSTEMS INC AF $ 32,992
4401 DAYTON-XENIA RD
DAYTON, OH 45432
S KRISHNAMURTHY
TITLE:
HIGH STRENGTH TITANIUM ALLOYS VIA RAPID SOLIDIFICATION POWDER METALLURGY DEVELOPMENT
TOPIC: 42 OFFICE: AFWAL/ML

TITANIUM ALLOYS ARE USED IN HIGH PERFORMANCE AEROSPACE COMPONENTS DUE TO THEIR UNIQUE COMBINATION OF HIGH STRENGTH-TO-DENSITY RATIO AND EXCELLENT CORROSION RESISTANCE. THE EVER INCREASING DEMAND FOR STRONGER AND LIGHTER ALLOY FOR AIRBORNE APPLICATIONS REQUIRES NEW TITANIUM ALLOYS WITH USEABLE STRENGTH LEVELS EXCEEDING 200ksi. THIS PROPERTY GOAL REQUIRES A SIGNIFICANT IMPROVEMENT OVER THE PRESENT ALLOYS LIKE Ti-10V-2Fe-3Al, AND REPRESENTS A 60% INCREASE OVER THE STRENGTH OF ANNEALED Ti-6Al-4V ALLOY. IT IS PROPOSED TO MEET THIS OBJECTIVE BY DEVELOPING NEW RAPIDLY SOLIDIFIED TERNARY AND HIGHER ORDER ALLOYS BASED ON THE EUTECTOID-FORMING Ti-Cu SYSTEM. IT IS EXPECTED TO ACHIEVE A COMBINATION OF STRENGTHENING MECHANISMS INCLUDING SOLID SOLUTION HARDENING, PRECIPITATION HARDENING AND GRAIN BOUNDARY STRENGTHENING. THE PROPOSED ALLOYS HAVE SHOWN PROMISE FOR ACHIEVING A COMBINATION OF VERY HIGH STRENGTH AND DUCTILITY WHEN THE PRECIPIT-

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ATE SIZE AND SPACING ARE CAREFULLY CONTROLLED. IT IS PROPOSED TO CONDUCT AGING HEAT TREATMENTS ON RAPIDLY SOLIDIFIED PARTICULATES OF THESE ALLOYS TO DETERMINE PROCESSING CONDITIONS CORRESPONDING TO OPTIMUM MICROSTRUCTURE AND PROPERTIES. THIS WORK WILL BE SUPPORTED BY MICROHARDNESS MEASUREMENTS AND A DETAILED MICROSTRUCTURAL CHARACTERIZATION USING SCANNING TRANSMISSION ELECTRON MICROSCOPY AND X-RAY ENERGY DISPERSIVE SPECTROSCOPY.

UNIVERSAL SENSORS ARMY $ 49,806
PO BOX 736
NEW ORLEANS, LA 70148
DR GEORGE G GUILBAULT
TITLE:
BIOMICROSENSOR TECHOLOGY: A PROTEIN COATED PIEZOELECTRIC CRYSTAL DETECTOR
TOPIC: 19 OFFICE: CRDC

PROTEIN ABSORBENTS (ENZYMES AND ANTIBODIES) WILL BE PLACED AS COATINGS ON THE PIEZOELECTRIC CRYSTAL, AND THE DEVICE WILL BE EVALUATED AS A POSSIBLE DETECTOR FOR IDENTIFICATION AND ASSAY OF THESE AGENTS. THIS EXPLORATORY DEVELOPMENT WILL THUS FOCUS ON A NOVEL METHOD FOR TRANSDUCTION OF A RECOGNITION EVENT INTO AN ELECTRICAL SIGNAL, USING A SURFACE MODIFIED WITH A BIOMATERIAL, PROVIDING A METHOD FOR AMPLIFICATION (DUE TO THE HIGH TURNOVER NUMBER OF THE PROTEIN) TO 1,000,000 OR BETTER, AND A DETECTOR THAT OPERATES WITHOUT LIQUID FLOW. THE DETECTOR, AND EACH ABSORBENT, WILL BE EVALUATED WITH RESPECT TO SENSITIVITY AND LINEARITY OF RESPONSE, SPEED OF RESPONSE, ACCURACY, LIMIT OF DETECTION, EFFECT OF TEMPERATURE, SELECTIVITY OF RESPONSE, SIMPLICITY OF DESIGN, REVERSIBILITY AND STABILITY.

UNIVERSAL SENSORS ARMY $ 49,262
PO BOX 736
NEW ORLEANS, LA 70148
DR GEORGE G GUILBAULT
TITLE:
STABILIZATION OF BIOMATERIALS - NEW TECHNIQUES
TOPIC: 18 OFFICE: CRDC

INNOVATIVE METHODS FOR STABILIZATION, IMMOBILIZATION AND REGENERATION

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OF ENZYMES, ANTIBODIES AND RELATED BIOMATERIALS WILL BE DEVELOPED. DOCUMENTED STABILIZATION PROCEDURES AND PROTOTYPES OF STABILIZED BIOACTIVE MEMBRANES USEFUL FOR CONTINUOUS USE AS WELL AS FOR SINGLE-USE DISPOSABLE ASSAYS WILL BE DEVELOPED. ATTENTION WILL BE PAID TO LONG TERM USE UNDER FIELD AND SHIP-BOARD CONDITIONS. THE DEVELOPMENT OF TESTING METHODOLOGY FOR EVALUATION OF THERMAL STABILITY AND ACCELERATED STORAGE WILL ALSO BE STUDIED.

