The Department of Defense

DoD DEPARTMENTS/AGENCIES:

AD-A210 041

Department of the Army

Department of the Navy

Department of the Air Force

DARPA Defense Advanced Research Projects Agency

Defense Nuclear Agency

Strategic Defense Initiative Organization

DEFENSE SMALL BUSINESS INNOVATION RESEARCH PROGRAM (SBIR)

VOLUME I
ARMY
ABSTRACTS OF PHASE I AWARDS
1988

VOLUME I

ARMY PROJECTS

ABSTRACTS OF PHASE I AWARDS

FROM

FY 1988 SBIR SOLICITATION

May 1989

PREFACE

On September 1, 1988 Secretary of Defense Frank C. Carlucci announced the selection of small business firms proposals under Phase I of the Fiscal Year (FY) 1988 Department of Defense (DoD) Small Business Innovation Research (SBIR) Program to be funded upon successful completion of contract negotiations.

The selection of proposals for funding was made from proposals received by the Military Departments, the Defense Advanced Research Projects Agency (DARPA), the Defense Nuclear Agency (DNA), and the Strategic Defense Initiative Organization (SDIO) in response to the FY 1988 solicitation distributed on October 1, 1987 with a closing date of January 8, 1988.

FY 1988 Program

	Number of Topics	Proposals Received	Phase I Awards
Army	234	2426	214
Navy	250	2022	249
Air Force	242	2740	375
DARPA	38	555	61
DNA	8	187	19
SDIO	15	730	138
	787	8660	1056

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

This is Volume I which contains abstracts and contacts for the 214 Phase I projects funded by the Army from the FY 1988 SBIR solicitation. Projects funded by other Department of Defense components are published in separate volumes as follows:

- Volume II - Navy Projects (Pages 131 - 289)
- Volume III - Air Force Projects (Pages 290 - 525)
- Volume IV - DARPA, DNA and SDIO Projects (Pages 526 - 679)

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

INTRODUCTION

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

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

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

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

Selection Criteria

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

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

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

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

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

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

	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	150M	202M	221M
Actual Awarded Dollars	20.6M	44.6M	78.2M	150.7M	202M	221M

FY 1983 Program

	Number of Topics	Proposals Received	Phase I Awards	Phase II Awards
Army	182	1121	98	43
Navy	131	944	66	47
Air Force	75	496	99	49
DARPA	8	128	12	7
DNA	10	88	8	2
	406	2777	283	148

1984 Program

	Number of Topics	Proposals Received	Phase I Awards	Phase II Awards
Army	111	758	81	35
Navy	146	859	99	52
Air Force	283	1208	162	73
DARPA	17	107	15	7
DNA	8	80	12	1
	565	3012	369	168

FY 1985 Program

	Number of Topics	Proposals Received	Phase I Awards	Phase II Awards
Army	111	808	124	68
Navy	138	851	110	62
Air Force	218	1306	249	120
DARPA	17	130	13	6
DNA	7	95	18	6
SDIO	18	415	36	16
	509	3605	550	278

FY 1986 Program

	Number of Topics	Proposals Received	Phase I Awards	Phase II Awards
Army	225	1643	244	92
Navy	190	1222	225	87
Air Force	304	1795	307	138
DARPA	22	177	42	11
DNA	7	171	46	10
SDIO	12	552	154	53
	760	5560	1018	391

FY 1987 Program

	Number of Topics	Proposals Received	Phase I Awards	Phase II Awards
Army	330	2402	331	119
Navy	263	2004	286	74
Air Force	241	1863	351	64
DARPA	33	395	59	11
DNA	8	200	25	3
SDIO	14	672	212	39
	889	7536	1264	310

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

BY SERVICE
FISCAL YEAR 1988
ARMY

SUBMITTED BY

ABEL CO
SR 774 - BOX 267
PEMBROKE, VA 24136
CONTRACT NUMBER: DAMD17-88-C-8188
KENNETH ABEL
TITLE:
SURGICAL INSTRUMENT DECONTAMINATION UNIT
TOPIC# 184 OFFICE: MEDICAL IDENT#: 25412

THE PRIMARY OBJECTIVE OF THIS PROPOSED EFFORT IS TO DETERMINE IF A MODIFIED TWO-COMPARTMENT ULTRASONIC VAPOR DEGREASER CAN BE BOTH AN EFFECTIVE CLEANER AND AN EFFECTIVE STERILANT FOR FREQUENTLY-USED SURGICAL INSTRUMENTS.

ADCOM SYSTEMS INC
30 GRANT ST
WALTHAM, MA 02154
CONTRACT NUMBER: DAAD07-88-C-0057
DR E J BAGHDADY
TITLE:
ONE-WAY DOPPLER MEASUREMENT
TOPIC# 150 OFFICE: TECOM/WSMR IDENT#: 25266

INNOVATIVE APPROACHES ARE DESCRIBED IN THIS PROPOSAL FOR SUPPRESSING FREQUENCY MODULATION ON A SINUSOIDAL CARRIER. PARTICULAR EMPHASIS IS DIRECTED TO THE SUPPRESSION OF IDENTIFIABLE COMPONENTS OF A COMPOSITE MODULATION PROCESS FOR THE PURPOSE OF RETAINING, FOR SEPARATE MEASUREMENT, ANY FORM OF RANGE-RATE DOPPLER SHIFT/MODULATION PRESENT. THE PROPOSED EFFORT WILL CONSIST OF AN ANALYTICAL STUDY FOR COMPARATIVE EVALUATION OF THESE TECHNIQUES, LEADING TO A SELECTION OF THE TECHNIQUE THAT PROMISES TO MEET THE SPECIFIED BOUND ON RESIDUAL MODULATION ERROR IN THE RETAINED DOPPLER TO WITHIN A GOOD MARGIN OF SAFETY WITH THE LEAST CIRCUIT COMPLEXITY. UPON SELECTION OF TECHNIQUE, A DESIGN ANALYSIS WILL BE PERFORMED TO EVOLVE A COMPREHENSIVE SET OF SPECIFICATIONS AND A PRELIMINARY CIRCUIT DESIGN TO BE BREADBOARDED FOR PROOF OF METHOD AS THE FIRST STEP IN PHASE II DEVELOPMENT.

ADVANCED DECISION SYSTEMS
201 SAN ANTONIO CIR - STE 286
MOUNTAIN VIEW, CA 94040
CONTRACT NUMBER: DAAED7-88-C-R076
MARCEL SCHOPPERS
TITLE:
TELEROBOTIC CONTROL FOR TEAMS OF SEMI-AUTONOMOUS AGENTS
TOPIC# 133 OFFICE: TACOM IDENT#: 26043

SUBMITTED BY

THE ARMY TANK COMMAND, TO DEVELOP ITS ROBOT COMMAND CENTER, IS LOOKING FOR WAYS TO CONTROL MORE VEHICLES WITH FEWER PEOPLE. THE SPECTRUM OF VEHICLE AUTONOMY RANGES FROM TELEOPERATION UP THROUGH TELEROBOTICS AND ON TO VEHICLE GOVERNED SOLELY BY GOAL SPECIFICATIONS. WE PROPOSE TO DEVELOP A TECHNOLOGY THAT PERMITS VEHICLES TO REACT AUTONOMOUSLY TO EXPECTED CIRCUMSTANCES, WHILE ALSO PERMITTING A HUMAN OPERATOR TO INSTRUCT VEHICLES ABOUT WHAT TO DO AND HOW TO DO IT, EVEN TO ASSEMBLING NEW BEHAVIORS FROM A LIBRARY OF PRIMITIVE BEHAVIOR COMPONENTS. WE WILL FUSE IDEAS FROM TELEROBOTICS AND FROM THE REACTION PLANNING SUBFIELD OF ARTIFICIAL INTELLIGENCE TO PRODUCE A PROGRAMMING LANGUAGE CAPABLE OF SUPPORTING INCREMENTAL IMPROVEMENTS ON ROBOTIC BEHAVIOR. THIS WILL EXTEND THE TEAM WORKS OPERATING ENVIRONMENT AS A TESTBED FOR TANK PLATOON STRATEGIZING.

ADVANCED FUEL RESEARCH INC
PO BOX 18343 - 87 CHURCH ST
EAST HARTFORD, CT 06118
CONTRACT NUMBER: DAAL04-88-C-0017
DAVID G HAMBLEN
TITLE:
INFRARED BOLOMETERS USING BULK HIGH T(c) SUPERCONDUCTORS
TOPIC# 231 OFFICE: MTL/LABCOM IDENT#: 26743

THE RECENT DISCOVERY OF PEROVSKITE-LIKE COPPER-OXIDE SUPERCONDUCTORS WITH TRANSITION TEMPERATURES ABOVE LIQUID NITROGEN TEMPERATURES HAS LED TO RENEWED INTEREST IN THE APPLICATION OF SUPERCONDUCTIVITY. THESE NEW YBaCuO (YBa(2)Cu(3)O(7-x) MATERIALS OFFER THE OPPORTUNITY TO USE THESE MATERIALS AS DETECTORS MORE CONVENIENTLY THAN THE "CLASSICAL" SUPERCONDUCTORS. THE LONG RANGE GOAL OF THE PROPOSED PROGRAM IS TO DEVELOP BOLOMETERS USING THE NEW HIGH T(c) SUPERCONDUCTING MATERIALS FOR USE AS IR DETECTORS. THE PHASE I OBJECTIVE IS TO DEMONSTRATE THE SENSITIVITY OF SUCH BOLOMETERS TO INFRARED RADIATION, TEST THE WAVELENGTH AND TEMPERATURE RANGE OF SENSITIVITY, INVESTIGATE THE EFFECTS OF GRAIN SIZE ON THE QUALITY OF SUCH DETECTORS, AND TO PROVIDE UNDERSTANDING ON WHICH TO GUIDE THEIR DEVELOPMENT.

ADVANCED MECHANICAL TECHNOLOGY INC
151 CALIFORNIA ST
NEWTON, MA 02158
CONTRACT NUMBER: DAAK70-88-C-0025
ELIA P DEMETRI
TITLE:
WASTE HEAT EXCHANGER FOR DIESEL EXHAUST POWERED AIR CONDITIONING
TOPIC# 110 OFFICE: BRDEC IDENT#: 26231

SUBMITTED BY

THE WASTE HEAT EXCHANGER IS OFTEN THE LARGEST SINGLE COMPONENT IN DIESEL-EXHAUST POWERED AIR CONDITIONING SYSTEMS, AND ON ACCOUNT OF ITS HIGH MATERIAL CONTENT, IS OFTEN THE HEAVIEST AND MOST COSTLY AS WELL. THE NEED EXISTS FOR A HEAT EXCHANGER DESIGN AND FABRICATION TECHNIQUE WHICH IS COMPACT AND LIGHTWEIGHT, RESISTS FOULING FROM EXHAUST GASES, IS EASILY CLEANED, USES INEXPENSIVE MATERIALS, AND IS AMENABLE TO HIGH VOLUME MANUFACTURING. THE PROPOSED PROGRAM WOULD DEVELOP A HEAT EXCHANGER MEETING THE REQUIREMENTS FOR DIESEL-EXHAUST POWERED AIR CONDITIONING BY UTILIZING A DESIGN APPROACH WHICH INTEGRATES A LOW-COST, FOULING RESISTANT, EASILY CLEANABLE HEAT EXCHANGER WITH THE ENGINE MUFFLER. THE PHASE I OBJECTIVE WOULD BE TO DESIGN, FABRICATE AND TEST A PROTOTYPE EXHAUSE HEAT EXCHANGER.

ADVANCED OPTICAL SYSTEMS
312 S HARBOR CITY BOVD - #6
MELBOURNE, FL 32901
CONTRACT NUMBER: DAAB07-88-C-A054
ROBERT E DRAGOO
TITLE:
MINIATURIZED FIBER-OPTIC TELEPHONE SWITCH
TOPIC# 200 OFFICE: CECOM/C3 IDENT#: 25631

ADVANCED OPTICAL SYSTEMS PROPOSES TO MODIFY AN EXISTING FIBER-OPTIC NETWORK TO PROVIDE A MEANS OF SUPPORTING A GROUP OF EXISTING INVENTORY TELEPHONE INSTRUMENTS WITH A MAN-PORTABLE SWITCHED VOICE TELEPHONE NETWORK. THE SYSTEM IS ORIENTED ON PROVIDING A RAPID DEPLOYMMENT CAPABILITY TO SUPPORT HIGHLY MOBILE TACTICAL FORCES IN LIEU OF SHELTER-MOUNTED SWITCHING NODE FACILITIES. ADDITIONALLY, THE SYSTEM WILL ELIMINATE THE REQUIREMENT FOR SPECIALIZED LINE TERMINATION EQUIPMENT FOR EACH DISTINCT TYPE OF TERMINAL INSTRUMENT CONNECTED TO A TACTICAL SWITCHING FACILITY. THE SYSTEM WILL ... EXISTING INVENTORY TELEPHONE INSTRUMENTS (BOTH ANALOG AND DIGITAL), CLEAN TEXT AND ENCRYPED VOICE REQUIREMENTS, 2-WIRE AND 4-WIRE TELE-PHONE INSTRUMENTS, AND A VARIETY OF SIGNALLING STRATEGIES (COMMON BATTERY SIGNALLING, RINGDOWN, DUAL-TONE ... FREQUENCY <DTMF), AND OTHER SIGNALLING FORMATS). INTERFERS ... NECESSARY TO ADAPT THE NETWORK TO A VARIETY OF TELEPHONE ... DATA WILL BE ADDRESSED.

ADVANCED TECHNOLOGY & RESEARCH INC
14900 SWEITZER LN
LAUREL, MD 20707
CONTRACT NUMBER: DAAA21-88-C-0182
JOHN S GOTT
TITLE:
ENVIRONMENTAL STRESS SCREENING FOR ONE SHOT ITEMS
TOPIC# 3 OFFICE: ARDEC IDENT#: 27017

SUBMITTED BY

ENVIRONMENTAL STRESS SCREENING (ESS) IS THE TAILORED APPLICATION OF ENVIRONMENTAL STRESSES TO MANUFACTURED END ITEMS TO IDENTIFY AND ELIMINATE DEFECTIVE, ABNORMAL, OR MARGINAL PARTS AND MANUFACTURING DEFECTS. THE APPLICATION OF ESS TO ONE-SHOT ORDNANCE DEVICES LIKE FUZES, SAFE/ARMING DEVICES AND TIMERS IS COMPLICATED AND TOO OFTEN IGNORED OR INEFFECTUAL. THIS PROPOSAL SHOWS A WAY OF RELATING ESS PROCESSES TO PREVALENT STOCKPILE FAILURES SO THAT EFFECTIVE ESS PROCESSES CAN BE ACCOMPLISHED. THE METHODOLOGY DEVELOPED WILL BE DOCUMENTED FOR FUTURE USE AS A SET OF GROUND RULES.

AEROMETRICS INC
PO BOX 308
MOUNTAIN VIEW, CA 94042
CONTRACT NUMBER: NAS2-12914
WILLIAM D BACHALO
TITLE:
ADVANCED DEVELOPMENT OF THREE-COMPONENT LASER DOPPLER VELOCIMETRY
TOPIC# 39 OFFICE: AVSCOM IDENT#: 27054

IN THE PROPOSED EFFORT, SIMULTANEOUS PARTICLE SIZING CAPABILITY WILL BE ADDED TO A TWO-COMPONENT LASER DOPPLER VELOCIMETER TO FORM A THREE-COMPONENT SYSTEM. THIS COMBINATION OF CAPABILITIES WILL PRODUCE AN INSTRUMENT UNIQUELY SUITED TO THE CHARACTERIZATION OF HIGH SPEED, TURBULENT, THREE-DIMENSIONAL FLOW FIELDS SUCH AS ENCOUNTERED IN HELICOPTER ROTOR FLOWS. THE RECENTLY DEVELOPED PHASE DOPPLER PARTICLE ANALYZER (PDPA), TO BE USED IN THIS EFFORT, CAN PROVIDE SIMULTANEOUS PARTICLE SIZE INFORMATION WHICH, WHEN USED IN CONJUNCTION WITH VELOCITY DATA FROM INDIVIDUAL PARTICLES, CAN EVALUATE THE RESPONSE OF PARTICLES NEEDED TO SEED THE AIRFLOW FOR THE LDV MEASUREMENTS. AN IMPROVED METHOD FOR SIGNAL COINCIDENCE IS PROPOSED AND WILL BE INCORPORATED INTO THE SYSTEM. THIS WILL INSURE SIMULTANEITY OF THE THREE VELOCITY MEASUREMENTS AS WELL AS THE PARTICLE SIZE MEASUREMENT. TOTAL INSTANTANEOUS VELOCITIES CAN BE DETERMINED ALONG WITH REYNOLD'S SHEAR STRESS FOR THE FLUID. TIME-TAGGING OF INDIVIDUAL EVENTS DURING DATA ACQUISITION WILL PERMIT TEMPORAL CORRELATIONS AND ANALYSIS OF UNSTEADY PHENOMENA.

ALTUS CORP
1610 CRANE CT
SAN JOSE, CA 95112
CONTRACT NUMBER: DAAL01-88-C-0823
J PHILLIPS
TITLE:
COMPONENTS FOR RECHARGEABLE AMBIENT TEMPERATURE HIGH ENERGY LITHIUM BATTERIES
TOPIC# 95 OFFICE: ETDL/LABCOM IDENT#: 26552

SUBMITTED BY

RECHARGEABLE LITHIUM SYSTEMS TO BE OF BROAD MILITARY USE MUST OPERATE TO -40 DEG C YET STILL RETAIN GOOD AMBIENT TEMPERATURE CYCLE LIFE. LOW TEMPERATURE CELL PERFORMANCE IS AFFECTED BY THE SEPARATOR POROSITY, ELECTROLYTE CONCENTRATION, AND ANODIC FILMS. THIS INVESTIGATION EXPLORES THE IMPACT OF EACH FACTOR ON AMBIENT TEMPERATURE CYCLE LIFE AND LOW TEMPERATURE DISCHARGE PERFORMANCE USING THE RECHARGEABLE LITHIUM/COPPER (II) CHLORIDE/SULFUR DIOXIDE SYSTEM IN A SPIRAL CELL DESIGN AS A TEST VEHICLE.