UTAH GEOPHYSICAL INC — DNA — $ 50,000
PO BOX 9344
SALT LAKE CITY, UT 84109
LEWIS KATZ
TITLE:
SEISMIC DETECTION OF TUNNEL BORING MACHINES
TOPIC: 6 OFFICE: OAAM

OF APPARENT INTEREST TO THE DEFENSE NUCLEAR AGENCY (DNA) IS THE ABILITY TO DETECT THE LOCATION OF TUNNEL BORING MACHINES (TBM). THESE TYPES OF DEVICES ARE USED TO DRILL TUNNELS FOR MILITARY PURPOSES, SUCH AS THE STORAGE OF NUCLEAR DEVICES AND THE CONSTRUCTION OF MISSILE SILOS. BY LOCATING TBM'S IN OPERATION, UNFRIENDLY FORCES COULD IDENTIFY POTENTIAL MILITARY TARGETS. IT IS THEREFORE OF INTEREST TO DNA TO DETERMINE TO WHAT EXTENT TBM'S CAN BE LOCATED, AND THUS DEVELOP ANTI-DETECTION METHODS. ALSO, OF INTEREST TO OTHER MILITARY AGENCIES IS THE DETECTION OF CLANDESTINE TUNNELING BY HOSTILE FORCES. THE TBM IS KNOWN TO GENERATE A CONTINUOUS SEISMIC SIGNAL WHILE OPERATING. UTAH GEOPHYSICAL, INC. (UGI) HAS DEVELOPED A SEISMIC DRILL BIT POSITIONING METHOD (U.S. PATENT #4,460,059) THAT SHOULD BE APPLICABLE TO LOCATING A TBM. THIS TECHNIQUE USES A BEAM-STEERING ARRAY PROCESSING PROCEDURE TO DETECT COHERENT CONTINUOUS SEISMIC EVENTS IN POOR SIGNAL TO NOISE ENVIRONMENTS. UGI PROPOSES TO INVESTIGATE THE FEASIBILITY OF USING PARTICLE MOTION PREFILTERING TO ENHANCE THE COHERENCY VALUES OF THE PROCESSED DATA, THEREBY IMPROVING ON THE LIKELIHOOD OF LOCATING A TBM WITH THE EXISTING TECHNOLOGY.

UTD INCORPORATED — DNA — $ 50,000
8220 RUSSELL RD
ALEXANDRIA, VA 22309
DR EUGENE L FOSTER
TITLE:
CORRELATION OF GROUND BEHAVIOR UNDER STATIC LOADING WITH DYNAMIC RESPONSE
TOPIC: 5 OFFICE: OAAM

THE OBJECTIVES OF THE PROPOSED EFFORT ARE TO DEVELOP A GEOTECHNICAL

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INVESTIGATION SCHEME AND A DESIGN METHODOLOGY FOR HARDENED UNDERGROUND STRUCTURES. THESE ARE TO BE ACHIEVED BY EXTENDING EXISTING NEW AUSTRIAN TUNNELING METHOD (NATM) TECHNIQUES THROUGH THEORETICAL MODELING COMBINED WITH EXPERIMENTATION TO ENABLE THEM TO BE USED FOR TWO PURPOSES: (1) TO DETERMINE, FROM NATM TECHNIQUES THE GROSS PROPERTIES OF A ROCK FORMATION; AND (2) TO PROVIDE A DESIGN PROCEDURE FOR LININGS/TUNNEL SUPPORTS WHICH CAN BE USED WITH THE GROSS FORMATION PROPERTIES OBTAINED IN (1) TO DESIGN A FACILITY HAVING A DESIRED LEVEL OF HARDNESS/SURVIVABILITY.

VERAC INC — AF — $ 74,182
9605 SCRANTON RD - STE 500
SAN DIEGO, CA 92121
DR RICHARD D BINKOWSKI
TITLE:
LASER HARDENING EXTERNAL PROTECTION MATERIALS (EPM)
TOPIC: 108 OFFICE: AFBMO/PMX

THIS PROGRAM EVALUATES THE USE OF EXTERNAL PROTECTION MATERIAL (EPM) FOR HARDENING U.S. ICBMs TO FOREIGN LASER THREATS. BOTH CONTINUOUS WAVE AND PULSED LASERS ARE CONSIDERED. THE PROGRAM FIRST COLLECTS AND EVALUATES MATERIALS TEST DATA RELATIVE TO ITS THREAT APPLICABILITY. THE MORE PROMISING OF THE MATERIALS ARE THEN SYNTHESIZED INTO EPM LAYUPS. THESE LAYUPS INCLUDE THE STRUCTURED SUBSTRATE MATERIAL AND ARE EVALUATED AS HARDENED SYSTEMS RELATIVE TO THE LASER THREATS. THE EVALUATIONS ARE ACCOMPLISHED RELATIVE TO OPERATIONAL FAILURE MECHANISMS AND CONSIDERATIONS SUCH AS EXPECTED BEAM CONDITIONS, MACH AND PRESSURE EFFECTS, AND THE MATERIAL'S INITIAL THERMAL STATE. THESE LAYUP EVALUATIONS ARE ACCOMPLISHED WITH VERAC'S INTEGRATED VULNERABILITY APPROACH (VIVA) SO THAT UNCERTAINTIES IN MANUFACTURING TOLERANCES, MATERIALS PROPERTIES AND ENGAGEMENT CONDITIONS CAN BE DIRECTLY INCLUDED IN THE RESULTS. THE MOST PROMISING LAYUPS ARE IDENTIFIED FOR FURTHER COMBINED EFFECTS ANALYSES IN PHASE II WITH X-RAY LASERS AND NUCLEAR WEAPON EFFECTS.

VERAC INC — SDIO — $ 0
9605 SCRANTON RD - STE 500
SAN DIEGO, CA 92121
JOHN J O'CONNOR
TITLE:
COMPUTER ARCHITECTURE/ARTIFICIAL INTELLIGENCE TO SUPPORT C3
TOPIC: 4 OFFICE: IST