ANALYTICAL SOFTWARE INC
10939 McCREE RD
DALLAS, TX 75238
CONTRACT NUMBER: DAAED7-88-C-0074
MARK HALEY
TITLE:
VEHICLE MONITORING SYSTEM (VMS) DATA ANALYSIS
TOPIC# 131 OFFICE: TACOM IDENT#: 26015

THE OBJECTIVE IS TO DEVELOP COMPUTER SOFTWARE WHICH ANALYZES THE OPERATIONAL HISTORY OF ARMY VEHICLES, SUCH AS 5-TON DIESEL TRUCKS, AND BASED ON THIS ANALYSIS RECOMMENDS MAINTENANCE AND OTHER PREVENTIVE ACTION WHICH MINIMIZES EQUIPMENT BREAKDOWN. THE SOFTWARE WOULD OPERATE ON A PRIME COMPUTER, AND IT SHOULD INCLUDE EXTENSIVE GRAPHICS CAPABILITIES WHICH WOULD ASSIST IN PROGNOSTIC ANALYSIS. THE SOFTWARE WOULD SORT THROUGH INFORMATION SUCH AS ENGINE REVOLUTIONS PER MINUTE (RPM), ROAD SPEED, CONTROL ARM POSITION, AND VERTICAL ACCELERATION, AND CONSOLIDATE THIS DATA INTO A FORM THAT WILL HIGHLIGHT ENGINE OR VEHICLE PROBLEMS. THERE MUST BE EXTENSIVE GRAPHICS CAPABILITIES WHICH ENABLE THE USER TO DISPLAY THESE OPERATIONAL PARAMETERS AGAINST EACH OTHER TO PROJECT POTENTIAL PROGNOSTIC TRENDS. THE SOFTWARE WOULD BE DEVELOPED FOR A PRIME COMPUTER, BUT TO INSURE THAT IT IS WIDELY AVAILABLE ON PERSONAL COMPUTERS, THE SOFTWARE WOULD ALSO BE PROGRAMMED FOR A ZENITH 248.

ANATECH LTD
5510 VINE ST
ALEXANDRIA, VA 22310
CONTRACT NUMBER: DAMD17-88-C-8190
ROBERT W BARR
TITLE:
DEVELOPMENT OF DESIGN PARAMETERS AND CONCEPTUAL DRAWING FOR A PLASMA ETCHER TO CLEAN AND STERILIZE SURGICAL INSTRUMENTS
TOPIC# 184 OFFICE: MEDICAL IDENT#: 25415

SUBMITTED BY

THE PROPOSED PROCESS WILL USE ACCELERATED IONS TO REMOVE ORGANIC MATTER BY PHYSICALLY DESORBING MOLECULAR FRAGMENTS AND BY REACTING CHEMICALLY TO PRODUCE VOLATILE, NON-TOXIC GASES SUCH AS CO2. STUDIES WITH RELATED EQUIPMENT HAVE DEMONSTRATED FEASIBILITY. PHASE I RESEARCH IS TO DETERMINE THE OPTIMAL SIZE OF THE PROCESS CHAMBER AND HOW SURGICAL INSTRUMENTS CAN MOST EFFECTIVELY BE ARRANGED IN IT; THE OPTIMAL AIR PRESSURE INSIDE THE CHAMBER; THE REQUIRED POWER DENSITY; AND EVALUATE ALTERNATIVE PROCESS GENERATED BY DIRECT CURRENT, ALTERNATING CURRENT AND RADIO FREQUENCY. THE RESULT OF PHASE I WILL BE A SET OF DESIGN PARAMETERS AND A CONCEPTUAL DRAWING OF THE PROPOSED ETCHER.

APPLICATIONS RESEARCH CORP
4031 COLONEL GLENN HWY
DAYTON, OH 45431
CONTRACT NUMBER: DAAA15-88-C-0033
RODNEY B BEACH
TITLE:
SMOKE AND AEROSOL CLEARING SYSTEM (SACS)
TOPIC# 28 OFFICE: CRDEC IDENT#: 27040

BASED UPON EARLIER EXPERIMENTAL WORK, IT WAS DISCOVERED THAT ULTRASONIC RADIATION OF THE PROPER FREQUENCY WOULD PRECIPITATE SMOKE AND AEROSOLS WITHIN THE RADIATION PATTERN. THE PURPOSE OF THIS EFFORT IS TO EXPERIMENTALLY PROVE THE FEASIBILITY OF USING THE CONCEPT TO CLEAR SMOKE AND AEROSOLS FROM A BATTLEFIELD. TWO SPECIFIC APPLICATIONS WILL BE STUDIED, 1) TO CREATE A SMALL AREA OF CLEAR AIR TO TARGET TACTICAL WEAPONS, AND 2) TO PROVIDE A CLEAR PATH TO SAFELY MANEUVER BATTLEFIELD VEHICLES. SOME THEORETICAL WORK HAS BEEN ACCOMPLISHED BUT MANY YEARS AGO. WITH MODERN PIEZO-ELECTRIC TRANSDUCERS AND ELECTRONICS THE EFFECT MAY PROVIDE THE ARMY WITH A VERY USEFUL TACTICAL TOOL. LABORATORY EXPERIMENTS WILL BE ACCOMPLISHED USING A SCALE MODEL OF AN ARRAY OF TRANSDUCERS TO DETERMINE OPTIMUM FREQUENCY, SCALE FACTORS, AND OVERALL EFFECTIVENESS OF THE CONCEPT. VISUAL PROOF OF CONCEPT IS EXPECTED.

APPLIED TECHNOLOGIES INC
6395 GUNPARK DR - UNIT E
BOULDER, CO 80301
CONTRACT NUMBER: DAAD09-88-C-0030
W R DAGLE
TITLE:
BOUNDARY LAYER MIXING HEIGHT DETECTOR
TOPIC# 145 OFFICE: TECOM/DPG IDENT#: 25195

SUBMITTED BY

APPLIED TECHNOLOGIES, INC. PROPOSES A DESIGN PROGRAM TO DESIGN A SIMPLE, MOBILE, VERTICAL AXIS FM-CW RADAR. THE PROGRAM WILL ENCOMPASS A LITERATURE SEARCH TO FIND THE LATEST STATE-OF-THE-ART ADVANCES IN RADAR TECHNOLOGY. THE DATA FROM THE LITERATURE SEARCH WILL FORM THE BASIS FOR A DESIGN THAT INCLUDES ANTENNA DESIGN, TRANSMITTER DESIGN, RECEIVER DESIGN, AND DATA COLLECTION AND PROCESSING. COST TRADE-OFF ANALYSES WILL BE PERFORMED TO PROVIDE THE MOST COST-EFFECTIVE, YET TECHNOLOGICAL ADVANCED RADAR TO MEET THE REQUIREMENTS OF DUGWAY PROVING GROUND. THE DESIGN EFFORT WILL CULMINATE IN THE GENERATION OF A CONCEPTUAL DESIGN THAT WILL FORM THE BASIS OF A PHASE II PROTOTYPE FW-CW RADAR SYSTEM. THE RESULTANT RADAR SOUNDER WILL BE DESIGNED TO ACHIEVE A NEW LEVEL OF OPERATIONAL CAPABILITY.

AQUANAUTICS CORP
4560 HORTON ST
EMERYVILLE, CA 94608
CONTRACT NUMBER: DAAA15-88-C-0028
DR SAM MOHANTA
TITLE:
OXYGEN EXTRACTION FOR LIFE SUPPORT IN A CHEMICALLY CONTAMINATED ENVIRONMENT
TOPIC# 29 OFFICE: CRDEC IDENT#: 27042

CURRENT LIFE SUPPORT SYSTEMS FOR A CHEMICALLY CONTAMINATED ENVIRONMENT FILTER OUT CONTAMINATES AND ALLOW AIR TO ENTER THE INDIVIDUAL OR COLLECTIVE PROTECTION ENVIRONMENT. THIS WORKS WELL FOR KNOWN CONTAMINATES BUT MAY BE SUSCEPTIBLE TO UNKNOWN CHEMICALS. SELECTIVELY CAPTURING THE OXYGEN WITHOUT REGARD TO THE ENVIRONMENT WOULD HAVE A HIGHER LEVEL OF PROTECTION. SINCE 1985, THE DEPARTMENT OF DEFENSE HAS CONTRACTED WITH AQUANAUTICS CORPORATION TO EXTRACT DISSOLVED OXYGEN FROM SEAWATER WITH A UNIQUE TECHNOLOGY INVOLVING MOLECULAR ENGINEERING AND ELECTROCHEMISTRY. THIS PROCESS CAN BE MODIFIED FOR AIR SEPARATION. THE COMPANY IS JOINTLY DEVELOPING AN AIR SEPARATION PROCESS FOR LARGE SCALE INDUSTRIAL OXYGEN PRODUCTION WITH LIQUID AIR CORPORATION, THE WORLD'S LARGEST MANUFACTURER OF INDUSTRIAL GASES. IT WAS ALSO SELECTED BY NASA TO EXTRACT OXYGEN FROM THE MARS. FOR PHASE I, AQUANAUTICS WILL PERFORM A FEASIBILITY

SUBMITTED BY

ENGINEERING STUDY FOR HIGH ALTITUDE APPLICATIONS. THE ARMY CAN APPLY THIS TECHNOLOGY WITH ONLY A SMALL INCREMENTAL INVESTMENT BECAUSE AQUANAUTICS HAS ALREADY INVESTED MORE THAN $7 MILLION IN R&D. AQUANAUTICS HAS DEMONSTRATED DRAMATIC TECHNICAL ACHIEVEMENTS WITH A TEAM OF TWENTY PROFESSIONALS, OF WHOM TEN HOLD Ph.D. DEGREES. THE COMPANY HAS SBIR EXPERIENCE AND THE FACILITIES TO CONDUCT THE SCOPE OF WORK.

ARTECH CORP
2901 TELESTAR CT
FALLS CHURCH, VA 22042
CONTRACT NUMBER: DAAL04-88-C-0020
DR FRED ORDWAY
TITLE:
SUPERHARD COATING FOR BEARINGS
TOPIC# 76 OFFICE: MTL/LABCOM IDENT#: 26660

THE CUBIC CRYSTALLINE PHASE OF CARBON (DIAMOND) AND THE ANALOGOUS STRUCTURE OF BORON NITRIDE (cBN, BORAZON) ARE THE HARDEST KNOWN SOLIDS. TO MAKE USE OF THIS HARNESS FOR INCREASED WEAR RESISTANCE, COATINGS OF "DIAMONDLIKE" CARBON HAVE BEEN WIDELY STUDIED. ARTECH HAS DEVELOPED A TECHNIQUE FOR APPLYING SUPERHARD BORON NITRIDE COATINGS USING SIMULTANEOUS BEAMS OF BORON AND NITROGEN ATOMS, AND PROPOSED TO EXPLORE ITS APPLICATION TO BALL BEARINGS.

ATLANTIC AEROSPACE ELECTRONICS CORP
6404 IVY LN - STE 300
GREENBELT, MD 20770
CONTRACT NUMBER: DAAL03-88-C-0018
CORY MYERS
TITLE:
ULTRAFAST SIGNAL PROCESSING ALGORITHMS AND ARCHITECTURES
TOPIC# 88 OFFICE: ARO/LABCOM IDENT#: 26428

A CRITICAL PROBLEM IN THE USE OF SIGNAL PROCESSING ALGORITHMS IN REAL-WORLD APPLICATIONS IS THAT OF FINDING EFFICIENT REALIZATIONS ON AVAILABLE HARDWARE. RECENT WORK IN SYMBOLIC SIGNAL ANALYSIS AND

SUBMITTED BY

MANIPULATION HAS DEMONSTRATED THE POTENTIAL FOR THE AUTOMATIC TRANSFORMATION OF ALGORITHMS INTO EFFICIENT FORMULATIONS. THESE METHODS HAVE SHOWN PROMISE IN REDUCING THE HUMAN EFFORT REQUIRED IN DESIGNING EFFICIENT IMPLEMENTATIONS OF ALGORITHMS AND HAVE DEMONSTRATED THE ABILITY TO FIND NEW METHODS FOR IMPLEMENTING SOME SIGNAL PROCESSING OPERATIONS. CURRENTLY, HOWEVER, THESE METHODS ARE GENERAL-PURPOSE AND DO NOT MAINTAIN REALISTIC HARDWARE MODELS. AS A RESULT, IT IS DIFFICULT TO AUTOMATICALLY EVALUATE THE APPLICABILITY OF PARTICULAR ARCHITECTURES AND TO QUANTIFY PERFORMANCE. IT IS PROPOSED TO STUDY THE TECHNIQUES OF SYMBOLIC SIGNAL ANALYSIS AND MANIPULATION USING HARDWARE-SPECIFIC MODELS. THIS WORK WILL DEVELOP SPECIFICATIONS OF DIFFERENT ARCHITECTURES, INCLUDING BOTH REGULAR AND SPECIAL-PURPOSE ARCHITECTURES, AND WILL EXAMINE VARIOUS MEASURES OF MERIT, INCLUDING OPERATIONS COUNT, MEMORY, AND THROUGHPUT. SYMBOLIC METHODS FOR SIGNAL ANALYSIS AND TRANSFORMATION TAILORED TO THESE HARDWARE SPECIFICATIONS WILL BE DEMONSTRATED. PHASE I WILL ANALYZE CURRENT ALGORITHMS AND ARCHITECTURES FOR THE APPLICABILITY OF SYMBOLIC MANIPULATION, WILL DEVELOP AN EXPLICIT REPRESENTATION FOR A PARTICULAR HARDWARE ARCHITECTURE, AND WILL DEMONSTRATE SYMBOLIC ANALYSIS AND TRANSFORMATION OF SOME SIGNAL PROCESSING ALGORITHMS FOR THE CHOSEN ARCHITECTURE.

BABINGTON ENGINEERING
1113 INGLESIDE AVE
McLEAN, VA 22101
CONTRACT NUMBER: DAAD09-88-C-0027
ROBERT S BABINGTON
TITLE:
SUB MICROMETER MICROBIAL AEROSOL GENERATOR
TOPIC# 146 OFFICE: TECOM/DPG IDENT#: 25198

AN ADVANCED TECHNIQUE IN THE ATOMIZATION OF LIQUIDS WILL BE UTILIZED IN DEVELOPING AN AEROSOL GENERATOR TO SATISFY THE REQUIREMENTS OF THIS PROJECT. THE PHASE I AEROSOL GENERATOR WILL BE CAPABLE OF OPERATING AT RELATIVELY LOW AIR PRESSURES, TO INSURE HIGH VIABILITY AFTER AEROSOLIZATION. THE SYSTEM WILL BE ESSENTIALLY NON CLOGGING AND WILL BE INSENSITIVE TO PARTICULATE MATTER IN THE LIQUID.

BELTRAN INC
1133 - E 35TH ST
BROOKLYN, NY 11210
CONTRACT NUMBER: DAAED7-88-C-R066
T S RAVI
TITLE:
A SURVIVABLE TACTICAL TRUCK HEAT PIPE RADIATOR
TOPIC# 122 OFFICE: TACOM IDENT#: 25872

SUBMITTED BY

THE PHASE I RESEARCH WILL ESTABLISH THE FEASIBILITY OF THE INNOVATIVE CONCEPT OF A AUTO HEAT PIPE RADIATOR THROUGH EXPERIMENTAL WORK. HEAT PIPES ARE HIGH EFFICIENCY HEAT TRANSFER EQUIPMENT THAT HAVE NO MOVING PARTS. A HEAT PIPE NETWORK WILL CONTINUE TO WORK, EVEN IF, ONE OR MORE OF THE HEAT PIPES ARE DAMAGE. THIS ALMOST FAIL-SAFE CHARACTERISTIC HAS MADE HEAT PIPE A WIDELY USED EQUIPMENT IN SPACE APPLICATIONS, WHERE MICROMETEOROIDS POSE A THREAT THAT IS SIMILAR TO SMALL ARMS THREAT FACED BY TACTICAL TRUCKS. THE PROPOSED ANALYSIS AND THE EXPERIMENTAL WORK WILL PROVIDE VALUABLE RESULTS ON THE PERFORMANCE OF THE TACTICAL TRUCK HEAT PIPE RADIATOR, INCLUDING THE EFFECTIVENESS OF VARIOUS MATERIALS, WORKING FLUIDS, WICK STRUCTURE, AND THE OPERATING TEMPERATURE AND LOAD.

BIO-IMAGING RESEARCH INC
425 BARCLAY BLVD
LINCOLNSHIRE, IL 60069
CONTRACT NUMBER: DAAL03-88-C-0024
BRUCE G ISAACSON
TITLE:
ON-LINE X-RAY INSPECTION OF MATERIALS AND STRUCTURAL COMPONENTS USING DISCRETE ELEMENT X-RAY DETECTORS FOR DIGITAL RADIOGRAPHIC..
TOPIC# 89 OFFICE: ARO/LABCOM IDENT#: 26453

DISCRETE ELEMENT X-RAY DETECTORS DEVELOPED FOR MEDICAL COMPUTER TOMOGRAPHY ARE RECENTLY BEING APPLIED AS A DETECTION MEDIUM FOR INDUSTRIAL X-RAY RADIOGRAPHY. THE DETECTORS ARE DESIGNED WITH A WIDE DYNAMIC RANGE TO ACCOMMODATE THE MULTIPLE PATH DATA COLLECTION NECESSARY FOR COMPUTED TOMOGRAPHY. IN THE STANDARD RADIOGRAPHIC INSPECTION MODE, THIS FEATURE ALLOWS THE EVALUATION OF A WIDE RANGE OF MATERIAL THICKNESS WITH ONE X-RAY EXPOSURE TECHNIQUE. THE DISCRETE ELEMENT NATURE OF THE DETECTORS ALSO MINIMIZES CROSSTALK, SIGNIFICANTLY REDUCING BLOOMING AND UNDERCUTTING WHICH OBSCURE THE EDGES IN IMAGES TAKEN WITH TRADITIONAL DETECTION TECHNIQUES. DETECTORS DESIGNED FOR INDUSTRIAL INSPECTION ALSO REQUIRE AN IMPROVED SPATIAL RESOLUTION TO SOLVE THE SMALL FEATURES NECESSARY FOR MANY MATERIAL EVALUATION APPLICATIONS. THIS PROJECT IS DESIGNED TO DETERMINE THE FEASIBILITY OF DIGITAL RADIOGRAPHY AND COMPUTED TOMOGRAPHY USING THESE HIGH PERFORMANCE DISCRETE ELEMENT DETECTORS AS A X-RAY DETEC-

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TION TOOL FOR ON-LINE CONTINUOUS MANUFACTURED PRODUCTS, SUCH AS METAL MATRIX COMPOSITES. DIGITAL RADIOGRAPHY DATA COLLECTION WITH THIS DETECTOR TECHNOLOGY REQUIRES THAT THE MATERIAL BE MOVED OR PASSED BETWEEN THE X-RAY SOURCE AND THE DETECTORS AT SPEEDS UP TO 1 INCH PER SECOND. SAMPLES OF COMPOSITES WHICH ARE MANUFACTURED IN A CONTINUOUS PROCESS, SUCH AS METAL MATRIX AND RESIN-BASED COMPOSITES, WILL BE COLLECTED FOR STUDY. REQUIRED X-RAY TESTING TECHNIQUES WILL BE COMPARED AGAINST PRACTICAL MANUFACTURING PROCESS PARAMETERS FOR COMPATIBILITY. THE EFFECTIVENESS OF THE TESTING TECHNIQUE IN THE PARTICULAR APPLICATION WILL DETERMINE THE FEASIBILITY OF THE INSPECTION TECHNIQUE.

BIO-METRIC SYSTEMS INC
9924 - W 74TH ST
EDEN PRAIRIE, MN 55344
CONTRACT NUMBER: DAMD17-88-C-8200
DR RICHARD A AMOS
TITLE:
AN ENZYME IMMUNOASSAY FOR ANATOXI-A
TOPIC# 176 OFFICE: MEDICAL IDENT#: 25376

CONSIDERABLE ATTENTION HAS BEEN FOCUSED UPON THE POSSIBLE USE OF TOXIC BIOLOGICAL AGENTS IN BOTH SOUTHEAST ASIA AND AFGHANISTAN. SUCH REPORTED INCIDENTS INDICATE A NEED FOR IMPROVING THE UNITED STATES' CAPABILITY OF ACCURATELY DETECTING A VARIETY OF NATURALLY OCCURRING TOXINS. ONE SUCH TOXIN OF CONSIDERABLE INTEREST IS ANATOXIN-A, A SECONDARY METABOLITE OF THE CYANOBACTERIA (BLUE-GREEN ALGAE) ANABENA FLOS-AQUAE, WHICH HAS BEEN SHOWN TO BE EXTRAORDINARILY TOXIC. NUMEROUS EXAMPLES OF ANIMAL DEATHS HAVE BEEN REPORTED AFTER DRINKING FROM LAKES AND PONDS FOLLOWING BLOOMS OF THIS FRESH-WATER ALGAE. WE PROPOSE TO DEVELOP AN IMMUNOASSAY TEST, BASED ON EITHER AN RIA OR AN ELISA FORMAT, THAT WILL PERMIT RAPID DETECTION OF THIS TOXIN DIRECTLY IN WATER SAMPLES. PREVIOUS SYNTHETIC WORK HAS MADE AVAILABLE AMPLE QUANTITIES OF THE TOXIN FOR TEST DEVELOPMENT AND THE SYNTHETIC ROUTE IS READILY ADAPTABLE FOR RADIOLABELING THE TOXIN. POLYCLONAL ANTIBODIES AGAINST THIS HAPTEN WILL BE RAISED USING CONVENTIONAL METHODS AND THOSE ANTIBODIES WILL BE EVALUATED FOR THEIR USE IN BOTH RIA AND ELISA FORMATS.

BIO-STAR MEDICAL PRODUCTS INC
5766 CENTRAL AVE
BOULDER, CO 80301
CONTRACT NUMBER: DAMD17-88-C-8199
DR DIANA M MAUL
TITLE:
OPTICAL ASSAYS FOR MICROBIAL INFECTIONS
TOPIC# 177 OFFICE: MEDICAL IDENT#: 25388

SUBMITTED BY

THE DIFFICULTY IN DIAGNOSIS OF MICROBIAL INFECTIONS IS DUE TO THE WIDE VARIETY OF MICRO-ORGANISMS WHICH INFECT MAN, AND TO THE VARIATION IN HOST RESPONSE TO SUCH INFECTIONS. IN CASES WHERE ANTIBODIES ARE RAPIDLY PRODUCED AND SUSTAINED FOR A LONG PERIOD OF TIME, DIAGNOSIS BASED ON THESE ANTIBODIES IS USEFUL. HOWEVER, LEVELS OF ANTIBODY MAY VARY DRASTICALLY BETWEEN INDIVIDUALS AND MAY BE PRESENT IN THE ABSENCE OF CLINICAL SYMPTONS. FOR ABSOLUTE IDENTIFICATION OF A MICROBIAL INFECTION, THE ABILITY TO DETECT THE PRESENCE OF SPECIFIC GENES USING DNA PROBES IS A VERY ATTRACTIVE TECHNIQUE BUT THE CURRENT TECHNOLOGY IS NOT READILY ADAPTED TO FIELD USE. BIO-STAR HAS A UNIQUE OPTICAL ASSAY FORMAT THAT LENDS ITSELF TO THE DETECTION OF ANTIBODIES PRODUCED TO MICRO-ORGANISMS, TO THE DETECTION OF MICROBIAL ANTIGENS, OR THE DETECTION OF THE MICRO-ORGANISMS GENETIC MATERIAL. THE OPTICAL FORMAT EXISTS IN TWO SEPARATE TYPES: 1) A HIGHLY QUANTITATIVE FORMAT AND 2) A QUALITATIVE OT A SEMI-QUANTITATIVE FORMAT. THIS ASSAY'S FLEXIBILITY ALLOWS DIAGNOSIS OF ANTIBODIES, ANTIGENS AND GENETIC MATERIAL BASED ON MULTIPLE LIGAND/ANALYTE COMBINATIONS WHICH ARE EASILY USABLE IN FIELD TESTING.

BK-SECURITY
2100 STANLEY AVE
ROCKVILLE, MD 20851
CONTRACT NUMBER: DAAB07-88-C-A048
HERBERT DIXON
TITLE:
C3 SCENARIO SIMULATING WORKSTATION
TOPIC# 196 OFFICE: CECOM/C3 IDENT#: 25567

THE PROPOSED RESEARCH EFFORT IS FOCUSED ON THE GOAL OF DEMONSTRATING THE EFFECTIVENESS OF USING LIBRARIES OF GENERIC HIGH LEVEL LANGUAGE, SYSTEMS LEVEL LANGUAGE, AND MACHINE LANGUAGE SOFTWARE CODE IN THE RAPID PROTOTYPING OF ARTIFICIAL INTELLIGENCE SYSTEMS ON MICROCOMPUTERS. THE CONCEPT IS VALIDATED HOLDS OUT SIGNIFICANT ADVANTAGES IN SPEED OF DEVELOPMENT, SPECIALIZATION, USER TO PROGRMMER INTERACTION AND SOFTWARE RE-USABILITY. MOST NOTABLY SOFTWARE IS REUSABLE BECAUSE APPLICATIONS ARE BUILT FROM A GENERIC LIBRARY THAT IS RE-FLAVORED FOR A SPECIFIC APPLICATION RATHER THAN BUILDING A SOFTWARE SYSTEM AND LOOKING FOR ADDITIONAL USES OF ITS CODE AT A LATER DATE.

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BKM INC
5141 SANTA FE ST
SAN DIEGO, CA 92109
CONTRACT NUMBER: DAAED7-88-C-R075
N J BECK
TITLE:
A DEMONSTRATION OF UNIVERSAL COMBUSTION OPTIMIZATION WITH RATE SHAPING (UCORS)
TOPIC# 132 OFFICE: TACOM IDENT#: 26029

THE PERFORMANCE ADVANTAGES OF THE SERVOJET HIGH PRESSURE, SHORT DURATION, ELECTRONIC FUEL INJECTOR HAVE BEEN DEMONSTRATED. IT IS KNOWN THAT THE RATE OF FUEL INJECTION, AND THE WAY THAT THE RATE VARIES THROUGHOUT THE COMPLETE INJECTION EVENT, HAS A SIGNIFICANT EFFECT ON ENGINE PERFORMANCE. THE NEWLY DEVELOPED SERVOJET UCORS SYSTEM IS A DEVELOPMENT TOOL THAT CAN CONTINUOUSLY VARY THE RATE SHAPE WHILE THE ENGINE IS RUNNING. THIS OPTIMUM RATE CHARACTERISTIC CAN THEN BE DESIGNED INTO A PRODUCTION SERVEOJET INJECTOR. IT IS PROPOSED THAT THE UCORS SYSTEM BE DEMONSTRATED ON A SINGLE CYLINDER RESEARCH ENGINE TO EVALUATE THE PERFORMANCE CHARCTERISTICS OF VARIOUS RATE SHAPES INCLUDING PILOT AND SPLIT INJECTION.

BROWN J ASSOCS INC
PO BOX 145
BERKELEY HEIGHTS, NJ 07922
CONTRACT NUMBER: DAMD17-88-C-8194
Wm A THORNTON
TITLE:
BROADBAND LASER FILTER
TOPIC# 175 OFFICE: MEDICAL IDENT#: 25365

A REQUIREMENT EXISTS TO PROVIDE OCULAR PROTECTION TO TROOPS AT RISK FROM LASER ENERGY EXPOSURE AND BALLISTIC FRAGMENTS WHILE MAINTAINING ESSENTIAL VISUAL PERFORMANCE. SINCE HOSTILE LASER BEAMS MAY BE AT UNEXPECTED WAVELENGTHS, THE USUAL NOTCH FILTER IS NOT A COMPLETE ANSWER TO THE PROBLEM. THIS LABORATORY PROPOSES A COMPLETELY DIF-

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FERENT ANSWER: AN INTERFERENCE FILTER THAT BLOCKS ALL OF THE VISIBLE SPECTRUM EXCEPT FOR THREE EXTREMELY NARROW SPECTRAL BANDS. WE HAVE SHOWN THAT SUCH A FILTER SUPPORTS EXCELLENT SEEING EVEN IN DIM LIGHT, WITH EXCELLENT VISUAL ACUITY AND EXCELLENT COLOR DISCRIMINATION, BECAUSE THE DISCARDED WAVELENGTHS ARE NOT NECESSARY TO GOOD SEEING. SUCH A FILTER OFFERS PROTECTION FROM ALL LASER WAVELENGTHS EXCEPT ONES THAT FALL EXACTLY ON ONE OF THE NARROW PASSBANDS. THIS STILL LEAVES SOME VULNERABILITY, BUT MUCH LESS THAN ANY CONVENTIONAL FILTER.

BROWN J ASSOCS INC
PO BOX 145
BERKELEY HEIGHTS, CA 07922
CONTRACT NUMBER: DAMD17-88-C-8193
JOHN A BROWN
TITLE:
RUGATE LASER FILTER
TOPIC# 175 OFFICE: MEDICAL IDENT#: 25366

A REQUIREMENT EXISTS TO PROVIDE OCULAR PROTECTION TO TROOPS AT RISK FROM LASER ENERGY EXPOSURE AND BALLISTIC FRAGEMENTS WHILE MAINTAINING ESSENTIAL VISUAL PERFORMANCE. OPTICAL FILTERS BASED ON HOLOGRAPHIC MIRRORS OR THIN FILM INTERFERENCE FILTERS ARE EFFECTIVE IN BLOCKING LASER BEAMS BUT ARE FRAGILE AND ARE SUBJECT TO DEGRADATION FROM AMBIENT MOISTURE. THIS LABORATORY PROPOSES TO MAKE THIN FILM INTERFERENCE FILTERS FROM CROSSLINKED ORGANIC POLYMERS, IN A RUGATE STRUCTURE WITH A SMOOTHLY VARYING, CYCLIC, INDEX OF REFRACTION AND NO INTERFACES FOR DELAMINATION OR MOISTURE ATTACK - ONE SOLID, MONOLITHIC, POLYMER FILM. MANUFACTURE REQUIRES ONLY SIMPLE EQUIPMENT. WE HAVE DEMONSTRATED THE FABRICATION OF PROTOTYPE INTERFERENCE FILTERS FROM ORGANIC POLYMERS, ON THE LABORATORY BENCHTOP, LITERALLY IN MASON JARS.

C MAX CO INC
8908 LaGRANGE ST
LORTON, VA 22079
CONTRACT NUMBER: DAEA18-88-C-0045
CAROL M CUTCHALL
TITLE:
TESTING OF BUILT-IN-TEST (BIT) SOFTWARE
TOPIC# 161 OFFICE: TECOM/EPG IDENT#: 25320

SUBMITTED BY

THIS PROGRAM WILL DEVELOP TECHNIQUES, PROCEDURES, AND SPECIALIZED INSTRUMENTATION TO ACCESS THE BUILT-IN-TEST (BIT) SOFTWARE WITHIN A PRIME EQUIPMENT. CONTROL OF THE ACCESS INSTRUMENTATION AND BIT TESTING WILL BE ACCOMPLISHED WITH A PC XT TYPE COMPUTER. THE CONTROL SOFTWARE WILL BE DEVELOPED USING THE DEPARTMENT OF DEFENSE ADA LANGUAGE AND WILL BE TITLED ADA LANGUAGE SOFTWARE TEST PROGRAM (ALSTP). A TYPE A SPECIFICATION FOR THE INSTRUMENTATION, ACCESS TECHNIQUES AND THE ALSTP WILL BE GENERATED. THE ACCESS TECHNIQUES, BIT SOFTWARE TESTING AND SPECIALIZED INSTRUMENTATION WILL BE DEMONSTRATED.

CALCULEX INC
PO BOX 3481
LAS CRUCES, NM 88003
CONTRACT NUMBER: DAAD07-88-C-0064
MARTIN J SMALL
TITLE:
MAXIMIZING DATA ACQUISITION AND PROCESSING SYSTEM CAPABILITIES
TOPIC# 148 OFFICE: TECOM/WSMR IDENT#: 25259

A VARIETY OF HARDWRE ENHANCEMENTS HAVE BEEN MADE OVER THE YEARS TO THE HIGH ENERGY LASER DATA ACQUISITION AND PROCESSING SYSTEM (HELDAPS) AT THE WHITE SANDS MISSILE RANGE HIGH ENERGY LASER SYSTEM TEST FACILITY. THE EXISTING HELDAPS SOFTWARE DOES NOT FULLY UTILIZE THE CAPABILITIES OF THE ENHANCED SYSTEM CONFIGURATION. A PHASE I PROJECT IS PROPOSED TO SYSTEMATICALLY ANALYZE THE HELDAPS ROCESSING REQUIREMENTS, PERFORMANCE CAPABILITIES, OPERATIONAL PROCEDURES, AND DATABASE ENVIRONMENT. THE RESULTS OF THE ANALYSIS WILL THEN BE USED TO FORMULATE RECOMMENDATIONS FOR HELDAPS ENHANCEMENTS WHICH WILL MAXIMIZE ITS PROCESSING CAPABILITIES AND REDUCE THE TIME REQUIRED TO PRODUCE TEST DATA PACKAGES.

CARDINAL SCIENTIFIC INC
1018 COPLEY AVE
WALDORF, MD 20601
CONTRACT NUMBER: DAAK70-88-C-0017
ANDREW P BROSKY
TITLE:
FRAME STRUCTURES FOR EQUIPMENT DECOYS
TOPIC# 113 OFFICE: BRDEC IDENT#: 26180

SUBMITTED BY

PROPOSES A FRAMED STRUCTURE (TO SUPPORT THREE-DIMENSIONAL DECOY COVERS) THAT IS COLLAPSIBLE, LIGHTWEIGHT, AND RAPIDLY DEPLOYABLE. STOWED DIMENSIONS ARE APPROXIMATELY 45" x 26" x 18". THE DECOY STRUCTURE HAS THE FOLLOWING FEATURES: (1) COLLAPSES TO 2% OF DEPLOYED VOLUME; (2) DEPLOYS ON UNEVEN TERRAIN WITH NO EXPOSED FRAME; (3) INCORPORATES CANVAS INTEGRATED STRUCTURAL CABLES; (4) EFFECTS DEPLOYMENT BY THE USE OF SWIVEL-SNAP CONNECTIONS; (50 REQUIRES MINIMUM TRAINING AND NO SPECIAL TOOLS FOR ASSEMBLY; AND (6) ABSORBS LOAD THROUGH CABLE TENSIONING, MINIMIZING FRAME TUBING AND PLACING PHOTOGRAPHIC COVER IN TAUT, UNDEFORMED IMAGE AT ALL ANGLES. ADVANCED MATERIALS AND COMPONENT SELECTION REPRESENT THE PRIMARY AREAS OF RESEARCH TO BE DONE. MANUAL AND GRAPHICAL VERIFICATION AND NORMAL MODE ANALYSIS ARE PLANNED. LOADING ANALYSES ARE OUTLINED. A SCALED WORKING MODEL THAT APPROXIMATES THE KINEMATIC BOUNDARY CONDITIONS HAS BEEN SUBMITTED. THE PROPOSAL IS MADE BY A SMALL, DISADVANTAGED BUSINESS (AS DEFINED BY DEPARTMENT OF DEFENSE GUIDELINES) WHOSE EMPLOYEES HAVE THE KNOWLEDGE AND EXPERIENCE REQUIRED.

CENTER FOR REMOTE SENSING
8200 GREENSBORO DR - STE 503
McLEAN, VA 22102
CONTRACT NUMBER: DAAB07-88-C-P041
SUMAN GANGULY
TITLE:
DEVELOPMENT OF AIRBORNE NUCLEAR RADIATION DETECTOR
TOPIC# 205 OFFICE: CECOM/EW IDENT#: 25710

A STUDY WILL BE CONDUCTED OF A CONCEPT FOR A COMPACT AIRBORNE DETECTOR OF X- AND -GAMMA RADIATION THAT WILL RAPIDLY MEASURE AIRBORNE RADIOACTIVE CONCENTRATIONS AND FALLOUT DEPOSITS ON THE GROUND, FROM NATURAL BACKGROUND LEVELS TO INTENSITIES AT LEAST FIVE ORDERS OF MAGNITUDE GREATER THAN BACKGROUND. COMPUTER SIMULATIONS OF THE EFFECTS OF THE INTERVENING ATMOSHERE WILL BE RUN. LABORATORY MEASUREMENTS WILL ANALYZE THE SENSITIVITY OF, AND OPTIMIZE THE COMPOSITION AND ENERGY RESOLUTION PARAMETERS OF, A COLLIMATED MOSAIC OF MANY SMALL, INDEPENDENT, HIGH DENSITY, HIGH-ATOMIC-NUMBER, INORGANIC SCINTILLATION COUNTERS. THE MOSAIC'S COLLIMATOR AND A PASSIVE COLLIMATOR CONSTRUCTED FROM LEAD BLOCKS. THE STUDY WILL ALSO

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OPTIMIZE THE DIMENSIONS OF, AND SPATIAL RESOLUTION OBTAINED WITH, A PERFORATED LEAD MASK THAT COVERS THE COLLIMATOR'S APERTURE. THE PERFORMATION PATTERN ACTS TO CODE THE APERTURE, THEREBY IMPARTING A GAMMA RAY IMAGING CAPABILITY WITHIN THE FIELD OF VIEW. THERE WILL ADDITIONALLY BE STUDY OF THE FUNCTIONAL, POWER, WEIGHT, AND COOLING REQUIREMENTS FOR THE NECESSARY MICROPROCESSOR CONTROLLED ELECTRONICS.