THE PROBLEM OF DETECTING TARGETS FROM SPACE-BASED SENSORS AGAINST

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INTERFERING EARTH BACKGROUNDS REQUIRES A SKILLFUL COMBINATION OF TARGET SIGNATURES AND THE HEURISTIC (E.G., "HUNCHES," "RULES-OF-THUMB") USED BY EXPERIENCED INTELLIGENCE ANALYSTS FOR INTERPRETING THE RELATIONSHIPS AMONG THE OBSERVED DATA. IN OUR PAST EFFORTS FOR NAVELEX, VERAC EXAMINED VARIOUS DATA CORRELATION CONCEPTS AS PART OF A RESEARCH TESTBED FOR PPLICATION OF ARTIFICIAL INTELLIGENCE TO SYNTHETIC APERTURE RADAR (SAR) IMAGE UNDERSTANDING. IN THAT EFFORT AND SUBSEQUENT IN-HOUSE DEVELOPMENT EFFORTS, VERAC RESEARCHERS CREATIVELY COMBINED INTO A HYBRID CORRELATION SYSTEM THE BEST FEATURES OF CONVENTIONAL PROBABILISITC TECHNIQUES, INCLUDING BAYESIAN DECISION THEORIES, AND NEWER SYMBOLIC REASONING METHODS BY DEVELOPING A PRODUCTION-RULE BASED SYSTEM CALLED AN INTELLIGENCE CORRELATION AGENT (INCA). VERAC PROPOSES TO EXPLORE AND DEFINE FEASIBLE HYBRID CORRELATION SYSTEMS COMPRISED OF VARIOUS COMBINATIONS OF HARDWARE AND SOFTWARE FOR BOTH GROUND-BASED PROCESSING FACILITIES AND SPACE-BASED SENSOR ENHANCEMENTS THAT COULD BE TRADED OFF BY SYSTEMS DESIGNERS TO DERRIVE PREFERRED PROCESSING ARCHITECTURES FOR THE SDI MISSION. A PHASE II EXTENSION OF THIS RESEARCH WOULD BE THE EVALUATION OF THE FEASIBLE SYSTEMS FOR EVENTUAL DEVELOPMENT AND IMPLEMENTATION IN PHASE III.

VERAC INCORPORATED — NAVY — $ 81,533
9605 SCRANTON RD
SAN DIEGO, CA 92121
DANIEL R GREENWOOD
TITLE:
EXPERT SYSTEMS FOR AUTOMATIC DIGITAL SCENE MATCHING AREA CORRELATOR (DSMAC) SCENE SELECTION AND SCENE ENHANCEMENT
TOPIC: 136 OFFICE: JCM

VERAC PROPOSES USING ITS EXTENSIVE COMPUTER SCIENCE AND SOFTWARE EXPERTISE TO IMPROVE REFERENCE SCENE SELECTION AND ENHANCEMENT PROCEDURES FOR THE CRUISE MISSILE'S DIGITAL SCENE MATCHING AREA CORRELATOR (DSMAC). VERAC WILL APPLY EXPERT SYSTEM TECHNOLOGY TO THE SCENE SELECTION PROCESS USING KNOWLEDGE ENGINEERING METHODS TO BUILD A PRE-PROTOTYPE SCENE SELECTION AID. VERAC'S EXPERIENCE INCLUDES A RECENT DELIVERY TO AN OPERATIONAL SITE OF A PROTOTYPE SURVEILLANCE EXPERT SYSTEM EXHIBITING ORDERS OF MAGNITUDE IMPROVEMENT IN USER PRODUCTIVITY. THE SYSTEM DEVELOPED HERE WILL COMBINE EXPERT DECISION RULES AND STATISTICAL ANALYSIS OF CANDIDATE REFERENCE IMAGES TO SELECT THOSE WHICH HAVE A BETTER PROBABILITY OF CORRECT MATCH WITH SENSED SCENES. IN ADDITION, VERAC WILL INVESTIGATE THE APPLICATION

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OF ADAPTIVE IMAGE PROCESSING ALGORITHMS AND OR OPERATORS IN ORDER TO REDUCE IMAGE NOISE AND ENHANCE THOSE IMAGE FEATURES DETERMINED TO BE OF IMPORTANCE TO SCENE MATCHING.

VIGYAN RESEARCH ASSOCS INC — AF — $ 50,000
28 RESEARCH DR
HAMPTON, VA 23666
SUDHIR C MEHROTRA
TITLE:
COMPUTATION OF AERODYNAMIC CHARACTERISTICS AND NONLINEAR STABILITY DERIVATIVES OF A FIGHTER/ATTACK AIRCRAFT AT HIGH ANGLES OF ATTACK
TOPIC: 30 OFFICE: ASD

MODERN TACTICAL AIRCRAFT FLYING AT HIGH ANGLES OF ATTACK ENCOUNTER VISCOUS SEPARATION, VORTEX FLOWS, VORTEX BREAKDOWN, UNSTEADY FLOW SITUATIONS AND THEIR EFFECTS ON THE LIFTING SURFACES DOWNSTREAM. IT IS VERY IMPORTANT TO ANALYZE THESE FLOWS IN ORDER TO PREDICT THE STABILITY DERIVATIVES ACCURATELY AND ALSO IT IS HIGHLY DESIRABLE THAT IN THE METHODS PREDICTING THE STABILITY DERIVATIVE OF THESE AIRCRAFTS AS MANY OF THESE PHENOMENA ARE INCLUDED TO REDUCE COSTLY WIND TUNNEL TESTS AND FLIGHT TESTS. HERE IT IS PROPOSED TO DEVELOP A COMPUTER PROGRAM TO PREDICT LONGITUDINAL AND LATERAL-DIRECTIONAL STABILITY DERIVATIVES OF A FIGHTER/ATTACK AIRCRAFT AT HIGH ANGLES OF ATTACK.

VISIDYNE INC — AF — $ 74,000
5 CORPORATE PL - S BEDFORD ST
BURLINGTON, MA 01803
ORR SHEPHERD
TITLE:
RAMAN DETECTION FOR BALLOONBORNE LIDAR
TOPIC: 156 OFFICE: AFGL/XOP

THE FEASIBILITY OF ADDING A RAMAN DETECTION SYSTEM, FOR THE MEASUREMENT OF ATMOSPHERIC CONSTITUENTS, TO AN EXISTING BALLOONBORNE LIDAR PAYLOAD WILL BE INVESTIGATED. THE BALLOONBORNE LIAR IS CURRENTLY USED TO MAKE RAYLEIGH/MIE ATMOSPHERIC BACKSCATTER MEASUREMENTS. THE FEASIBILITY STUDY WILL INCLUDE, FOR THE VARIOUS TYPES OF RAMAN SCATTERING AN ERROR ANALYSIS BASED ON THE OPERATING PARAMETERS OF THE PRESENT LIDAR SYSTEM, AND THE ALTITUDE RESOLUTION, INTEGRATION TIME,

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SIGNAL-TO-NOISE, AND SELECTED SPECIES ALTITUDE PROFILES. A TRADE-OFF ANALYSIS OF THE HARDWARE REQUIREMENTS WILL BE PERFORMED. AN EXPERIMENTAL LABORATORY PROTOTYPE RAMAN DETECTOR WILL BE DESIGNED, FABRICATED, AND TESTED. BASED UPON THESE ANALYSES AND THE LABORATORY TESTS, THE MOST PROMISING RAMAN MEASUREMENT TECHNIQUE WHICH IS COMPATIBLE WITH THE EXISTING BALLOONBORNE LIAR WILL BE SELECTED AND A PRELIMINARY DESIGN OF A RAMAN DETECTION SYSTEM PERFORMED.

VISTA RESEARCH CORP — NAVY — $ 50,000
4540 CERCO DEL CORAZON
TUCSON, AZ 85718
J G CALDWELL
TITLE:
FAST ALGORITHMS FOR REAL-TIME ESTIMATION PREDICTION AND CONTROL
TOPIC: 4 OFFICE: ONR

THIS PROPOSAL DESCRIBES A RESEARCH PROGRAM TO DEVELOP FAST ALGORITHMS FOR REAL-TIME ESTIMATION, PREDICTION AND CONTROL. SUCH ALGORITHMS WOULD PROVIDE A SOLUTION TO A CRITICAL PROBLEM FACED IN BOTH INDUSTRIAL AND MILITARY APPLICATIONS - - THE FACT THAT THE ALGORITHMS USED TO IMPLEMENT STATE-OF-THE-ART STATISTICAL ESTIMATION, PREDICTION AND CONTROL TECHNIQUES ARE FAR TOO SLOW FOR MANY REAL-TIME OR NEAR-REAL-TIME APPLICATIONS OF HIGH INTEREST, EVEN USING THE FASTEST COMPUTERS.

VISUAL AERODYNAMICS/EIDETICS INT'L INC — AF — $ 49,559
24050 MADISON ST - STE 211
TORRANCE, CA 90505
W L HAMILTON
TITLE:
INNOVATIVE PERFORMANCE AND MANEUVERABILITY MEASURES OF MERIT FOR AIR COMBAT
TOPIC: 10 OFFICE: ASD/XR

CURRENT PERFORMANCE MEASURES OF MERIT DO NOT CHARACTERIZE MANEUVERS REQUIRED BY FIGHTERS TO BE EFFECTIVE WHEN USING ALL-ASPECT, SHORT-RANGE MISSILES DURING AIR COMBAT. POINT PERFORMANCE COMPARISONS AND SUSTAINED PERFORMANCE COMPARISONS ARE NOT ADEQUATE INDICATORS OF A FIGHTER'S ABILITY TO MANEUVER TO ADVANTAGE. NEITHER COMPARISON AC-

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COUNTS FOR THE EFFECTS OF TIME COMPRESSION ON MANEUVERS, NOR ADDRESSES MANEUVERS THAT RAPIDLY EXCHANGE ENERGY FOR NOSE POSITION BY USE OF PITCH AND ROLL CONTROLS. NEW MEASURES OF MERIT ARE REQUIRED THAT CHARACTERIZE AND QUANTIFY A FIGHTER'S ABILITY TO ACCELERATE. DECELERATE, MAXIMIZE TURN RATE WHILE MINIMIZING TURN RADIUS, AND CHANGE PLANE OF MANEUVER BY ROLLING WHILE TURNING. THE OBJECTIVE OF THE PROPOSED STUDY IS TO VALIDATE CANDIDATE MEASURES OF MERIT THAT ADDRESS THESE CURRENTLY UNDERFINED AREAS OF FIGHTER PERFORMANCE. A LARGE VOLUME OF THE ACM DATA WILL BE ANALYZED USING THE CUBIC TACTS/ ACMI SYSTEM TO EXTRACT APPROPRIATE PARAMETERS. ENTRY AIRSPEEDS, ALTITUDES, ATTITUDES, ENERGY STATES, CONTROL POSITIONS, ETC., CAN BE EXTRACTED FROM THE DATA TAPES FOR PARAMETER VALIDATION.

VISUAL AERODYNAMICS/EIDETICS INT'L INC — AF — $ 49,105
24050 MADISON - STE 211
TORRANCE, CA 90505
ANDREW SKOW
TITLE:
IMPROVED HIGH ANGLE OF ATTACK CONTROLLABILITY THROUGH VORTEX MANIPULATION
TOPIC: 30 OFFICE: AFWAL/FI

THE OBJECTIVE OF THE PROPOSED STUDY IS TO TEST THE FEASIBILITY OF A UNIQUE AND INNOVATIVE AIRCRAFT CONTROL CONCEPT. THE CONCEPT INVOLVES USING SMALL PNEUMATIC OR MECHANICAL DEVICES TO MANIPULATE THE ORIENTATION, TRAJECTORY AND BREAKDOWN CHARACTERISTICS OF THE DOMINANT VORTEX SYSTEM THAT DEVELOP ON TYPICAL FIGHTER AIRCRAFT AT HIGH ANGLES OF ATTACK. IT IS BELIEVED THAT THIS CONCEPT CAN HARNESS THE TREMENDOUS ENERGY THAT IS CONTAINED IN THE VORTEX SYSTEMS EMANATING FROM THE FORCEBODY AND THE STRAKE-WING AREA AND CAN TRANSFORM THIS ENERGY INTO USUABLE PITCH, YAW AND ROLL CONTROL POWER. THE MECHANICAL DEVICES ARE INHERENTLY LOW HINGE MOMENT AND THE PNEUMATIC DEVICES REQUIRE SMALL MASS-FLUX OWING TO THE FLUIDIC AMPLICATION AFFORDED BY THE VORTEX MANIPULATION.