CHASE CONSULTING INC
3543 CAMINITO CARMEL LANDING
SAN DIEGO, CA 92130
CONTRACT NUMBER: DAAD07-88-C-0056
LEONID B VOLFSON
TITLE:
THREE-DIMENSIONAL VIDEO IMAGE PROCESSING
TOPIC# 147 OFFICE: TECOM/WSMR IDENT#: 25247

AN INNOVATIVE TECHNIQUE HAS BEEN DEVELOPED TO DIGITIZE AND ANALYZE THE VIDEO DATA TAKEN BY MULTI-STATION, REAL-TIME TRACKING SYSTEM. IN PHASE I WE SHALL UNDERTAKE TO CARRY OUT A PROOF-OF-CONCEPT STUDY TO DEMONSTRATE THE FEASIBILITY OF USING PATTERN RECOGNITION TECHNIQUES TO ANALYZE AND EXTRACT THE TARGET INFORMATION. AS A RESULT WE PROPOSE TO DEVELOP AND TEST A COMPREHENSIVE AUTOMATED POST-FLIGHT ANALYSIS SYSTEM WHICH, BY COMBINING A PRIORI INFORMATION, COMPUTER GRAPHICS METHODS, AND SIGNAL PROCESSING TECHNIQUES IS CAPABLE OF PRODUCING ENHANCED THREE-DIMENSIONAL IMAGE, SIX-DIMENSIONAL DATA (POSITION AND ATTITUDE), AS WELL AS ACCURATE RECONSTRUCTION OF A SIX-DIMENSIONAL TARGET TRAJECTORY (POSITION AND ATTITUDE AS A FUNCTION OF TIME).

CHEMETEK
RT #3 - BOX 235 C
ASTORIA, OR 97103
CONTRACT NUMBER: DAAK70-88-C-0019
DR JOHN W KAAKINEN
TITLE:
IMPROVED AUTOMATED ANALYZER FOR SILT DENSITY INDEX
TOPIC# 112 OFFICE: BRDEC IDENT#: 26171

SUBMITTED BY

EXCESSIVE RATES OF RO (REVERSE OSMOSIS) FOULING MAY REQUIRE FREQUENT RO ELEMENT REPLACEMENT, WHICH IS BOTH EXPENSIVE AND TIME CONSUMING. THE OPERATIONAL EFFECTIVENESS OF PRETREATMENT PROCESSES TO REMOVE COLLOIDS AND ORGANIC MATERIALS CAN BE MONITORED USING SDI (SILT DENSITY INDEX). THE FIELD ARMY FOR OPERATION OF THEIR ROWPU (REVERSE OSMOSIS WATER PURIFICATION UNITS) WANTS A PRACTICAL MEANS OF SDI MEASUREMENT THAT IS FAST, ACCURATE, AND FACILE. EXISTING AUTOMATED FILTER PLUGGING MONITORS HAVE PROVEN THEIR VALUE IN ESTIMATING FOULING POTENTIAL, BUT THE USE OF FILTER TAPE IN THESE MONITORS HAS INCREASED THEIR MECHANICAL COMPLEXITY, INCREASED THEIR COST, AND DECREASED THEIR FLEXIBILITY TO UTILIZE ALTERNATE FILTER TYPES. SEVERAL NOVEL APPROACHES TO THE DEVELOPMENT OF A MORE PRACTICAL, ACCURATE, AND FLEXIBLE AFPA (AUTOMATED FILTER PLUGGING ANALYZER) WILL BE INVESTIGATED. SUCCESSFUL USE OF DISPOSABLE, READY-TO-USE FILTER MODULES FOR SDI MEASUREMENT WOULD ELIMINATE THE AFOREMENTIONED DISADVANTAGES OF FILTER TAPE. MEASUREMENT AND ANALYSIS OF THE ENTIRE FILTRATION FLOW DECLINE CURVE WOULD ALLOW THE SDI DETERMINATION TO BE COMPLETED FASTER AND PROVIDE SDI ERROR ESTIMATES. HIGH FILTRATION PRESSURE AND SELECTION OF ALTERNATE FILTER TYPES COULD ALSO INCREASE SDI ANALYSIS SPEED AND ACCURACY. A PRACTICAL, INEXPENSIVE AFPA WOULD HAVE WIDE APPLICABILITY TO HELP MAKE RO WATER PRODUCTION MORE EFFICIENT AND ECONOMICAL.

CHRONOS RESEARCH LABS INC
4186 SORRENTO VALLEY BLVD - STE H
SAN DIEGO, CA 92121
CONTRACT NUMBER: DAAL04-88-C-0018
DR RANDALL B OLSEN
TITLE:
NOVEL SUPERCONDUCTORS
TOPIC# 231 OFFICE: MTL/LABCOM IDENT#: 26762

BASED ON THE SUCCESSFUL DISCOVERY OF HIGH TEMPERATURE PEROVSKITE SUPERCONDUCTORS, A NEW CLASS OF SUPERCONDUCTING MATERIALS IS HYPOTHESIZED. THE NEW CLASS WILL BE MECHANICALLY TOUGH AND MAY HAVE HIGH CRITICAL TEMPERATURES. THE NEW MATERIAL WILL BE INEXPENSIVE TO MANUFACTURE AND EASILY FORMED INTO WIRES AND BANDS. THE PHASE I GOAL IS TO DETECT A SUPERCONDUCTING TRANSITION IN THIS NEW MATERIAL. THE

SUBMITTED BY

PHASE II EFFORT WILL EMPLOY SEVERAL MEASUREMENTS TO FIRMLY ESTABLISH THIS MATERIAL AS A (HIGH TEMPERATURE) SUPERCONDUCTOR. AFTER THE SUPERCONDUCTING PROPERTIES ARE FIRMLY ESTABLISHED A SPECIMEN WHICH IS SEVERAL METERS LONG WILL BE PRODUCED IN PHASE II.

COMPUTATIONAL MECHANICS CO INC
4801 AVENUE H
AUSTIN, TX 78751
CONTRACT NUMBER: NAS2-12911
DR C Y HUANG
TITLE:
ADVANCED ADAPTIVE COMPUTATIONAL METHODS FOR NAVIER-STOKES SIMULATIONS IN ROTORCRAFT AERODYNAMICS
TOPIC# 41 OFFICE: AVSCOM IDENT#: 27056

A NEW AND INNOVATIVE CLASS OF ADAPTIVE COMPUTATIONAL PROCEDURES IS TO BE DEVELOPED FOR THE SPECIFIC PURPOSE OF NUMERICALLY-MODELING COMPLEX FLOWS INHERENT IN ADVANCED HELICOPTER-BLADE DESIGNS. THESE PROCEDURES MAKE USE OF MATHEMATICALLY CONSISTENT ESTIMATES OF LOCAL NUMERICAL ERROR, AND AUTOMATICALLY REFINE OR UNREFINE THE MESH OR INCREASE OR DECREASE THE LOCAL SPECTRAL ORDER OF THE APPROXIMATION SO AS TO DELIVER A PREASSIGNED LEVEL OF ACCURACY. THE RESULT IS A SCHEME WHICH ATTEMPTS TO PRODUCE THE BEST POSSIBLE RESULTS WITH THE LEAST NUMBER OF GRID POINTS, DEGRESS OF FREEDOM, AND OPERATIONS. THESE TYPES OF SCHEMES AUTOMATICALLY LOCATE AND RESOLVE SHOCKS, VORTEX INTERACTIONS, VISCOUS BOUNDARY LAYERS, AND OTHER FLOW DETAILS TO AN ACCURACY LEVEL SPECIFIED BY THE USER OF THE CODE. THEY ALSO ARE CAPABLE OF ELIMINATING ARTIFICIAL VISCOSITY IN REGIONS WHERE VORTICAL EFFECTS ARE SIGNIFICIANT. THE PHASE I WORK INVOLVES A FEASIBILITY STUDY OF COMBINED H-SPECTRAL ADAPTIVE METHODS FOR DYNAMIC ROTORBLADE FLOWS, WITH EMPHASIS ON ACCURATE SIMULATION OF VORTEX INITIATION, MIGRATION, AND INTERACTION. THE MAJOR COMPONENTS OF A WORKING COMPUTER PROGRAM BASED ON THESE SCHEMES WILL BE DEVELOPED AND TESTED IN PHASE I.

CON-SOLVE INC
171 CONCORD RD
WAYLAND, MA 01778
CONTRACT NUMBER: DAAA15-88-C-0029
P G GREENSPUN
TITLE:
AI FOR LOGISTICS PLANNING SYSTEM
TOPIC# 73 OFFICE: HEL/LABCOM IDENT#: 26272

SUBMITTED BY

OUR OBJECTIVE IS TO DEVELOP AN INTEGRATED LOGISTICS PLANNING SYSTEM FOR REAL-TIME DECISION SUPPORT TO FIELD LOGISTICIAN AND LOGISTICS PLANNERS: MEGAPLAN. THE SYSTEM, IMPLEMENTED IN COMMON LISP ON TI EXPLORER COMPUTERS, WILL USE AN AI-BASED DECISION SUPPORT CORE TO UNIFY (1) DATA BASE, (2) SYSTEM SIMULATION, AND (3) LOGISTICAL ANALYSIS CAPABILITIES. THE SYSTEM WILL USE A MULTISCREEN GRAPHICAL ENVIRONMENT FOR USER INTERFACE. THIS WILL ENABLE THE LOGISTICS PLANNER TO INTERACT WITH TERRAIN AND SPATIAL MODELS, AND TO VIEW DATA (E.G., ON INVENTORY, SITE CONDITIONS, TRANSPORTATION ASSESTS, ETC.) AS NEEDED. THE AI-BASED DECISION SUPPORT CORE SERVES AS A BUFFER BETWEEN THE USER AND THE SYSTEM TO HELP FORMALIZE LOGISTICAL PROBLEMS, RETRIEVE NECESSARY DATA, AND INTERPRET ANALYSES. WE ENVISION THAT AN INTEGRATED LOGISTICS PLANNING SYSTEM HAS BROAD MILITARY AND COMMERCIAL APPLICATIONS, NOT ONLY IN TACTICAL SITUATIONS BUT IN A VARIETY OF PROJECT SUPPORT ACTIVITIES (E.G., CONSTRUCTION).

CONCEPT ANALYSIS CORP
14789 KEEL ST
PLYMOUTH, MI 48170
CONTRACT NUMBER: DAHO-88-C-0942
DR'S WALDEN & GLANCE
TITLE:
MISSILE GEOMETRY PACKAGE
TOPIC# 118 OFFICE: MICOM IDENT#: 25995

CONCEPT ANALYSIS CORPORATION (CAC) PROPOSES TO DEVELOP A COMPUTER-AIDED DESIGN AND MANUFACTURING (CADCAM) - BASED MISSILE GEOMETRY PACKAGE. THE CURRENT PROCESS OF PRODUCING THREE-DIMENSIONAL DESCRIPTIONS OF MISSILE SYSTEMS AND UNMANNED AERIAL VEHICLES IS TIME-CONSUMING AND NEEDS TO BE AUTOMATED. CAC MARKETS A GENERAL-PURPOSE CADCAM SYSTEM, CADCEPT. CAC PROPOSES TO TAILOR CADCEPT BY ADDING CUSTOM FEATURES FOR PARAMETRIC DESIGN OF COMMON GEOMETRIC CONFIGURATIONS FOUND IN MISSILE SYSTEMS AND UNMANNED AERIAL VEHICLES. INPUT WILL BE MACHINE-INTELLIGENT DATA ACQUISITION FROM DRAWINGS OR 3D MODELS, OR GRAPHICS TERMINAL DESIGN ALONE, OR COMBINATIONS THEREOF. OUTPUT WILL BE CUSTOMIZED TO CUSTOMER NEEDS. EXAMPLES CAN BE AS VARIED AS DRAFTING MACHINES AND PLOTTERS, 3D DISPLAYS (STEREO-

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GRAPHICS), OR CONTROL FILES FOR CNC MILLING AND FABRICATING MACHINES. MODELS AND OTHER FORMS OF PHYSICAL THREE-DIMENSIONAL DESCRIPTIONS CAN BE FABRICATED FROM DESIGN DATA, WITH DRAWINGS AS OPTIONAL INPUT.

CREARE INC
PO BOX 71 - ETNA RD
HANOVER, NH 03755
CONTRACT NUMBER: DAAA21-88-C-0139
PAUL H ROTHE
TITLE:
HIGH TEMPERATURE SUPERCONDUCTORS FOR EM LAUNCH COMPONENTS
TOPIC# 4 OFFICE: ARDEC IDENT#: 27018

THIS PROJECT WILL ASSESS THE FEASIBILITY OF APPLICATION OF HIGH TEMPERATURE SUPERCONDUCTORS TO EM LAUNCH COMPONENTS. THE PROJECT WILL STUDY PULSED HIGH REPETITION RATE, HIGH CURRENT SUPERCONDUCTING COMPONENTS SUCH AS BUSBARS, INDUCTORS, AUGMENTING RAILS, ETC. TO EVALUATE PULSED HEAT LOADS WHICH PRESENT A KEY POTENTIAL BARRIER TO CONCEPT FEASIBILITY. RAPID TRANSIENT HEAT TRANSFER WILL BE DEVELOPED AND APPLIED TO SEVERAL POTENTIAL COMPONENT CONFIGURATIONS. MATERIALS PROPERTIES WILL BE DOCUMENTED AND COMPONENTS ASSESSED TO DETERMINE CONCEPTS WITH HIGH PERFORMANCE AND BENEFIT. LIMITS FOR STABLE OPERATION UNDER PULSED POWER CONDITIONS WILL BE EVALUATED. RECOMMENDATIONS FOR REQUIRED ANALYSIS AND EXPERIMENTS TO DEMONSTRATE HIGH TEMPERATURE SUPERCONDUCTOR TECHNOLOGY TO COMPONENTS OF EM LAUNCHERS WILL BE DEVELOPED.

CREATIVE OPTICS INC
32 WILDWOOD DR
BEDFORD, MA 01730
CONTRACT NUMBER: DAAA15-88-C-0034
DR JOHN F EBERSOLE
TITLE:
NOVEL TECHNIQUE FOR OPTICAL IMAGE-PROCESSING ALGORITHMS FOR AUTONOMOUS HOMING MUNITIONS
TOPIC# 224 OFFICE: AMSAA IDENT#: 25121

COI PROPOSES TO DEVELOP A NEW METHODOLOGY FOR ANALYZING IMAGE

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PROCESSING (IP) ALGORITHMS FOR OPTIMIZING TARGET ACQUISITION WHILE MINIMIZING FALSE TARGETS. WE WILL UTILIZE TARGET AND BACKGROUND DATABASES AND IP ALGORITHMS. WE DESCRIBE HOW WE WILL IMPLEMENT OUR WORK AND HOW OUR METHODOLOGY WILL PROVIDE AMSAA WITH A NEW CAPABILITY TO EVALUATE IP ALGORITHMS AND ALGORITHM SEQUENCES. WE PROVIDE EXAMPLES OF ANTICIPATED RESULTS BASED ON ON-GOING CONTRACTS WITH OTHER GOVERNMENT AGENCIES. WE DISCUSS DELIVERABLE ALGORITHMS AND HARDWARE.

CREATIVE OPTICS INC
32 WILDWOOD DR
BEDFORD, MA 01730
CONTRACT NUMBER: DAEA18-88-C-0046
DR JOHN F EBERSOLE
TITLE:
NOVEL TECHNIQUE FOR STANDARD TEST TARGETS FOR AUTOMATIC RECOGNITION SYSTEMS
TOPIC# 158 OFFICE: TECOM/EPG IDENT#: 25308

WE PROPOSE TO DEVELOP FOR TECOM/EPG STANDARD TEST TARGET (STT) TECHNOLOGY WHICH WILL ALLOW EVALUATION OF INFRARED AUTOMATIC TARGET RECOGNIZER (ATR) PERFORMANCE FOR DIFFERENT TARGETS AND BACKGROUNDS UNDER A VARIETY OF CONDITIONS. WE DESCRIBE HOW THE DEVELOPMENT OF STT CAN EXPLOIT CURRENT TECHNOLOGY AS WELL AS RETAIN THE FLEXIBILITY TO ACCOMMODATE NEW ATR EVOLUTION. WE DISCUSS DELIVERABLE HARDWARE ISSUES.

CSA ENGINEERING INC
560 SAN ANTONIO RD - STE 101
PALO ALTO, CA 94306
CONTRACT NUMBER:
ERIC M AUSTIN
TITLE:
PASSIVE DAMPING OF SPACE STRUCTURES
TOPIC# 165 OFFICE: CERL IDENT#: 25147

THE SCENARIOS FOR MANY LARGE SPACE SYSTEMS WILL REQUIRE THAT, FOR

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THEIR SUCCESS, THE EFFECTS OF STRUCTURAL DYNAMICS BE REDUCED. PASSIVE DAMPING IS AN EXCELLENT MEANS OF SUPPRESSING UNDESIRED STRUCTURAL DYNAMICS. DISCRETE DAMPERS ARE ESPECIALLY WELL SUITED FOR DAMPING LARGE STRUCTURES WHICH ARE CHARACTERIZED BY LOW, HIGHLY DISTRIBUTED MODAL STRAIN ENERGY, E.G., A LARGE SPACE-BASED PLATFORM OR TRUSS. DISCRETE DAMPERS MAY TAKE THE FORM OF LINK DAMPERS, DAMPED JOINTS, OR TUNED-MASS DAMPERS. EACH OF THESE PLAYS AN IMPORTANT ROLE IN THE PASSIVE DAMPING OF SPACE STRUCTURES. THE PROPOSED EFFORT IS DIRECTED TOWARDS ADVANCING THE STATE OF THE ART IN PASSIVE DAMPING OF SPACE STRUTURES BY DEVELOPING DAMPED JOINTS AND LINK DAMPERS. THERMAL CONTROL FOR THE VISCOELASTIC MATERIAL WILL BE DEVELOPED SO THAT THESE DAMPING DEVICES CAN BE EMPLOYED IN SITUATIONS WHERE THE THERMAL ENVIRONMENT IS WIDELY CHANGING. SINCE ONLY A SMALL AMOUNT OF VISCOELASTIC MATERIAL IS USED, VERY LITTLE POWER WILL BE REQUIRED. THE CAPABILITY FOR DESIGN AND PREDICTION OF DAMPING OF THESE PASSIVELY DAMPED COMPONENTS AND SYSTEMS WILL ALSO BE EXPANDED AND IMPROVED.