VRA INC — AF — $ 48,615
PO BOX 50
BLACKSBURG, VA 24060
DR CLARK H LEWIS
TITLE:
EXTENSIONS AND EVALUATION OF THE AFWAL PNS CODE
TOPIC: 37 OFFICE: AFWAL/FI

OVER THE PAST SEVERAL YEARS SIGNIFICANT INTEREST HAS BEEN GENERATED

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IN THREE-DIMENSIONAL FLOWFIELD ANALYSES OF LIFTING REENTRY VEHICLES. THE PARABOLIZED NAVIER-STOKES (PNS) SCHEMES ARE ELLIPTIC IN THE CROSSFLOW DIRECTION AND CAN TREAT REGIONS OF CROSSFLOW SEPARATION. THE PRESENT NON-ITERATIVE AFWAL PNS SCHEME SUFFERS FROM QUITE A FEW LIMITATIONS AND RESTRICTIONS; HOWEVER, THE NEW FULLY-ITERATIVE PNS SCHEME OF BHUTTA AND LEWIS SUCCESSFULLY RESOLVES SEVERAL OF THE PROBLEMS INHERENT IN THE PRESENT NON-ITERATIVE AFWAL PNS SCHEME. IN PHASE I OF THE PROPOSED TWO-PHASE EFFORT, WE WILL EXTEND THE NON-ITERATIVE PERFECT-GAS AFWAL PNS SCHEME TO ACCURATELY PREDICT EQUILIBRIUM-AIR FLOWFIELDS AROUND REALISTIC REENTRY CONFIGURATIONS. IN PHASE II OF THIS EFFORT, WE PROPOSE TO EXTEND THE RECENT AXISYMMETRIC FULLY-ITERATIVE PERFECT-GAS PNS SCHEME TO BHUTTA AND LEWIS, AND PROVIDE THE AIR FORCE WITH THE CODE TO STUDY THREE-DIMENTIONAL PERFECT-GAS/EQUILIBRIUM-AIR FLOWFIELD AROUND BALLISTIC AND LIFTING REENTRY VEHICLES.

WEATHER CORP — NAVY — $ 50,000
46 KENDAL COMMON RD
WESTON, MA 02193
RALPH J MARKSON
TITLE:
AIRBORNE ELECTRIC FIELD AND LIGHTNING DETECTION INSTRUMENTATION FOR AVIATION SAFETY
TOPIC: 3 OFFICE: ONR

THIS PROPOSAL IS TO DEVELOP 2 NOVEL METHODS FOR REMOTE DETECTION OF DANGEROUS ATMOSPHERIC REGIONS THROUGH ATMOSPHERIC ELECTRICAL MEASUREMENTS FROM AIRCRAFT AND THE GROUND. THE PROPOSED DETECTION TECHNIQUES MAY BE BETTER THAN RADAR FOR DETECTING DANGEROUS TURBULENT AND ELECTRIFIED REGIONS UNDER SOME CONDITIONS (LITTLE OR NO RAIN), CAN SEE THROUGH CLOUDS WITH MUCH RAIN (WHICH BLOCK RADAR), HAS LONGER RANGE THAN RADAR, AND CAN BE MOUNTED ON AIRCRAFT AND HELICOPTERS WHERE THERE MAY BE NO NOSE CONE AVAILABLE FOR A RADAR ANTENNA. ELECTRIC FIELDS WILL BE OBSERVED WITH SIMPLE CORONA CURRENT INSTRUMENTATION SINCE AIRCRAFT CAN TRIGGER LIGHTNING. LIGHTNING WILL BE MAPPED WITH AN INTERFEROMETER. THUS, THE PRE- AND POST-LIGHTNING AS WELL AS THE LIGHTNING PHASES OF A STORM WILL BE COVERED. THERE WILL BE COCKPIT DISPLAYS FOR THE ELECTRIC FIELD VECTOR, LIGHTNING POSITION AND SFERIC RATE. PRELIMINARY TESTING OF A CORONA SYSTEM HAS ALREADY BEEN ACCOMPLISHED ON OUR UNIQUE ATMOSPHERIC ELECTRIC RESEARCH AIRCRAFT. THE LIGHTNING INTERFEROMETER HAS BEEN PROVEN FOR DIRECTIONAL

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SENSING ON THE GROUND; THIS PROGRAM WILL EXTEND THE TECHNOLOGY TO AIRCRAFT INCLUDING SINGLE-STATION-RANGING.

WEST COAST RESEARCH CORP — ARMY — $ 49,991
1527 26TH ST
SANTA MONICA, CA 90404
H M SPIVACK
TITLE:
DIFFERENTIAL PRESSURE TRANSDUCER
TOPIC: 71 OFFICE: TACOM

AN EXPLORATORY DEVELOPMENT TO PROVIDE FOR DIFFERENTIAL PRESSURE MEASUREMENT INTEGRAL WITH DIAGNOSTIC CONNECTOR ASSEMBLIES (DCAS) IS DESCRIBED. EMPHASIS WILL BE PLACED ON MINIATURE STRAIN GAGE TRANSDUCERS BASED ON SEMICONDUCTOR TECHNOLOGY AS WELL AS STANDARD FOIL GAGE INSTALLATIONS. FROM A RELATIVELY LARGE LIBRARY OF SPECIAL DESIGNS FOR MINIATURIZATION AND COMPLEX CONFIGURATIONS, THE OFFEROR PROPOSES TO ADAPT A RANGE OF PRESSURE MEASURING DEVICES TO THE GEOMETRY OF CURRENT AND PLANNED DCAS CONFIGURATIONS. THE DESIGNS WHICH ARE PLANNED WILL BE FABRICATED AND TESTED, AND FEASIBILITY WILL BE DEMONSTRATED.