DATA SYSTEMS ANALYSTS INC
4300 HADDONFIELD RD
PENNSAUKEN, NJ 08109
CONTRACT NUMBER: DAAB07-88-C-A043
LOUISE R REARDON
TITLE:
MESSAGE SWITCH-PACKET SWITCH INTERWORKING
TOPIC# 194 OFFICE: CECOM/C3 IDENT#: 25547

THE NEED EXISTS FOR AN INTERFACE BETWEEN EXISTING TACTICAL RECORD TRAFFIC NETWORKS AND A PROPOSED WIDE-AREA TACTICAL PACKET SWITCHING NETWORK (TPN). THESE RECORD TRAFFIC NETWORKS INCLUDE THE AN/TYC-39 MESSAGE SWITCH (MS) AND THE MOBILE TACTICAL COMMUNICATIONS CENTER (MTCC). THE TPN IS TO BE PART OF THE MOBILE SUBSCRIBER EQUIPMENT (MSE), AND IS ASSUMED TO INTERFACE AND SHARE PROTOCOLS WITH THE DEFENSE DATA NETWORK (DDN). THE TACTICAL MESSAGE SWITCH-PACKET SWITCH ADAPTER (TAMPA) WILL PROVIDE THIS INTERFACE WHILE PRESERVING EXISTING MS/MTCC FUNCTIONS, INCLUDING THE SUPPORT OF DEDICATED SUB-SCRIBERS. IT WILL TAKE ADVANTAGE OF THE RELIABILITY, PATH DIVERSITY, AND RESOURCE SHARING OF THE TPN TO PROVIDE MORE EFFICIENT SERVICE TO CURRENT MS/MTCC SUBSCRIBERS, AS WELL AS MESSAGE PROCESSING FACILITIES

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FOR MANY NEW SUBSCRIBERS. TAMPA IS TO BE ESSENTIALLY A PROTOCOL "CONVERTER". ON THE MS/MTCC SIDE, TRANSFER OF MESSAGE SEGEMENTS WILL BE UNDER CONTROL OF THE NATIVE LINE PROTOCOL (E.G. MODE I); ON THE TPN SIDE, TRANSFER WILL BE ACCOMPLISHED VIA THE DDN'S PROTOCOL SUITE. TAMPA WILL ALSO PERFORM TRANSLATION OF ADDRESSING INFORMATION BETWEEN THE NETWORKS. THE SECURITY WILL BE PROVIDED BY LINK, PACKET, AND END-TO-END ENCRYPTION, AS WELL AS EXISTING MS/MTCC SECURITY VALIDATION.

DCS CORP
1055 N FAIRFAX ST
ALEXANDRIA, VA 22314
CONTRACT NUMBER: DAAD07-88-C-0062
RICHARD T FLAHERTY
TITLE:
WEATHER EFFECTS ON BACKGROUND SIGNATURES ALGORITHM DEVELOPMENT
TOPIC# 63 OFFICE: ASL IDENT#: 27075

THE INTERACTIONS BETWEEN TARGETS AND THE BACKGROUND IN BOTH THE VISUAL AND THERMAL SPECTRAL BANDS ARE AFFECTED BY SEVERAL WEATHER RELATED VARIABLES. THE DCS TE-EX MODEL WAS ORIGINALLY DEVELOPED AS A FIRST PRINCIPLES MATHEMATICAL MODEL TO PREDICT THE RADIATED TEMPERATURE OF TARGETS IN A FIELD ENVIRONMENT. THE MODEL, BECAUSE IT IS A FIRST PRINCIPLES MODEL, CAN BE USED TO PREDICT RADIATED TEMPERATURES OF BACKGROUND OBJECTS. THE REFINEMENTS REQUIRED TO EXTEND THIS MODEL WILL BE PERFORMED AND THE ALGORITHMS CODED IN FORTRAN. PARTICULAR EMPHASIS WILL BE PLACED ON THE EFFECTS OF CLOUDS ON THE THERMAL AND VISIBLE SIGNATURE AND THE INSULATION EFFECTS OF LOW LEVEL CLOUDS IN THE INFRARED. THE IMPROVED MODEL WILL BE VALIDATED BY COMPARING THE PREDICTED TEMPERATURE OF SPECIFIC OBJECTS WITH MEASURED FIELD COLLECTED DATA. THE RESULTING COMPARISONS WILL THEN BE USED TO FINALIZE THE MODEL.

DECISION SCIENCE CONSORTIUM INC
1895 PRESTON WHITE DR - STE 300
RESTON, VA 22091
CONTRACT NUMBER:
DR JOHN M LEDDO
TITLE:
TECHNIQUES FOR DEVELOPING EXECUTIVE DECISION AND THINKING SKILLS
TOPIC# 226 OFFICE: ARI IDENT#: 25013

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THE ARMY HAS LONG RECOGNIZED THAT A CRITICAL PART OF ITS LEADER DEVELOPMENT PROCESS IS INSTILLING IN EXECUTIVES THE REQUIRED DECISION-MAKING AND THINKING SKILLS. THE DIFFERENT MAJOR MILITARY EDUCATIONAL INSTITUTIONS HAVE INSTITUTED EXECUTIVE TRAINING PROGRAMS, EACH OF WHICH HAS DEVELOPED ITS OWN INNOVATIVE METHODS AND PEDAGOGICAL APPROACH. WHAT IS LACKING IS A THEORY TO TIE TOGETHER, EVALUATE, AND IMPROVE THESE DIVERSE APPROACHES. THE PROPOSED RESEARCH REPRESENTS AN INNOVATIVE APPROACH TO TEACHING EXECUTIVE AND DECISION SKILLS, BASED ON RECENT RESEARCH FINDINGS ABOUT HOW EXECUTIVES AND OTHER EXPERTS ENCODE AND USE KNOWLEDGE. OUR INSTRUCTIONAL METHODS ARE BASED ON AN EXPLICIT STRATEGY OF DEVELOPING IN STUDENTS THE KINDS OF KNOWLEDGE STRUCTURES FOUND IN SUCCESSFUL EXECUTIVES. IN ADDITION, OUR KNOWLEDGE REPRESENTATION THEORY HAS SPURRED A THEORY FOR KNOWLEDGE ELICITATION, WHICH CAN BE USED AS A TOOL FOR EVALUATING THE EFFECTIVENESS OF OUR TRAINING METHODS.

DECISION SCIENCE CONSORTIUM INC
1895 PRESTON WHITE DR - STE 300
RESTON, VA 22091
CONTRACT NUMBER:
STUART H RAKOFF
TITLE:
CONCEPTUAL MODELS OF UNIT PERFORMANCE
TOPIC# 229 OFFICE: ARI IDENT#: 25067

OVERALL PERFORMANCE OF ARMY UNITS IS THE PRODUCT OF A COMPLEX INTERACTION OF A MYRIAD OF UNIT CHARACTERISTICS AND ENVIRONMENTAL FACTORS. WHILE ARMY SUBJECT-MATTER EXPERS (ESPECIALLY COMMANDERS) ARE ABLE TO MAKE JUDGMENTS ABOUT THE RELATIVE QUALITY OF UNITS, NO METRIC NOW EXISTS WHICH CAN BE APPLIED TO MEASURE UNIT PERFORMANCE. IT IS NECESSARY TO BUILD A MEASUREMENT MODEL WHICH ESSENTIALLY REPLICATES, IN RIGOROUS FORM, THE JUDGMENTS MADE BY INDIVIDUAL COMMANDERS AND OTHERS IN THE ARMY LEADERSHIP. THREE THEORETICAL PERSPECTIVES ON THIS PROBLEM WILL BE EXPLORED IN THE PROJECT--A MULTI-ATTRIBUTE MODEL WHICH ALLOWS THE COMBINATION OF EMPIRICAL DATA AVAILABLE FOR SOME ASPECTS OF UNIT PERFORMANCE AND EXPERT JUDGMENT FOR THER ASPECTS; AN APPROACH BASED ON THE THEORY OF NEURAL NETWORKS WHICH IS MODELED AFTER THE PROCESSING OF COMPLEX BIOLOGICAL OR MENTAL

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SYSTEMS; AND AN INFERENCE NETWORK APPROACH BASED ON EXPLICATING AND MODELING THE INFERENCES MADE BY ARMY OFFICERS IN EVALUATING THEIR UNITS. THESE THREE APPROACHES WILL BE RESEARCHED AND A MODEL WHICH MAY DRAW ON PARTS OF ALL THREE WILL BE DEFINED AND TESTED ACROSS A LIMITED SET OF ARMY UNITS.

DELFIN SYSTEMS
1349 MOFFETT PARK DR
SUNNYVALE, CA 94089
CONTRACT NUMBER: DAAA15-88-C-0041
MARK WILLIAMS
TITLE:
AMMUNITION ALLOCATION EXPERT SYSTEM
TOPIC# 73 OFFICE: HEL/LABCOM IDENT#: 26274

IN COMBAT OPERATIONS THE EXPENDITURE OF AMMUNITION IS ONE OF THE MOST SIGNIFICANT FACTORS IN DETERMINING THE OUTCOME OF A CONFLICT. REQUIREMENTS FOR AMMUNITION RESUPPLY VARY IN ACCORDANCE WITH EXPENDITURE RATES THAT ARE SUBJECT TO DYNAMICALLY CHANGING TACTICAL PLANS. MORE ACCURATE CONSUMPTION RATE FORECASTS CAN BE OBTAINED BY MODIFYING FORECASTS THAT ARE BASED ON STANDARD SUPPLY PLANNING DATA USING MODELS AND HEURISTICS OF THEATER AND SITUATION DEPENDENT VARIATIONS. THE OBJECTIVE OF THE PROPOSED RESEARCH IS TO DEVELOP AN AI-BASED DECISION SUPPORT SYSTEM THAT ENHANCES THE FIELD LOGISTICIAN'S ABILITY TO ACCURATELY PREDICT AMMUNITION RESUPPLY REQUIREMENTS. THE TECHNICAL APPROACH INTEGRATES MACHINE LEARNING, PERTURBATION THEORY, AND HIERARCHICAL OBJECT-BASED CLUSTERING TECHNIQUES.

DELTA INFORMATION SYSTEMS INC
300 WELSH RD - HORSHAM BUS CTR/BLDG 3
HORSHAM, PA 19044
CONTRACT NUMBER: DAAED7-88-C-R067
ALAN DEUTERMANN
TITLE:
ROBOTIC VEHICLE VIDEO IMAGE TRANSMISSION
TOPIC# 123 OFFICE: TACOM IDENT#: 25904

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THE ARMY ANTICIPATES THE CONTROL OF MULTIPLE UNMANNED ROBOTIC VEHICLES FROM A SINGLE MANNED VEHICLE. THE ROBOTIC VEHICLES WOULD BE PERFORMING A VARIETY OF MISSIONS: WEAPONS FIRING, NBC DETECTION, DECOY, RECON, MINE DETECTION AND CLEARING AND TARGET ACQUISITION AND DESIGNATION FOR EXAMPLE. THE COMMAND, CONTROL, COMMUNICATIONS, AND INTELLIGENCE REQUIREMENTS OF SUCH A ROBOTIC FLEET REQUIRE THE IMPROVEMENT OF PRESENT COMMUNICATION TECHNIQUES. AREAS OF INTEREST ARE COMMUNICATIONS SECURITY, LASER COMMUNICATIONS, AND BANDWIDTH-REDUCTION TECHNIQUES TO ALLOW VIDEO IMAGERY TO BE TRANSMITTED FROM A MOBILE ROBOT VEHICLE TO A REMOTE COMMAND CENTER OVER AN RF LINK FOR DRIVING OF THE ROBOT VEHICLE. THIS PROPOSAL FOCUSES ON THE USE OF MOTION COMPENSATION AND TRANSFORM CODING AS A COMPRESSION TECHNIQUE.

DESIGNERS & PLANNERS INC
2011 CRYSTAL DR - STE 500
ARLINGTON, VA 22202
CONTRACT NUMBER: DAAK70-88-C-0009
ROGER SCHAFFER
TITLE:
INNOVATIVE APPLICATIONS FOR SWATH TECHNOLOGY IN THE LOGISTICS OVER THE SHORE (LOTS) ENVIRONMENT
TOPIC# 109 OFFICE: BRDEC IDENT#: 26100

THE OBJECTIVE OF THIS PROJECT IS TO DETERMINE THE TECHNICAL MERIT OF USING SMALL WATERPLANE AREA TWIN HULL (SWATH) CONFIGURED CRAFT FOR LOGISTICS OVER THE SHORE (LOTS) OPERATIONS. RECENT EXERCISES SHOW THAT TRANSFER OF CARGO FROM SHIP TO AN UNOPPOSED SHORE IS LIMITED BY THE RELATIVE MOTION BETWEEN THE CARGO SHIP AND THE LIGHTER WHEN CONDITIONS EXCEED SEA STATE 2. THIS RESTRICTS THE ENTIRE RESUPPLY MISSION. SWATH VESSELS ARE INHERENTLY LESS SENSITIVE TO SEA CONDITIONS DUE TO THEIR SMALL WATERPLANE AREA. THE SWATH TECHNOLOGY BASE IS WELL DEVELOPED. HOWEVER, THE APPLICATION TO THE LOTS MISSION REQUIRES CAREFUL STUDY BECAUSE SEVERAL ASPECTS OF THE SWATH CONFIGURATION COULD LIMIT ITS EFFECTIVENESS IN THIS APPLICATION. THE DRAFT AND LOAD CARRYING CAPACITY ARE THE PRINCIPAL CONCERNS. THIS STUDY WILL TAKE A TOTAL SYSTEM APPROACH TO DETERMINING THE TECHNICAL FEASIBILITY OF SWATH APPLICATION TO THE LOTS MISSION. IT WILL ESTABLISH

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FUNDAMENTAL DESIGN REQUIREMENTS; INVESTIGATE THE MAJOR CONFIGURATION TRADE-OFFS; INVESTIGATE FUNDAMENTAL LIMITATIONS; AND DEVELOP AT A FEASIBILITY STUDY LEVEL OF DETAIL ONE OR MORE SWATH CRAFT. THE RESULTS OF THE STUDY WILL CLEARLY INDICATE WHETHER SWATH TECHNOLOGY HAS POTENTIAL FOR IMPROVING THE PERFORMANCE OF THE LOTS MISSION.

DISPLAYTECH INC
2200 CENTRAL AVE
BOULDER, CO 80301
CONTRACT NUMBER: DAAL02-88-C-0012
MARK HANDSCHY
TITLE:
SILICON INTEGRATED CIRCUIT/FERROELECTRIC LIQUID CRYSTAL HYBRID SPATIAL LIGHT MODULATORS
TOPIC# 53 OFFICE: HDL IDENT#: 27069

THE PROPOSED WORK AIMS TO DEVELOP NOVEL, HIGH-PERFORMANCE SPATIAL LIGHT MODULATORS (SLMs) BY JOINING FERROELECTRIC LIQUID CRYSTALS (FLCs), A FAST, LOW-VOLTAGE, LOW-POWER ELECTRO-OPTIC MATERIAL, WITH SILICON INTEGRATED CIRCUITS (ICs). THE RESULTING SLMs MAY BE EITHER ELECTRONICALLY OR OPTICALLY ADDRESSED, HAVE FRAME RATES FROM 10 kHz (PRESENT) TO 10 MHz (FUTURE), AND CAN BE USED TO MODULATE OPTICAL INTENSITY, POLARIZATION, OR PHASE, ALL WITH HIGH THOUGHPUT. THE IC TECHNOLOGY IS ALREADY MATURE, ALLOWING SCALE-UP TO SLMs WITH LARGE NUMBERS OF ELEMENTS (512 X 512) TO OCCUR IN THE NEAR TERM, AND AT LOW COST. THE PHASE I WORK WILL DEMONSTRATE A CONCEPT-PROVING ELECTRICALLY ADDRESSED SLM WITH A 10 kHz FRAME RATE AND UP TO 256K ELEMENTS. DURING PHASE II, FULL-SCALE CUSTOM ICs AND IMPROVED FLC MATERIALS WILL BE DEVELOPED, INCREASING THE NUMBER OF ELEMENTS AND FRAME RATE, AND PERMITTING SENSITIVE OPTICAL ADDRESSING.

DOTY SCIENTIFIC INC
600 CLEMSON RD
COLUMBIA, SC 29223
CONTRACT NUMBER: DAAL02-88-C-0014
F D DOTY
TITLE:
MICROWAVE OP AMPS FOR PICOSECOND INTEGRATORS
TOPIC# 52 OFFICE: HDL IDENT#: 27068

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SEVERAL CANDIDATE CIRCUITS ARE PROPOSED FOR MICROWAVE OP AMPS, BASED ON PRELIMINARY DEMONSTRATIONS OF CONCEPT FEASIBILITY USING DISCRETE SILICON DEVICES. A HYBRID APPROACH EMPLOYING A SILICON IC INPUT STAGE WITH A GaAs MESFET OUTPUT STAGE IS SHOWN TO BE THE MOST PROMISING IN ACHIEVING THE DESIGN GOALS OF A STABLE, COMPENSATED, LOW NOISE, LOW DRIFT, DC-10GHz OP AMP WITH 25V/ns SLEW RATE, 60dB VOLTAGE GAIN BELOW 10MHz WITH A 50 OHMS LOAD, 50K OHMS + .5pF INPUT IMPEDANCE, 70dB COMMON MODE REJECTION, AND + OR - 1.5V MINIMUM INPUT AND OUTPUT RANGE. THE PHASE SHIFT AND TOPOLOGY WILL PERMIT STABLE RESISTIVE AND CAPACITIVE FEEDBACK AT MICROWAVE FREQUENCIES. THE OP AMP WILL BE PARTICULARLY WELL SUITED FOR INTEGRATOR APPLICATIONS WITH RISE TIME BELOW 300ps.

DYNETICS INC
PO DRAWER "B"
HUNTSVILLE, AL 35814
CONTRACT NUMBER: DAAA21-88-C-0123
W NEIL MOHON
TITLE:
HYBRID OPTICAL/ELECTRONIC SIGNAL PROCESSOR FOR FIRE CONTROL SYSTE
TOPIC# 19 OFFICE: ARDEC IDENT#: 27030

ARMY FSC REQUIREMENT HAVE BEEN EXTENDED BEYOND CAPABILITIES OF ALL-ELECTRONIC PROCESSOR DUE TO STRESSING MULTIPLE-TARGET AND FIRE-WHILE-ON-THE-MOVE SCENARIOS. DYNETICS PROPOSES THAT A HYBRID OPTICAL/ELECTRONICS FCS SIGNAL PROCESSOR CAN MEET THESE REQUIREMENTS THROUGH THE EFFICIENT COMBINATION OF HIGH-THROUGHPUT OPTICAL PROCESSING CONCEPTS WITH EXISTING DIGITAL ELECTRONIC PROCESSORS. THE ANALYSES AND SPECIFICATION OF POTENTIAL HYBRID OPTICAL/ELECTRONIC PROCESSORS FOR APPLICATION IN AN IR OPTICAL RADAR (LIDAR) WILL BE THE SPECIFIC OBJECTIVE OF A PHASE I EFFORT. DYNETICS' ELECTRONIC SIGNAL PROCESSING EXPERIENCE WILL FIRST BE UTILIZED TO PARTITION A SELECTED LIDAR FCS SIGNAL PROCESSOR INTO FUNCTIONAL ELEMENTS. THE OPTICAL SIGNAL PROCESSING ALGORITHMS, ARCHITECTURES, AND DEVICES THAT MAY OFFER POTENTIAL SOLUTIONS TO PRESENT ELECTRONIC DEFICIENCIES WILL BE IDENTIFIED AND ADAPTED TO ONE OR MORE OF THE PROCESSOR FUNCTIONAL ELEMENTS. THE HYBRID OPTICAL/ELECTRONIC CONCEPTS THAT RESULT WILL BE FULLY EVALUATED IN TERMS OF SUCH BENEFITS AS SPEED/THROUGHPUT,

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ACCURARY, MEMORY REQUIREMENTS, ENVIRONMENTAL IMMUNITY, AND SIZE. DYNETICS BELIEVES THAT THE RESULTANT OPTIMIZED, HYBRID OPTICAL/ ELECTRONIC PROCESSOR WILL OFFER ENHANCED LIDAR FCS PERFORMANCE AND BE APPROPRIATE FOR A PHASE II BREADBOARD DEVELOPMENT EFFORT.

E-O PRODUCTS CORP
23101 MOULTON PKWY - STE 210
LAGUNA HILLS, CA 92653
CONTRACT NUMBER: DAMD17-88-C-8191
DIETER H POMMERRENIG
TITLE:
LARGE AREA DIGITAL X-RAY IMAGING SYSTEM
TOPIC# 191 OFFICE: MEDICAL IDENT#: 25441

THE OBJECT ADDRESSES THE NEED FOR A LARGE AREA, LIGHT WEIGHT X-RAY IMAGER TO BE USED BY MEDICAL PERSONNEL IN FIELD ENVIRONMENTS. ESPECIALLY FOR APPLICATION TO IMAGE LARGE SECTIONS OF THE SKULL, THE REQUIREMENT EXISTS FOR A 4 X 5 INCH X-RAY IMAGING PANEL. WE PROPOSE TO DEVELOP THE DESIGN OF A LARGE AREA PANEL WHICH WILL ALLOW THE UTILIZATION OF CCD/SCINTILLATOR IMAGING DEVICE BUILDING BLOCKS. DURING PHASE 1, WE WILL EXERCISE TWO DESIGN OPTIONS FOR THE IMAGING PANEL. FABRICATION AND TESTING USING ALREADY DEVELOPED DRIVE, SIGNAL PROCESSING AND DISPLAY ELECTRONICS IS PLANNED DURING PHASE II.

ELECTRO MAGNETIC APPLICATIONS INC
PO BOX 260263
DENVER, CO 80226
CONTRACT NUMBER: DAAC07-88-C-H041
RODNEY A PERALA
TITLE:
A PROPOSAL TO EVALUATE EM CONTROL AND DEVELOP DESIGN PHILOSOPHY AND MEASUREMENT PLANS FOR NEW TECHNOLOGY AIRCRAFT DESIGNS
TOPIC# 34 OFFICE: AVSCOM IDENT#: 27050

A PROGRAM TO EVALUATE EM CONTROL, DEVELOP THE OVERALL DESIGN PHILOSOPHY AND MEANS TO MEANS TO MEASURE THE CONTROL EFFECTIVENESS WILL BE THE GOAL OF THE PROPOSED EFFORT. THE PROGRAM IS OUTLINES IN

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THIS PROPOSAL. A DATA BASE FOR THE NEW TECHNOLOGY IS TO BE OBTAINED AS THE FIRST SUBTASK; INCLUDING THE DEFINITIONS OF THE EM THREAT WAVEFORMS (EMI, EMP, EW AND ECM, LIGHTNING AND STATIC ELECTRIFICATION), THE COUPLING TO AVIONICS OBTAINED FROM TESTING/SIMULATION AND COMPUTER ANALYSIS AND THE RESPONSE OF CIRCUITS (DAMAGE AND UPSET). DEVELOPMENT OF AN OVERALL HARDENING METHODOLOGY AND THE CONSEQUENT REQUIREMENTS IS THE SECOND SUBTASK FOR PREVENTING DAMAGE AND LIMITING UPSET BASED ON AN ANALYSIS OF THE NEW TECHNOLOGY MATERIALS AND CIRCUITS, AND NEW TACTICS. DEVELOPMENT OF A TESTING AND VERIFICATION PLAN TO MEASURE THE EFFECTIVENESS OF RESULTANT EM HARDENING IS THE THIRD SUBTASK. THIS SUBTASK WILL REQUIRE SPECIFICATION OF EQUIPMENT, PROCEDURES AND CRITERIA FOR BOXES, CABLES, BUSES AND INTERFACES.

ELECTRON TRANSFER TECHNOLOGIES INC
PO BOX 160
PRINCETON, NJ 08542
CONTRACT NUMBER: DAMD17-88-C-8187
DR WILLIAM M AYERS
TITLE:
ALTERNATIVE STERILIZATION PROCESS FOR HEAT LIABLE GOODS
TOPIC# 185 OFFICE: MEDICAL IDENT#: 25421

A TWO STEP PROCESS FOR THE STERILIZATION OF HEAT LIABLE GOODS IS PROPOSED IN WHICH THE OXIDATION STRENGTH OF A GAS OR VAPOR IS ENHANCED THROUGH A PHOTOCHEMICAL REACTION. THE PHOTOCHEMICAL REACTION PRODUCES A SHORT LIVED OXIDANT SPECIES WHICH DISINFECTS THE ITEM BUT LEAVES NO TOXIC RESIDUE BEHIND. THIS APPROACH HAS THE ADVANTAGE THAT LESS TOXIC MATERIALS THAN THE CURRENTLY AVAILABLE STERILIZING GASES CAN BE STORED AND HANDLED MORE SAFELY. THE MOST OXIDIZING FORM IS ONLY PRODUCED BY THE PHOTOCHEMICAL REACTION IN THE STERILIZING CHAMBER.

ELECTRONICS DEVELOPMENT CORP
6905G OAKLAND MILLS RD
COLUMBIA, MD 21045
CONTRACT NUMBER: DAAL02-88-C-0071
CHARLES E H EDWARD
TITLE:
GROUND SURVEILLANCE RADAR KNOWLEDGE-BASED TARGET TRACKING AND ASSOCIATIVE CLASSIFICATION
TOPIC# 42 OFFICE: HDL IDENT#: 27057

SUBMITTED BY

THE PROPOSED PROGRAM INVESTIGATES THE USE OF MULTI-EXPERT SYSTEM CONCEPTS FOR TERRAIN AND TACTICAL KNOWLEDGE, AND APPLIED THOSE CONCEPTS TO TRACK HISTORY FILES PRODUCED BY A GROUND SURVEILLANCE RADAR TRACK PROCESSOR. PRESENTLY, A TRAINED OPERATOR MUST EXAMINE THE TARGET REPORTS, WHICH ARE DISPLAYED AGAINST A TERRAIN OVERLAY, AND ATTEMPT TO DETERMINE THE NATURE OF THE TARGET AND ITS HOSTILE INTENT. THE PROPOSED PROCESSING APPROACH WILL ENABLE AUTOMATION OF A LARGE PART OF THIS PROCESS BY AIDING THE OPERATOR IN IDENTIFICATION AND/OR CLASSIFICATION OF TARGETS, ALLOWING MORE ATTENTION TO BE CONCENTRATED ON ASSESSING THE TACTICAL THREAT REPRESENTED BY A FEW KEY TARGETS. TERRAIN KNOWLEDGE STORAGE AND SEARCH TECHNIQUES ARE INVESTIGATED AND A TEST BED MULTI-EXPERT SYSTEM IS PROPOSED FOR PHASE II.

EMCORE CORP
35 ELIZABETH AVE
SOMERSET, NJ 07052
CONTRACT NUMBER: DAAL01-88-C-0816
PETER NORRIS
TITLE:
MOCVD GROWN GaAs/AlGaAs AND GaAs/InGaAs STRUCTURES WITH APPLICATION TO HEMTS
TOPIC# 97 OFFICE: ETDL/LABCOM IDENT#: 26568

UNTIL RECENTLY, NEARLY ALL MAJOR WORK ON HEMTs HAS BEEN PERFORMED BY MBE. WITHIN THE LAST YEAR, SEVERAL JAPANESE COMPANIES, AFTER INTENSIVE RESEARCH EFFORTS, HAVE BEGUN TO OFFER MOCVD-GROWTH HEMT DEVICES FOR SALE. BASED ON OUR EXPERIENCE AND PREVIOUS WORK IN THE GROWTH AND FABRICATION OF MOCVD HEMTs, EMCORE FEELS THAT A CONCERTED EFFORT IN NECESSARY TO PROMOTE AND STIMULATE BOTH THE GROWTH AND FABRICATION OF MOCVD-GROWTH HEMT DEVICES IN THE U.S. MOCVD, BY VIRTUE OF ITS HIGH THROUGHPUT AND GREATER ECONOMY IN A PRODUCTION SETTING, OFFERS THE MOST PROMISING APPROACH TO THE COMMERCIALIZATION OF HIGH SPEED HETEROJUNCTION DEVICES. WE BELIEVE THIS IS THE MOTIVATION BEHIND THE INTENSE CURRENT INTEREST AND SUBSTANTIAL BASIC RESEARCH EFFORT BY THE JAPANESE. HEMT STRUCTURES WILL BE STUDIED WITH RESPECT TO SEVERAL STRUCTURAL PARAMETERS. THE PHASE I STUDY WILL VARY SPACER LAYER THICKNESS AND ALUMINUM CONCENTRATION. THE EFFECT OF THESE VARIATIONS OF 2 DEG MOBILITY AND SHEET CARRIER CON-

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CENTRATION WILL BE DETERMINED BY COMPARISON WITH BASELINE DATA ON A STANDARD HEMT STRUCTURE, PRESENTLY IN PILOT-PRODUCTION. MATERIALS WILL BE CHARACTERIZED FOR TRANSPORT PROPERTIES AND UNIFORMITY.

ENERGY SCIENCE LABS INC
PO BOX 85608
SAN DIEGO, CA 92138
CONTRACT NUMBER: DAAB07-88-C-F212
JAMES R CLINTON
TITLE:
THIN FILMS WITH HIGH TEMPERATURE COEFFICIENT OF RESISTANCE
TOPIC# 217 OFFICE: CECOM/NV IDENT#: 25840

THERMISTORS EXHIBIT HIGHLY TEMPERATURE-DEPENDENT RESISTANCE CHARACTERISTICS (TYPICALLY MANY PERCENT PER DEGREE NEAR ROOM TEMPERATURE) AND FIND WIDESPREAD USE AS DISCRETE DEVICES IN TEMPERATURE MEASUREMENT AND CONTROL CIRCUITS AND IN CIRCUITS WHICH UTILIZE THEIR SELF-HEATING PROPERTIES. THERMISTORS ARE MANUFACTURED BY HIGH TEMPERATURE CERAMIC TECHNIQUES NOT SUITED TO THIN FILM PRODUCTION. THE PROPOSED RESEARCH WILL DEVELOP A PROCESS FOR DEPOSITING THIN (500 nm OR LESS) THERMISTOR MATERIALS ON SILICON SUBSTRATES USING ION-BEAM DEPOSITION TECHNIQUES. METALLIZED CONTACTS WILL ALSO BE DEPOSITED AND BARRIER AYERS INVESTIGATED. STRUCTURAL AND ELECTRICAL PROPERTIES OF THE FILMS WILL BE CHARACTERIZED AND THE DEPOSITION PROCESS OPTIMIZED FOR MAXIMUM FILM STABILITY AND REPRODUCIBILITY.

EOS TECHNOLOGIES INC
10116 - 36TH AVE CT/STE 17
TACOMA, WA 98499
CONTRACT NUMBER: DAAA15-88-C-0045
DAVID J WELCH
TITLE:
TARGET VALUE ANALYSIS
TOPIC# 68 OFFICE: BRL IDENT#: 26835

THIS PROJECT IS DEVELOPING A METHODOLOGY FOR ESTABLISHING TARGET VALUES ON A TACTICAL BATTLEFIELD. THE METHODOLOGY PERMITS THE

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ALLOCATION OF WEAPONS BASED UPON TARGET PRIORITIZATION CALCULATED WITH CONSIDERATION OF TARGET TYPE, TACTICAL SITUATION, WEAPON TYPE AND AVAILABILITY, TIMELINESS AND OTHER KEY PARAMETERS.

EOS TECHNOLOGIES INC
10116 - 36TH AVE CT NW/STE 17
TACOMA, WA 98499
CONTRACT NUMBER: DAAA21-88-C-0166
IRA G CHAYUT
TITLE:
OPTIMAL ADA PROCESSOR
TOPIC# 25 OFFICE: ARDEC IDENT#: 27038

THE ADA PROGRAMMING LANGUAGE OFFERS SOLUTIONS TO MANY SOFTWARE DEVELOPMENT CHALLENGES BUT ALSO POSES NEW REQUIREMENTS TO THE PROCESSOR EXECUTING AN ADA PROGRAM. THIS PROJECT WILL ASSESS THE REQUIREMENTS THAT ADA PRESENTS TO THE HOST COMPUTERS AND WILL EVALUATE FIVE CURRENT ARCHITECTURES IN LIGHT OF THESE REQUIREMENTS. THE PROCESSORS UNDER STUDY WILL BE: DEC VAX, MOTOROLA 68030, INTEL 80386, SUN SPARC, AND RATIONAL R1000. THIS PROJECT LAYS THE FOUNDATION FOR THE DESIGN AND IMPLEMENTATION OF A CUSTOM PROCESSOR FAMILY TUNED FOR THE EXECUTION OF ADA PROGRAMS.

EPITAXX INC
3490 U.S. ROUTE 1
PRINCETON, NJ 08540
CONTRACT NUMBER: DAAL01-88-C-0812
DR GREGORY H OLSEN
TITLE:
A MERGED HYDRIDE/METALORGANIC VPE REACTOR FOR HIGH-PERFORMANCE OPTOELECTRONIC DEVICES
TOPIC# 96 OFFICE: ETDL/LABCOM IDENT#: 26564

EPITAXX PROPOSES TO MERGE THE BEST ASPECTS OF HYDRIDE VAPOR PHASE EPITAXY (VPE) AND METALORGANIC CHEICAL VAPOR DEPOSITION (MOCVD) INTO ONE TECHNIQUE TO FABRICATE SUPERIOR InGaAsP/InP DETECTORS, LASERS AND LEDS. THE HYDRIDE VPE TECHNIQUES IS A PROVEN GROWTH TECHNIQUE

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FOR InGaAs DETECTORS AND 1300 nm InGaAs LASERS AND LEDS. HOWEVER, THE EQUIPMENT IS USUALLY BUILT ON A "LABORATORY" BASIS AND HAS NOT INCLUDED IMPROVEMENTS INCORPORATED INTO MOCVD SYSTEMS SOLD BY SEMICONDUCTOR EQUIPMENT FIRMS OVER THE LAST TEN YEARS. THESE INCLUDE SUPERIOR GAS HANDLING FOR ABRUPT INTERFACES, BETTER THICKNESS/COMPOSITIONAL CONTROL AND 2" AND 3" SUBSTRATE CAPABILITY. IN PHASE I EPITAXX WILL PROCURE MOCVD WAFERS OF In(.53)Ga(.47)As/InP FROM SEVERAL RESEARCH AND COMMERCIAL SOURCES (INCLUDING EMCORE) AND COMPARE THE JUNCTION ABRUPTNESS, UNIFORMITY AND PURITY WITH ITS OWN HYDRIDE VPE MATERIAL. THE WAFERS WILL THEN UNDERGO DETECTOR FABRICATION IN THE SAME PROCESS AND DEVICE RESULTS WILL BE COMPARED. A DESIGN FOR AN OPTIMIZED REACTOR WILL BE INCLUDED IN THE PHASE II PROPOSAL. PHASE II WOULD INVOLVE CONSTRUCTION OF THE REACTOR (WHICH WOULD INCLUDE MOCVD SOURCES, 3" WAFER CAPACITY WITH + OR - 5% UNIFORMITY, ABRUPT (<15A) INTERFACES) AND DEMONSTRATION OF 1300 AND 1550 nm LASERS, PIN DETECTORS AND InGaAs AVALANCHE PHOTODIODES. PROF. S. R. FORREST (USC) WILL CONSULT.

EPITAXX INC
3490 U.S. ROUTE 1
PRINCETON, NJ 08540
CONTRACT NUMBER: DAAL02-88-C-0011
GEORGE A GASPARIAN
TITLE:
A HIGH PERFORMANCE 1.93 MICRON SEMICONDUCTOR PHOTODIODE
TOPIC# 54 OFFICE: HDL IDENT#: 27074

THERE IS A GREAT INTEREST IN HIGH SPEED (5 ns) LIGHT DETECTION IN THE 1.7 TO 2.0 MICRON SPECTRAL RANGE. APPLICATIONS INCLUDE GAS MONITORING, DOWNHOLE LOGGING, ATMOSPHERIC TRANSMISSION, AND ACTIVE OPTICAL PROXITY SENSING. ALTHOUGH SEMICONDUCTOR PHOTODIODES (InAs, InSb, PbS, PbSe, ETC.) ARE AVAILABLE, THEY HAVE SLOW RESPONSE AND LACK SENSITIVITY. EPITAXX PROPOSES TO DEVELOP A NOVEL METHOD TO FABRICATE PLANAR InGaAs/InAsP PHOTODIODES FOR THIS SPECTRUM. THESE In(.64)Ga(.36)As/InAs(.21)P(.79) DIODES, WHICH RESPOND FROM 1.1 MICRON TO 1.98 MICRON, WILL BE GROWN ON AN InP SUBSTRATE VIA A COMPOSITIONALLY GRADED BUFFER LAYER WITH EPITAXX'S VAPOR PHASE EPITAXY (VPE) PROCESS. FIVE PROTOTYPE PHOTODIODES WILL BE DELIVERED AT THE END OF THE PHASE I PROGRAM. PERFORMANCE GOALS ARE: QUANTUM

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EFFICIENCY (1.93 MICRON) - 50%, DARK CURRENT (-IV) - 100 na, BREAK-DOWN VOLTAGE 100 ua) - 10V, RISE/FALL TIME (10-90%) - 5 ns, ACTIVE DIAMETER 500 MICRONS. THESE ROOM TEMPERATURE SPECIFICATIONS ARE SUPERIOR TO ANYTHING COMMERCIALLY AVAILABLE. FREQUENCY MEASURMENTS WILL BE PERFORMED BY PROFESSOR GERALD HERSKOWITZ (STEVENS). THE PHASE II PROGRAM WOULD INVOLVE DEVELOPMENT OF PACKAGING TECHNIQUES FOR THERMOELECTRIC COOLED DETECTORS, LINEAR ARRAYS, AS WELL AS EXTENSION TO LONGER WAVELENGTHS (3 MICROS) AND POTENTIAL DEVELOPMENT OF AN AVALANCHE PHOTODIODE FOR 1.93 MICRONS.