WIGGINS J H CO — AF — $ 49,841
1650 S PACIFIC COAST HWY
REDONDO BEACH, CA 90277
DR GEORGE CLARK
TITLE:
EXPLOSIVELY-DRIVEN HYPERVELOCITY PROJECTILE LAUNCHER FACILITY DESIGN
TOPIC: 99 OFFICE: AFBMO/PMX

IT IS PROPOSED TO DESIGN A TEST FACILITY AND DEVELOP A TESTING PLAN FOR A HYPERVELOCITY PROJECTILE LAUNCHER FACILITY AND FOR A TARGET IMPACT FACILITY. THE HYPERVELOCITY PROJECTILE LAUNCHER FACILITY SHALL BE CAPABLE OF GENERATING ROD-LIKE PROJECTILES UP TO 4-FEET LONG AND UP TO 0.5-INCH DIAMETER, AT UP SPEEDS UP TO THE RANGE OF 18,000 TO 40,000 FT/SEC. MODIFICATIONS OF THE EXPLOSIVELY DRIVEN SHARPED CHARGE AND LINER SYSTEM SHALL INCLUDE CAPABILITIES OF LAUNCHING MORE THAN ONE ROD AT A TIME, OR LAUNCHING RODS WITH SHEATHS AROUND THE ROD

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CORE MATERIAL. EXPLOSIVE, LINERS AND RESULTANT JET SIZE AND VELOCITY SCALING LAWS WILL BE EVALUATED. THE TARGET IMPACT FACILITY SHALL BE DESIGNED TO ISOLATE THE TARGET AREA FROM THE EXPLOSIVES AIRBLAST/ FRAGMENT ENVIRONMENT. THE TARGET MATERIAL WILL BE WATER FOR THOSE TESTS WHEREIN PROJECTILE FORMATION PHYSICS IS TO BE STUDIED. THESE TESTS WILL INCLUDE HIGH SPEED PHOTOGRAPH OF THE PROJECTILE DURING ITS FORMATION AND FLIGHT. THE TARGET MATERIALS WILL INCLUDE CONCRETE, REINFORCED CONCRETE, CERAMICS, AND STEEL FOR THOSE TESTS WHEREIN PENETRATION OF THE TARGET AND RESIDUAL ENERGY OF THE PROJECTILE AFTER TARGET PERFORATION IS TO BE STUDIED.

WIGGINS J H CO — ARMY — $ 0
1650 S PACIFIC COAST HWY
REDONDO BEACH, CA 90277
DR JOANNA JANNSON
TITLE:
EYE PROTECTION USING SUPER HIGH EFFICIENCY HOLOGRAPHIC TECHNOLOGY RESEARCH
TOPIC: 96 OFFICE: MED FT. DET

NATIONAL TECHNICAL SYSTEMS (NTS), UNDER SPONSORSHIP OF DEPARTMENT OF ENERGY, HAS BEEN SUCCESSFUL IN ACHIEVING SUPER HIGH EFFICIENCY HOLOGRAPHIC REFLECTION MIRRORS. BECAUSE THE TECHNOLOGY ALLOWS FOR ADJUSTABLE REFLECTION BAND PASS WAVELENGTHS, BOTH NARROW BAND (DELTA LAMBDA < THAN 20nm) AND BROADBAND (DELTA LAMBDA APPROX. 300nm) HOLOGRAPHIC MIRRORS HAVE BEEN FABRICATED THIS PAST YEAR WITH MAXIMUM OPTICAL DENSITIES OF 6. RECENTLY, NTS HAS EXTENDED THIS TECHNOLOGY FROM THE VISIBLE SPECTRUM INTO THE NEAR IR REGION OF THE SPECTRUM (450 < LAMBDA < 1600nm). A NEW METHOD OF PROCESSING WHICH ALLOWS FOR FABRICATION OF HOLOGRAPHIC MIRROR WHICH REFLECTS BOTH THE LASER FUNDAMENTAL AND ITS FIRST OVERTONE (E.G., NdYg 1.06 AND 0.53 MICROS) HAS RECENTLY BEEN DOCUMENTED IN THE NTS LABORATORIES. IT IS PROPOSED TO APPLY THIS SUPER HIGH EFFICIENCY HOLOGRAPHIC TECHNOLOGY TO THE PROTECTION OF THE EYE AGAINST VISIBLE AND NEAR IR WAVELENGTHS. BY FABRICATING VISORS USING THIS TECHNOLOGY PROTECTION AGAINST PICOSECOND AS WELL AS MULTISECOND TIME FRAMES CAN BE ACHIEVED, WHILE STILL MAINTAINING HIGH SCOTOPIC AND PHOTOIC SEE-THROUGH EFFICIENCIES.

WIGGINS J H CO — NAVY — $ 49,977
1650 S PACIFIC COAST HWY - STE 200
REDONDO BEACH, CA 90277
DR TOMASZ JANNSON
TITLE:
NON-DESTRUCTIVE INSPECTION OF BONDED METALLIC/ELASTOMERIC INTERFACES BY OPTICAL SHEAROGRAPHY
TOPIC: 80 OFFICE: NSWC

IT IS PROPOSED TO EXPLORE A NEW OPTICAL APPROACH REFERRED TO AS

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SHEAROGRAPHY FOR NONDESTRUCTIVE INSPECTION OF BONDED METALLIC/ELASTOMERIC INTERFACES. SHEAROGRAPHY IS EQUIVALENT TO A FULL-FIELD STRAIN GAGE; IT REVEALS DEFECTS BY LOOKING FOR DEFECT-INDUCED STRAIN ANOMALIES. THIS APPROACH IS SUPERIOR TO OTHER TECHNIQUES IN THAT IT ALLOWS DEFECT CRITICALITY TO BE QUANTIFIED. MOREOVER, IT IS A FAST, NON-CONTACTING, AND FULL-FIELD METHOD. THE ULTIMATE GOAL IS TO DEVELOP SHEAROGRAPHY TO BECOME A GENERAL PURPOSE NONDESTRUCTIVE INSPECTION TOOL.

WIGGINS J H CO SDIO $ 73,245
1650 S PACIFIC COAST HWY - #200
REDONDO BEACH, CA 90277
DR JOANNA JANNSON
TITLE:
HOLOGRAPHIC TARGET HARDENING AND COUNTERMEASURES AGAINST LASER WEAPONS
TOPIC: 3 OFFICE: IST

DURING THIS PAST YEAR, NATIONAL TECHNICAL SYSTEMS (NTS) OPTICS GROUP HAS BEEN SUCCESSFUL IN FABRICATING SUPER HIGH EFFICIENCY HOLOGRAPHIC REFLECTION COATINGS WITH OPTICAL DENSITY OF 6 AND WITH REFLECTIVITY 99.9% FOR THE VISIBLE PORTION OF THE SPECTRUM. MOST RECENTLY, NTS WAS ABLE TO EXTEND THESE HOLOGRAPHIC COATINGS INTO THE IR REGION OF THE SPECTRUM. THE HOLOGPAPHIC COATINGS ARE 10 MICROMETERS THICK AND HAVE EXTREMELY SMALL ABSORPTION. ELECTRON MICROGRAPHS HAVE SHOWN THE INDEX OF REFRACTION TO BE OF A SINUSOIDAL FORM (I.E., A NATURAL RUGATE FILTER). THESE HOLOGRAPHIC COATINGS HAVE PROPERTIES THAT EXCEED THE BEST DIELECTRIC STACKS AT A PROJECTED COST OF FABRICATION THAT IS TWO ORDERS OF MAGNITUDE LESS THAN DIELECTRIC MIRRORS. THUS, THE POSSIBILITY OF USING THESE HOLOGRAPHIC COATINGS AS A PASSIVE MEANS FOR TARGET HARDENING AGINST VARIOUS VISIBLE AND IR LASER WEAPONS SUGGESTS ITSELF. THE ABILITY TO DEFLECT/REFLECT SMALL WAVELENGTH REGIONS (DELTA LAMBDA APPROX 20 nm) HAS BEEN DEMONSTRATED AGAINST LOW POWER LASER THREATS OVER SMALL AREAS SISNCE THESE HOLOGRAPHIC COATINGS ARE FABRICATED WITH A LASER BEAM, THE ONLY LIMITATION TO FABRICATING LARGE AREA (APPROX m2), IS THE ABILITY TO DIVERGE (SPREAD OUT) THE LASER BEAM SO THAT IT IS STILL UNIFORM OVER THE SURFACE OF THE HOLOGRAM.

WINTEC INC AF $ 74,267
303 WASHINGTON AVE
VALPARAISO, FL 32580
CLAUDE M CONNELL
TITLE:
DIGITAL MISSION MANAGEMENT SYSTEM (MMS) FOR ADVANCED DISPENSER WEAPONS
TOPIC: 189 OFFICE: AD/PRM

THE PROLIERATION AND VARIETY OF TARGETS IN COMBAT OPERATIONS COUPLED

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WITH THEIR LETHAL DEFENSIVE CAPABILITIES PRESENT SOME FORMIDABLE CHALLENGES TO AN OPPOSING AIR ATTACK WITH CONVENTIONAL WEAPONS. SUCCESS IN THIS ENVIRONMENT NECESSITATES SOME EXTENSIVE COUNTER CAPABILITIES REQUIRED BOTH OF THE ATTACKING AIR PLATFORM AND ITS WEAPONS WHICH OFTEN REQUIRES A STAND-OFF ATTACK MODE FOR SURVIVABILITY OF THE PLATFORM. THE DIFFICULTIES OF INTEGRATING, WITHIN ALLOWABLE WEAPON ENVELOPES, THE SUBSYSTEM HARDWARE AND SOFTWARE REQUIRED FOR THE DESIRED STAND-OFF CAPABILITIES IS REFLECTED IN THE CONFIGURATIONS OF EXISTING STAND-OFF WEAPONS WITH THEIR PLATFORM DEPENDENT DESIGN FEATURES. THIS PROPOSAL OFFERS TO DEVELOP THE ARCHITECTURAL CONCEPTS FOR ADVANCED SUBSYSTEM INTEGRATION OF NEXT GENERATION DISPERSER WEAPONS. IN PARTICULAR, THE CONCEPT FOR AN ADVANCED TECHNOLOGY MISSION MANAGEMENT SYSTEM (MMS) FOR ON-BOARD CONTROL OF WEAPON SUBSYSTEM FUNCTIONS INCLUDING FLIGHT CONTROL, PROPULSION, FIRE CONTROL, NAVIGATION, TARGET ACQUISITION, GUIDANCE, AND SUBMUNITION PROGRAMMING AND DISPENSING IS PROPOSED FOR DEVELOPMENT.

XEMET INC — NAVY — $ 49,752
7525 BOBBYBOYAR AVE
CANOGA PARK, CA 91304
JOHN A ROBERTS
TITLE:
HIGH PERFORMANCE POROUS MATERIALS
TOPIC: 128 OFFICE: NUSC

A MODULAR APPROACH TO THE DESIGN OF A POROUS SURFACE CONSISTING OF AS MANY AS 43,776 CAPILLARIES PER SQUARE FOOT, FOR BOUNDARY LAYER CONTROL IS PROPOSED. THE ELEMENTS OF THE SURFACE COMPRISE UNIQUE STAINLESS STEEL CAPILLARY STRUCTURE INSERTS AND A RECEIVING SURFACE OF PERFORATED STAINLESS STEEL PLATE DESIGNED TO EXACTLY MATCH AND LOCK THE INSERTS IN PLACE. THE POROUS SURFACE IS STRONG, CORROSION RESISTANT AND LOW COST. FLEXIBILITY IN FLOW CHARTACTERISTICS IS ACHIEVED BY CHOICE OF THE NUMBER, DIAMETER (0.0004 INCHES TO 0.200 INCHES) AND LENGTH (UP TO 100 TIMES L/D) OF THE CAPILLARIES IN THE INSERTS AND THE ARRANGEMENT OF THE INSERTS. THE SURFACE CAN BE CONTOURED WITHOUT CAPILLARY DISTORTION USING PROPRIETARY TECHNIQUES. THE CAPILLARY INSERT FABRICATION PROCESS IS UNIQUE AND IS SUCH THAT THE COST OF THE INSERTS IS RELATIVELY INSENSITIVE TO THE NUMBER OF CAPILLARIES PER INSERT, IN DIRECT CONTRADICTION TO CONVENTIONAL HOLE MAKING PROCESSES SUCH AS DRILLING, e.b. AND LASER TECHNIQUES.