EVAPORATED COATINGS INC
2365 MARYLAND RD
WILLOW GROVE, PA 19090
CONTRACT NUMBER: DAMD17-88-C-8197
JOHN J WALLS JR
TITLE:
OCULAR PROTECTION FROM LASER HAZARDS
TOPIC# 175 OFFICE: MEDICAL IDENT#: 25360

STUDIES WILL BE DIRECTED TOWARD DEVELOPING/IMPROVING CURRENT ABSORBERS USED IN POLYCARBONATE MATERIALS AS WELL AS PROVIDING ADDITIONAL COVERAGE IN OTHER SPECTRAL REGIONS. IN ADDITION TO THE POLYCARBONATE STUDIES, PLASMA SPUTTERING DEPOSITION TECHNIQUES WILL BE EVALUATED TO DETERMINE THEIR POTENTIAL USE FOR DEPOSITING MULTI-LAYER COATINGS ON ABSORBING POLYCARBONATE OPHTHALMIC MATERIAL.

EVI INC
8300 GUILFORD RD - STE A
COLUMBIA, MD 21046
CONTRACT NUMBER: DAAD01-88-C-0067
DR STEPHEN I PARKS
TITLE:
MULTIPLE SUBMUNITION FUNCTION COUNTING
TOPIC# 153 OFFICE: TECOM/YPG IDENT#: 25286

THE MULTIPLE SUBMUNITION FUNCTION COUNTING STUDY CAN BE UTILIZED TO EVALUATE THE EFFECTIVENESS OF AN EXPLOSION MONITORING SYSTEM.

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SENSORS DISTRIBUTED ALONG THE EDGES OF THE IDENTIFIED ZONE WILL FEED THE SIGNAL VIA TELEPHONE CABLE INTO A CENTRAL COMPUTER. THE SIGNALS WILL BE PROCESSED BY SYNTHETIC APERTURE TECHNIQUES TO YIELD THE NUMBER AND LOCATION OF THE MUNITION STRIKES. THE MOST PROMISING SYNTHETIC APERTURE TECHNIQUE APPEARS TO BE LINEAR BACK PROJECTION OF THE SOUND PULSER ONTO A MATRIX CONSISTING OF TWO DIMENSIONS OF SPACE AND ONE OF TIME, SIMILAR TO "CAT" MEDICAL IMAGING TECHNIQUE. THE PERFERRED SENSOR FOR THE DATA GATHERING SYSTEM WILL BE ACOUSTIC UNLESS NON-EXPLOSIVE OR GROUND PENETRATING MUNITIONS ARE TO BE EVALUATED. IN THAT CASE THE SYSTEM WILL BE ENHANCED WITH SEISMIC SENSORS. THE SEISMIC SIGNALS MAY BE PROCESSED BY THE SAME ELECTRONICS, BUT THE PROCESSING ALGORITHMS WILL REQUIRE A SUBSTANTIAL AMOUNT OF ADAPTION AND REFINEMENT TO ACHIEVE THE SAME LEVEL OF ACCURACY AND RELIABILITY. THE PHASE I STUDY RESULTS WILL DETERMINE THE NEED AND SYSTEM VIABILITY.

FAILURE ANALYSIS ASSOCS
2225 E BAYSHORE RD
PALO ALTO, CA 94303
CONTRACT NUMBER: DAAK70-88-C-0021
DR DUANE P JOHNSON
TITLE:
RAPID DETECTION OF FALSELY MARKED BOLTS AND LARGE SCREWS
TOPIC# 117 OFFICE: BRDEC IDENT#: 26242

A MULTI-FREQUENCY ELECTROMAGNETIC TEST METHOD IS PROPOSED TO SORT FALSELY MARKED STEEL FASTENERS. TESTING WILL CONSIST OF MEASURING THE IMPEDANCE OF A PROBE AT TWO DIFFERENT FREQUENCIES AND TWO DIFFERENT MAGNETIC FIELD STRENGTHS WHEN IN CLOSE PROXIMITY TO THE FASTENER. THE 8 DIMENSIONAL STATE VECTOR GENERATED BY THIS MEASUREMENT WILL BE USED TO SEGREGATE THE STEEL FASTENERS ACCORDING TO GRADE. IT IS ANTICIPATED THAT THE GRADE COULD BE DETERMINED IN AS LITTLE AS A MILLI-SECOND. FIRST PHASE OF THE PROGRAM WILL PROVIDE A DEMONSTRATION OF THE ACCURACY OF ELECTROMAGNETIC SORTING OF DIFFERENT GRADES OF FASTENERS AND PROVIDE A DETAILED SPECIFICATION FOR A PROTOTYPE TEST SYSTEM. IT IS ANTICIPATED THAT BOTH A MANUAL TEST SYSTEM FOR TESTING INSTALLED FASTENERS AND A LARGE VOLUME AUTOMATIC TEST SYSTEM WILL BE SPECIFIED. SECOND PHASE OF THE PROGRAM WILL DEVELOP AND DEMONSTRATE A PROTOTYPE TEST INSTRUMENT AND AN AUTOMATIC PARTS

SUBMITTED BY

HANDLING SYSTEM.

FOSTER-MILLER INC
350 SECOND AVE
WALTHAM, MA 02254
CONTRACT NUMBER:
ROBERT F KOVAR
TITLE:
ADVANCED COMPOSITES FOR BODY ARMOR APPLICATIONS
TOPIC# 143 OFFICE: NRDEC IDENT#: 25518

FORECASTS OF FUTURE BATTLEFIELD SCENARIOS PREDICT TACTICAL OPERATIONS THAT WILL REQUIRE SOLDIER MOBILITY AND MULTIPLE THREAT PROTECTION. PRESENT BODY ARMOR DOES NOT PROTECT AGAINST LOW MASS, HIGH VELOCITY PROJECTILES SUCH AS FLECHETTES. ADVANCED, LAYERED COMPOSITE BODY ARMOR WILL BE FABRICATED THAT STOPS FLECHETTES WHILE MAINTAINING EFFECTIVENESS AGAINST CONVENTIONAL BALLISTIC THREATS. PBT ORDERED POLYMER FILM AND SOL-GEL GLASS PROCESSING TECHNIQUES WILL BE COMBINED TO PRODUCE LAYERED COMPOSITES THAT CONTAIN HARD, TOUGH PBT/SOL-GEL GLASS FILM/GLASS MATRIX SECTIONS TO BLUNT OR FRAGMENTS. THIS ARMOR WILL BE MORE EFFECTIVE, 15 PERCENT LIGHTER IN WEIGHT AND LESS BULKY THAN METAL OR CERAMIC-FACED KEVLAR FABRIC. IT WILL ALSO BE NOISELESS DURING BODY MOVEMENT, NON-ELECTRICALLY CONDUCTING AND EASILY PROCESSED INTO CONTOURED PROTECTIVE VESTS AT LOW COST. THE ENHANCED COMPOSITE FRACTURE TOUGHNESS SHOULD ALLOW MULTIPLE HITS IN ADJACENT AREAS WITHOUT PENETRATION. PHASE I WILL DEMONSTRATE THE EFFECTIVENESS OF TWO CONCEPTS FOR THE HARD COMPOSITE LAYER IN RESISTING FLECHETTE PENETRATION. PHASE II OF THIS STUDY WILL INCLUDE THE DESIGN AND FABRICATION OF LAYERED COMPOSITE ARMOR VESTS AND HELMENTS FOR LABORATORY AND FIELD EVALUATION.

FOSTER-MILLER INC
350 SECOND AVE
WALTHAM, MA 02254
CONTRACT NUMBER: DAAL04-88-C-0052
ROBERT C SYKES
TITLE:
PRODUCTION PROCESSES FOR ASSEMBLING CERAMIC TILE ARRAYS
TOPIC# 78 OFFICE: MTL/LABCOM IDENT#: 26695

SUBMITTED BY

FOR A VARIETY OF REASONS, EMPHASIS ON SURVIVABILITY ENHANCEMENT OF ARMY CREW SERVED WEAPONS SYSTEMS IS INCREASING. ONE ACCEPTED APPROACH TO ACHIEVING THIS ENHANCEMENT IS UP-ARMORING EXISTING SYSTEMS WITH CERAMIC APPLIQUE ARMOR. CURRENT R&D IS HIGHLY FOCUSED ON OPTIMIZING THE BALLISTIC PROPERTIES OF MATERIAL SYSTEMS. THE INHERENT COSTLINESS OF MATERIALS INVOLVED HAS BEEN RECOGNIZED AND IS NOW BEING ADDRESSED. COMPARATIVELY LITTLE THOUGHT HAS GONE INTO THE PROBLEM OF FIELDING APPLIQUE ARMOR ON A LARGE SCALE. IF THE LABOR INTENSIVE TECHNIQUES USED TO MAKE UP BALLISTIC TEST PANELS ARE USED FOR UP-ARMORING "THE FLEET," THE COST OF THE ARMOR ITSELF WILL BECOME A SMALL NUMBER COMPARED TO THE COST OF ATTACHING IT TO THE ASSETS INVOLVED. IN ORDER TO AVOID THIS PROBLEM, INNOVATIVE SYSTEM CONCEPTS MUST BE DEVELOPED WHICH GET APPLICATION COSTS DOWN INTO THE "FEW DOLLARS PER SQUARE FOOT RANGE." THIS PROPOSAL PRESENTS A NUMBER OF INNOVATIVE, COST-EFFECTIVE CONCEPTS FOR ATTACHING APPLIQUE ARMOR WHILE AT THE SAME TIME ENHANCING MILITARY (MISSION) FLEXIBILITY AND LOGISTIC SUPPORTABILITY OF THE UP-ARMORED SYSTEM.

FOSTER-MILLER INC
350 SECOND AVE
WALTHAM, MA 02254
CONTRACT NUMBER: DAAL04-88-C-0049
ROSS HAGHIGHAT
TITLE:
SOL-GEL BASED CERAMIC CERAMIC COMPOSITES
TOPIC# 81 OFFICE: MTL/LABCOM IDENT#: 26712

THE PROPOSED PROGRAM WILL EVALUATE AN INNOVATIVE NEW SOL-GEL PROCESS WHEREBY A FULLY DENSE, HIGH TEMPERATURE, HIGH PERFORMANCE TWINNED SiC WHISKER REINFORCED LITHIUM ALUMINO SILICATE (LAS) GLASS-CERAMIC WILL BE PRODUCED WITHOUT A HOT-PRESSING STEP. THE PROCESS WILL ALLOW THE FORMATION OF NEW ARMOR MATERIALS WITH SUBSTANTIALLY IMPROVED BALLISTIC AND IMPACT PROPERTIES WITH LITTLE LIMITATION ON THE COMPOSITE DIMENSIONS. THE PHASE I PROGRAM WILL EVALUAVTE PARAMETERS FOR THE SUCCESSFUL FABRICATION OF AN INNOVATIVE SOL-GEL APPROACH TO LAS GLASS-CERAMIC REINFORCED WITH HIGH LOADING (>25 VOLUME PERCENT) OF TWINNED SiC WHISKERS. THIS PROCESS WILL OVERCOME THE CURRENT DRAWBACKS IN SOL-GEL GLASS AND CERAMIC COMPOSITE PROCESSING AND ALSO

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RESOLVE THE INTERFACIAL DILEMMA FACING ALL CERAMIC BASED COMPOSITES.

FOSTER-MILLER INC
350 SECOND AVE
WALTHAM, MA 02254
CONTRACT NUMBER: DAAJ02-88-C-0009
DAVID EVANS
TITLE:
LOW COST PREFORMS
TOPIC# 38 OFFICE: AVSCOM IDENT#: 27053

LOW COST PREFORMS ARE ESSENTIAL TO ACHIEVING ECONOMIC RTM. NO CURRENT TEXTILE PROCESS CAN PRODUCE A COMPLETE PREFORM AND SECONDARY PROCESSES WILL ADD TO THE COST OF RESIN TRANSFER MOLDING. A PROCESS FOR PRODUCING AN ORIENTED FIBER FELT IS PROPOSED. THE FELT WILL ALLOW RAPID ONE-STEP PREFORMING AT A LOW COST. THE PROGRAM LEADS INTO A PHASE II WHICH WILL DEVELOP A DEMONSTRATION PART TO SHOW THE LOW COST OF RTM.

FREQUENCY & TIME SYSTEMS INC
34 TOZER RD
BEVERLY, MA 01915
CONTRACT NUMBER: DAAL01-88-C-0822
DONALD A EMMONS
TITLE:
MINIATURE ATOMIC FREQUENCY STANDARD DESIGN STUDY
TOPIC# 98 OFFICE: ETDL/LABCOM IDENT#: 26572

THE PROPOSED EFFORT ADDRESSES THE NEED FOR A MINIATURIZED ATOMIC FREQUENCY STANDARD HAVING GREATLY IMPROVED STABILITY OVER PRESENT AVAILABLE DEVICES. PRECISE AND ACCURATE TIME/FREQUENCY STANDARDS ARE BASED ON ATOMIC RESONANCE EFFECTS. PORTABLE FREQUENCY STANDARDS EMPLOY RUBIDIUM, CONTAINED IN A RESONANCE CELL OR CESIUM, AS A BEAM OF ATOMS. OPTICALLY PUMPED RUDIDIUM CELL DEVICES ARE CLASSED SECONDARY STANDARDS DUE TO LONG TERM FREQUENCY UNCERTAINTIES, BUT ARE SUFFICIENTLY ACCURATE FOR A WIDE VARIETY OF COMMUNICATIONS AND NAVIGATION NEEDS. MORE STRINGENT REQUIREMENTS OF FIELD-DEPLOYED

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AUTONOMOUS TIME/FREQUENCY STANDARDS ARE REQUIRING INCREASED STABILITY IN THESE DEVICES, WITH NO COMPROMISE IN SIZE AND POWER CONSUMPTION, ALTHOUGH SOME COMPROMISE IN ACCURACY MAY BE TOLERATED. THE CRITIAL PARAMETER RELEVANT TO FREQUENCY STABILITY IS SIGNAL-TO-NOISE. IMPROVEMENT OF AN ORDER OF MAGNITUDE CAN COME FROM IMPROVED OPTICAL PUMPING SOURCES, LASERS OR OTHER, WHICH REDUCE THE NOISE ASSOCIATED WITH EXCESS BACKGROUND SIGNAL. IN THE REALM OF ATOM BEAM DEVICES, INCREASED S/N CAN COME FROM INCREASED ATOM FLUX AND IMPROVED STATE SELECTION EFFICIENCY.

FROST ENGINEERING DEVELOPMENT CORP
PO BOX 1294 - 3900 S KALAMATH
ENGLEWOOD, CO 80150
CONTRACT NUMBER:
HORACE M VARNER
TITLE:
FORCE AND PRESSURE/CONTACT INSTRUMENTATION FOR PARACHUTE HARNESSE
TOPIC# 141 OFFICE: NRDEC IDENT#: 25508

PARACHUTE AND HARNESS DESIGNS NEED TO BE IMPROVED IN ORDER TO PERMIT PARATROOPER DROPS AT HIGHER SPEEDS AND LOW ALTITUDES. LITTLE IS KNOWN ABOUT HOW OPENING SHOCK FORCES ARE TRANSMITTED TO THE PARACHUTE USER. INSTRUMENTATION IS NEEDED TO ASSESS THE FORCES IN THE VARIOUS STRAPS OF THE HARNESS DURING OPENING SHOCK. IN ADDITION, SENSORS ARE NEEDED WHICH WILL MEASURE CONTACT PRESSURE BETWEEN THE HARNESS OCCUPANT AND THE HARNESS DURING PARACHUTE OPENING. SUCH INSTRUMENTATION SHOULD BE NON-INTRUSIVE AND ACCURATE AND LOCATED AT CRITICAL POINTS ON THE HARNESS. CONTACT PRESSURES CAN BE MEASURED USING RECENTLY-DEVELOPED AND COMMERCIALLY AVAILABLE FORCE SENSITIVE RESISTORS (FSRS) WHICH CAN BE MOUNTED ON HARDNESS WEBBING. FORCES WITHIN WEBBING ELEMENTS CAN BE SENSED BY MEANS OF LOAD LINKS USING STRAIN GAGES SEWN TO THE WEBBING. BY PROVIDING A SMALL BATTERY, BRIDGE RESISTORS, AND AN INTEGRATED-CIRCUIT DC AMPLIFIER, GOOD SIGNAL STRENGTH CAN BE OBTAINED FROM THE TRANSDUCERS, MINIMIZING THE NEED FOR BULKY MULTI-CONDUCTOR SHIELDING CABLES.

GALAXY MICROSYSTEMS INC
10711 BURNET RD - STE 325
AUSTIN, TX 78758
CONTRACT NUMBER: DAAL02-88-C-0010
GREGORY K CASWELL
TITLE:
INNOVATIVE ELECTRONICS PACKAGING FOR ARTILLERY FUZES
TOPIC# 55 OFFICE: HDL IDENT#: 27070

SUBMITTED BY

SYSTEM CONFIGURATIONS OF ARTILLERY PROJECTILE FUZES ARE FORCING A REDUCTION IN SIZE. THE PURPOSE OF THIS PROGRAM IS TO IDENTIFY ALTERNATE PACKAGING APPROACHES (E.G., COD, HERMETIC CHIP CARRIERS, TAB, WAFERSCALE, ETC.) THAT COULD BE USED TO MINIATURIZE FUTURE DESIGNS. SINCE THE ENVIRONMENTAL STRESSES IMPOSED ON THE FUZES IN THE ARTILLERY PROJECTILE APPLICATION ARE EXTREMELY SEVERE, IT WOULD BE USEFUL TO DETERMINE WHICH PACKAGING CONCEPTS ARE VIABLE. THIS CAN BE ACCOMPLISHED BY FIRST MODELING (FINITE ELEMENT ANALYSIS) THE CONFIGURATIONS AND THEN SELECTING THE MOST PROMISING CANDIDATES FOR A COMPREHENSIVE ENVIRONMENTAL TEST SEQUENCE.