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XERAD INC
1514 SORRENTO DR
PACIFIC PALISADES, CA 90272
RICHARD G SALTER
SDIO $ 79,942
TITLE:
LIQUID METAL-DRIVEN MHD FOR RAILGUN PULSE POWER UTILIZATION
TOPIC: 18 OFFICE: IST

THE PULSER (PULSED LIQUID SODIUM ELECTROMAGNETIC GENERATOR) IS A DEVICE FOR DIRECTLY POWERING RAILGUN KEW WEAPON LAUNCHERS. IT REPLACES CUSTOMARY PULSE-FORMING ELEMENTS FOR RAILGUN PULSE-ELECTRICAL POWER. PULSER POTENTIALLY SAVES SYSTEM WEIGHT AND COMPLEXITY AND ALSO CAN IMPROVE EFFICIENCY BY EXTRACTING RESIDUAL MAGNETIC FIELD ENERGY FROM THE GUN TUBE(S); TRANSFERING IT BACK TO PRIME POWER STORAGE. PHASE I EFFORT WILL ANALYTICALLY VERIFY THIS CONCEPT, DO SYSTEM PRELIMINARY DESIGNS, AND ASSESS SDI APPLICATION MERITS.

XMCO INC
8200 GREENSBORO DR - #801
MCLEAN, VA 22102
PAUL PATTI
AF $ 58,638
TITLE:
INNOVATIVE TACTICS FOR AIR COMBAT SIMULATION
TOPIC: 36 OFFICE: AFWAL/FI

EXISTING MULTIPLE-AIRCRAFT AIR COMBAT SIMULATION MODELS GENERALLY RELY ON SIMPLIFIED TACTICS BASED ON RELATIVE POSITIONS. THE OBJECTIVE OF THE PHASE I STUDY IS TO DETERMINE THE POTENTIAL OF INNOVATIVE TECHNIQUES FOR BUILDING A MORE REALISTIC TACTICS GENERATION MODULE ADAPTIVE TO EXISTING SIMULATION MODELS. THE APPROACH INVOLVES: (1) CLARIFICATION OF THE OVERALL AIR BATTLE MANAGEMENT STRUCTURE, WITHIN WHICH THE TACTICS DECISION PROBLEM IS IMBEDDED, THEREBY DETERMINING FUNCTIONAL REQUIREMENTS OF A TACTICS GENERATOR; (2) SUITABILITY ASSESSMENT OF VARIOUS TECHNIQUES, E.G., EXPERT SYSTEMS, RULED-BASED SYSTEMS, LEARNING THEORY, AND DIFFERENTIAL GAMES, FROM WHICH A MOST PROMISING TECHNIQUE WILL BE IDENTIFIED; (3) DEVELOPMENT OF A PROTOTYPE TACTICS GENERATOR USING THAT TECHNIQUE; AND (4) TESTING IT ON A

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SELECTED MODEL TO DEMONSTRATE FEASIBILITY AND ACHIEVEMENT ON SIGNIFICANTLY IMPROVED SIMULATIONS.

ZEGER-ABRAMS INC — ARMY — $ 49,991
1112 CLARK RD
PHILADELPHIA, PA 19118
DR STEPHEN J ROSASCO
TITLE:
STEERABLE NULL CONTROL TECHNIQUES
TOPIC: 37 OFFICE: LABCOM

A COMPREHENSIVE INVESTIGATION IS PROPOSED TO EXAMINE THE APPLICABILITY OF MULTIPLEXING TECHNIQUES TO ADAPTIVE ANTENNA NULLING ARRAYS, STARTING WITH PREVIOUS ZEGER-ABRAMS WORK IN THIS AREA AS A BASIS. SEVERAL ARRAY CONTROL ALGORITHMS, WITH EMPHASIS ON THE LMS ALGORITHM, WILL BE EXAMINED IN CONJUNCTION WITH SEVERAL MULTIPLEXING APPROACHES. THE COMBINATIONS WILL BE COMPARATIVELY EVALUATED BASED ON THEIR ACHIEVABLE NULL DEPTH, CONVERGENCE SPEED, AND PROJECTED IMPLEMENTATION COMPLEXITY. THE MOST ATTRACTIVE COMBINATION WILL BE SELECTED FOR DETAILED DEFINITION FROM WHICH A HARDWARE FEASIBILITY MODEL COULD BE BUILT IN A SUBSEQUENT PHASE.

bd SYSTEMS INC — NAVY — $ 53,532
20675 S WESTERN AVE - STE 204
TORRANCE, CA 90501
W L BROGAN
TITLE:
MODELING ADVANCED GUN SYSTEM PREDICTORS
TOPIC: 138 OFFICE: JCM

THE EFFECTIVENESS OF ANTI-SHIP CRUISE MISSILES, SUCH AS THE TOMAHAWK OR HARPOON DEPENDS UPON THE CAPABILITY OF THE ADVERSARY'S TRACKING AND GUN AIMING CAPABILITIES. MODELS OF THE ENCOUNTER GEOMETRY, SENSOR PERFORMANCE, AND PREDICTOR ALGORITHMS ARE DEVELOPED IN THIS PHASE I STUDY. PERFORMANCE PREDICITIONS ARE PROVIDED FOR A VARIETY OF SENARIOS AND PARAMETER SETS. THIS PHASE RESTRICTS ITSELF TO A SINGLE MISSILE - SINGLE DEFENDER ENCOUNTER. A MORE COMPLETE RANGE OF SENSITIVITY STUDIES, THE REDUCTION OF A STATISTICALLY MEANINGFUL

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NUMBER OF CASES USING ORDER STATISTICS, AND THE PROBLEM WITH MULTIPLE TRACK AMBIGUITIES WILL BE ADDRESSED IN PHASE II.

TOTAL NUMBER OF AWARDS: 542 TOTAL AMOUNT AWARDED: $26,167,056

END

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