GEO-CENTERS IC
7 WELLS AVE
NEWTON CENTRE, MA 02159
CONTRACT NUMBER: DAAA15-88-C-0050
DR PATRICK M NOLAN
TITLE:
CLEARING OF MILITARY SMOKES AND AEROSOLS
TOPIC# 28 OFFICE: CRDEC IDENT#: 27041

THE GOAL OF THE PROPOSED PROGRAM IS TO DEVELOP A DEVICE TO CLEAR MILITARY SMOKES AND AEROSOLS. SPECIFIC OBJECTIVES WITHIN THE PROPOSED PROGRAM ARE DIRECTED TOWARDS THE DEVELOPMENT AND DEPLOYMENT OF CHARGED SCAVENGERS AS AN EFFECTIVE MEANS TO REMOVING AEROSOL PARTICLES AND SMOKES. INCREASING THE CHARGE ON THE SCAVENGING MATERIAL GREATLY ENHANCES THE REMOVAL EFFICIENCY OF THE CLEARING MATERIAL. THE PRIMARY TECHNICAL OBJECTIVES OF PHASE I ARE TO DETERMINE THE TOTAL CHARGE ON PARTICULAR/SELECTED SCAVENGER MATERIALS AS TYPES OF MATERIALS TO BE STUDIED IN PHASE I INCLUDE, BUT NOT LIMITED TO, CARBON FIBERS, CHAFF (ALUMINIZED MYLAR), METALS (IRON, ALUMINUM, COPPER), METAL OXIDES (TiO[2]) AND COMMERCIALLY AVAILABLE ELECTRETE COMPOUNDS (I..S., POLY-MAG 80 AND 90 [BRUHOW INDUSTRIES]). THE SCAVENGING MATERIALS SELECTED FOR THE PHASE I STUDY WILL BE CHARGED WITH A CORONA DISCHARGE DEVICE HELD AT A CONSTANT DISCHARGE POTENTIAL. THE APPARATUS TO BE EMPLOYED FOR THE TERMINAL VELOCITY AND CHARGING MEASUREMENTS IS AN ELECTROSTATIC BALANCE EMPLOYING A HIGH INTENSITY LIGHT SOURCE. ADDITIONAL CHARGING TECHNIQUES/METHODS APPROPRIATE FOR MILITARY USE WILL BE IDENTIFIED.

BY SERVICE
FISCAL YEAR 1988
ARMY

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GEO-CENTERS INC
7 WELLS AVE
NEWTON CENTRE, MA 02159
CONTRACT NUMBER: DAAL01-88-C-0818
BRUCE N NELSON
TITLE:
OPTICAL DIFFERENTIAL STRAIN GAUGES FOR THE MEASUREMENTS OF DYNAMI STRAINS
TOPIC# 93 OFFICE: ETDL/LABCOM IDENT#: 26541

THE GOAL OF THE PHASE I PROGRAM IS TO DEMONSTRATE THE UTILITY OF GEO-CENTERS FIBER OPTIC DIFFERENTIAL STRAIN GAUGE FOR MONITORING THE DYNAMIC STRAINS IN CONTAINERS OF PULSED CAPACITORS AND TRANSFORMERS. THE FAILURE OF PULSED CAPACITORS AND TRANSFORMERS UNDER ROUTING OPERATING CONDITIONS PRESENTS A SERIOUS PROBLEM TO PULSED POWER SYSTEM DEVELOPMENT. COMPONENT FAILURE IMPACTS BOTH THE COST AND SAFETY OF THE PROGRAMS IN WHICH THEY ARE UTILIZED. MECHANICAL STRAINS IN THE CASES OF THESE DEVICES ARE THE MOST LIKELY CAUSE OF COMPONENT FAILURE. STANDARD STRAIN MEASURING DEVICES ARE INCAPABLE OF OPERATING IN THE HIGH ELECTROMAGNETIC INTERFERENCE (EMI) ENVIRONMENT ASSOCIATED WITH PULSE CAPACITORS AND TRANSFORMERS. THE PROPOSED SENSORS ARE IMMUNE TO THE EFFECTS OF EMI. THEY ARE, THEREFORE, IDEALLY SUITED TO THIS MEASUREMENT ENVIRONMENT. ADVANTAGES OF THE PROPOSED SENSING APPROACH INCLUDE A TEMPERATURE INSENSITIVE SENSOR OUTPUT, OPTICAL ISOLATION, PERFORMANCE CAPABILITIES EQUIVALENT TO THOSE OF FOIL GAUGES, AND A SENSOR OUTPUT DETECTION SCHEME WHICH IS IMMUNE TO SOURCE LIGHT INTENSITY VARIATIONS, MICROBENDING LOSSES AND THE EFFECTS OF RADIATION FIBER DARKENING.

GEO-CENTERS INC
7 WELLS AVE
NEWTON CENTRE, MA 02159
CONTRACT NUMBER: DAAA21-88-C-0163
DR GERALD DOYLE
TITLE:
CUSTOMIZED COMPATIBLE PROPELLANT BINDERS
TOPIC# 10 OFFICE: ARDEC IDENT#: 27024

SUBMITTED BY

THERE IS A WELL ESTABLISHED NEED FOR HIGH PERFORMANCE GUN PROPELLANT BINDERS. OUR RECENT WORK WITH THE SYNTHESIS OF HMX INTERMEDIATES SUGGESTS A METHOD OF CREATING A NEW SERIES OF UNUSUALLY COMPATIBLE BINDERS. IT IS EXPECTED THESE BINDERS WILL PROVIDE PROPELLANTS AND EXPLOSIVES WITH HIGHLY DESIRED PERFORMANCE AND INSENSITIVITY CHARACTERISTICS. WE PROPOSE TO DEMONSTRATE IN PRINCIPLE THAT BINDERS MAY BE PREPARED WHICH INCORPORATE CHEMICALLY BOUND SEGEMENTS OF THE EXPLOSIVES WITH WHICH THEY ARE TO BE MIXED. IT IS BELIEVED THE BOUND SEGMENTS WILL PROVIDE A COMMON BASIS FOR A PHYSICAL ATTRACTION BE-TWEEN THE BINDER AND THE RELATED COMPONENTS IN THE BULK OF THE MIX-TURE. THE UNDERLYING PRINCIPLES WILL BE DEMONSTRATED USING DAPT (3,7-DIACETYL-1,3,5,7-TETRAAZABICYCLO-3.3-1 NONANE) WHICH HAS THE CAPACITY TO POLYMERIZE. AFTER POLYMERIZATION THE POLYMER WILL BE NITRATED. IT IS EXPECTED THAT THE RESULTING NITRATED POLYMER WILL SHOW BOTH HIGH COMPATIBILITY WITH HMX AND VERY HIGH THERMAL AND CHEMICAL STABILITY IN THE PRESENCE OF HMX. AS PART OF THE WIDER SCOPE OF THIS PROGRAM IT IS INTENDED TO DEMONSTRATE THAT BINDERS SO PREPARED CAN PROVIDE UNCOMMONLY STABLE THREE DIMENSIONAL NETWORKS WITH A WIDE VARIETY OF PROPELLANT AND EXPLOSIVE COMPOSITIONS.

GEODYNAMICS CORP
6564 LOISDALE CT - STE 300
SPRINGFIELD, VA 22150
CONTRACT NUMBER: DAAB07-88-C-L810
PETER G MALPASS
TITLE:
AUTOMATED TOOLS FOR ANALYSIS OF THE CAPABILITIES OF A SIMULATION TO GENERATE REALISTIC STRESS ENVIRONMENTS OR COMMUNICA COMD AND C
TOPIC# 208 OFFICE: CECOM/PA IDENT#: 25746

THIS PHASE I SBIR PROJECT DEFINES A METHODOLOGY FOR DETERMINING OBJECTIVE QUANTITATIVE METRICS TO EVALUATE THE REALISM AND STRESS-TEST CAPABILITIES OF A SIMULATION. THIS METHODOLOGY WILL BE IMPLEMENTED DURING PHASE II IN THE FORM OF AN AUTOMATED KNOWLEDGE-BASED TOOL WHICH WILL ACCEPT CHARACTERISTICS OF THE SIMULATION AND CALCULATE/INFER A SET OF EVALUATION METRICS. THIS ANALYTICAL TOOL WILL ENSURE THAT THE STRESS TEST CAPABILITIES OF A SIMULATION ARE ADEQUATE. A PLAN IS ALSO PRESENTED TO VALIDATE THE PROTOTYPE TOOL

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AND METRICES ON ACTUAL MILITARY PROJECTS.

GINER INC
14 SPRING ST
WALTHAM, MA 02254
CONTRACT NUMBER: DAAL02-88-C-0006
DR JOSE GINER
TITLE:
ELECTROPLATING LEAD DIOXIDE WITH SUPERIOR ADHESION AND HIGH COULOMBIC CAPACITY
TOPIC# 59 OFFICE: HDL IDENT#: 27073

LEAD DIOXIDE DEPOSITED ON NICKEL PLATED STEEL SUBSTRATE IS USED AS CATHODE MATERIAL FOR RESERVE BATTERIES. THERE IS AN EXPRESSED NEED BY THE ARMY TO DEVELOP ELECTRODEPOSITS OF PbO(2) WITH SUPERIOR ADHESION AND HIGH COULOMBIC CAPACITY. WE PROPOSE HERE AN INVESTIGATION OF THE PRETREATMENT OF THE SUBSTRATE, ELECTRODEPOSITON BATH, ADDITIVES AND POST TREATMENT STEPS WITH A VIEW TO ACHIEVE THE ABOVE GOAL. CHARACTERIZATION OF DEPOSITS THRU STRESS MEASUREMENTS AND COULOMBIC CAPACITY DETERMINATION IS ALSO PROPOSED.

GMS ENGINEERING CORP
8940-D RTE 108
COLUMBIA, MD 21045
CONTRACT NUMBER: DAMD17-88-C-8192
S M FALK
TITLE:
NON-INVASIVE DETERMINATION OF CORE TEMPERATURE
TOPIC# 174 OFFICE: MEDICAL IDENT#: 25623

IN THIS PROPOSED PHASE I SBIR RESEARCH EFFORT, WE WILL DEVELOP A TECHNIQUE FOR RAPID, NON-INVASIVE DETERMINATION OF CORE TEMPERATURE FROM MEASURED PARAMETERS OF RESPIRED AIR (TEMPERATURE, HUMIDITY, AND VELOCITY). WE WILL MODIFY OUR EXISTING RESPIRATION TRANSDUCER (WHICH MEASURES TEMPERATURE AND VELOCITY OF RESPIRED AIR) TO INCLUDE INFRARED MEASUREMENT OF WATER VAPOR. WE WILL THEN CONSTRUCT A LABORATORY TEST BED FOR PARTIALLY SIMULATING THE HUMAN RESPIRATORY TRACT

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(ONLY THE THERMAL CHARACTERISTICS WILL BE SIMULATED). THIS TEST BED WILL PERMIT CONTROL OF "CORE" TEMPERATURE AND CONTROLLED VARIATION OF THE TEMPERATURE, HUMIDITY, AND VELOCITY OF RESPIRED AIR. WE WILL USE THE TEST BED TO ACQUIRE DATA FOR DEVELOPMENT OF A NONLINEAR MODEL OF CORE TEMPERATURE AS A FUNCTION OF RESPIRED AIR TEMPERATURE, HUMIDITY, AND VELOCITY; PRELIMINARY RESULTS INDICATE THAT THIS WILL BE POSSIBLE. FINALLY, WE WILL CONDUCT MEASUREMENTS IN A LIMITED NUMBER OF HUMAN SUBJECTS TO COMPARE PREDICTED CORE TEMPERATURE (FROM RESPIRATORY PARAMETERS) WITH ACTUAL CORE TEMPERATURE (DIRECTLY MEASURED WITH BOTH A RECTAL AND ESOPHAGEAL TEMPERATURE SENSOR). SUCCESSFUL DEMONSTRATION OF THIS APPROACH WILL PERMIT NONINVASIVE, NONOBTRUSIVE CORE TEMPERATURE MEASUREMENT WITHIN A FEW BREATHS. IN ADDITION TO USE WITH COMBAT CASUALTIES, THIS TECHNIQUE SHOULD ALSO BE USEFUL IN HUMAN WORKLOAD STUDIES.

GOLD HILL COMPUTERS INC
26 LANDSDOWNE ST
CAMBRIDGE, MA 02139
CONTRACT NUMBER: DAAB07-88-C-P047
G RANDOLPH PARKER
TITLE:
KNOWLEDGE-BASED SYSTEM ARCHITECTURE FOR A MULTI-SENSOR BATTLEFIEL ASSISTANT
TOPIC# 203 OFFICE: CECOM/EW IDENT#: 25671

EACH DATA SOURCE USED IN ANALYZING BATTLEFIELD INFORMATION PROVIDES A VIEW POINT THAT REQUIRES SPECIALIZED OPERATOR TRAINING TO UNDERSTAND. THE OPERATORS ARE CHARGED WITH COORDINATING LARGE VOLUMES OF INFORMATION FROM THESE MULTIPLE INFORMATION SOURCES AND INTEGRATING THEM INTO A SINGLE PROBLEM-SOLVING SYSTEM. A DATA SOURCE EXAMPLE IS MOVING TARGET INDICATOR (MTI) RADAR. THE TRACKING SYSTEMS THAT DETECT CHANGES IN IDENTIFIED OBJECTS CAN FAIL WHEN THE IMAGE IS COMPLICATED IN SOME MATTER. GOLD HILL PROPOSES TO RESEARCH THIS PROBLEM AREA AND TO DESIGN A SOLUTION ARCHITECTURE THAT CAN PERFORM SOME OF THE RECOGNITION ORIENTED TASKS NORMALLY REQUIRING THE ATTENTION OF OPERATORS. THIS SOLUTION WOULD BE BASED AROUND AN EXPERT SYSTEM DEVELOPMENT AND DELIVERY ENVIRONMENT RUNNING ON A SPECIAL PROCESSOR BOARD, PERMITTING THE SOLUTION TO BE DEPOLYED IN A POWERFUL, BUT YET, COMPACT COMPUTER.

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GOLD HILL COMPUTERS INC
163 HARVARD ST
CAMBRIDGE, MA 02139
CONTRACT NUMBER: DAAB10-88-C-0044
JOHN A TEETER
TITLE:
REMOTE EVALUATION TECHNIQUES FOR PERSONAL COMPUTER NETWORKS
TOPIC# 221 OFFICE: CECOM/SWL IDENT#: 25864

REMOTE EVALUATION IS A MECHANISM BY WHICH LISP COMPUTATIONS MAY BE INVOKED WITHIN LOOSELY COUPLED, DISTRIBUTED LISP-BASED APPLICATIONS. THE MECHANISM SUPPORTS BOTH SYNCHRONOUS AND ASYNCHRONOUS BEHAVIORS, THUS PROVIDING THE ABILITY TO INITIATE CONCURRENT OPERATIONS. THE PROGRAMMERS IS ALSO PROVIDED WITH A MECHANISM FOR SYNCHRONIZATION OF THE CONCURRENT OPERATIONS. THE REMOTE-EVALUATION FUNCTIONALITY IS PROVIDED BETWEEN A COLLECTION OF FULL COMMON LISP PROGRAMMING ENVIRONMENTS. THESE ENVIRONMENTS ARE VIEWED AS LOOSELY COUPLED, EACH WITH ITS PRIVATE, NON-SHARED LISP WORKSPACE, AND WITHOUT THE ABILITY TO CAUSE DIRECT SIDE EFFECTS WITHIN ANY OTHER SUCH ENVIRONMENT. THE REMOTE-EVALUATION FUNCTIONALITY FACILITIES THE SHARING OF COMPUTATION AND DATA BETWEEN THESE LOOSELY COUPLED WORKSPACES.

GUMBS ASSOCS INC
11 HARTS LN
EAST BRUNSWICK, NJ 08816
CONTRACT NUMBER: DAAD07-88-C-0096
DR P CHANDRA SEKHAR
TITLE:
ULTRAFAST OPTICAL SWITCHES FOR ECCM
TOPIC# 230 OFFICE: VAL IDENT#: 25082

THE EMPLOYMENT OF CONTINUOUS AND PULSED LASERS IN TARGET DESIGNATION AND COMBAT SITUATIONS IS INCREASING, CREATING THE NEED FOR CONTINUOUSLY AND REVERSIBLY SWITCHING DEVICES TO PROTECT COMBAT PERSONNEL AND SENSITIVE SENSING EQUIPMENT WITH TUNABLE LASER SYSTEMS NECISSITATING BROAD BAND PROTECTION. THE PROGRAM PROPOSED HEREIN

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WILL SEEK TO CLEARLY DEMONSTRATE THE FEASIBILITY OF USING A NOVEL TECHNOLOGY, BASED ON NONLINEAR OPTICAL PROPERTIES OF INSTRINSICALLY SWITCHABLE CONDUCTING POLYMER SYSTEMS FOR THIS PURPOSE. LABORATORY MODELS WILL BE MADE EMPLOYING POLYMER SYSTEMS THAT CAN BE SWITCHED EXTERNALLY OR INTRINSICALLY. THE DEVICES WOULD BE INHERENTLY RADIATION HARD. THE PHASE I RESEARCH IS AIMED MAINLY AT CONCEPT FEASIBILITY DEMONSTRATION, AND WILL LEAD TO THE SELECTION OF A FEW OPTIMAL POLYMER SYSTEMS AND DEVICE DESIGNS. EXTENSIVE TESTING AND CHARACTERIZATION OF THE OPTICAL, ELECTROCHEMICAL AND OTHER PHYSICAL PROPERTIES OF THE DEVICES IS ANTICIPATED IN PHASE II.

GUMBS ASSOCS INC
11 HARTS LN
EAST BRUNSWICK, NJ 08816
CONTRACT NUMBER: DAMD17-88-C-8195
DR RONALD W GUMBS
TITLE:
OCULAR SHIELDS FOR PROTECTION AGAINST LASER RADIATION AND BALLISTIC FRAGMENTS
TOPIC# 175 OFFICE: MEDICAL IDENT#: 25363

THE USE OF LASERS IN THE ARMED FORCES IS INCREASING RAPIDLY AND THEREFORE, SUITABLE FILTERS ARE NEEDED FOR PROTECTING THE EYES OF LABORATORY AND FIELD PERSONNEL FROM ACCIDENTAL OR DELIBERATE EXPOSURE TO HAZARDOUS LASER RADIATION. RECENT WORK AT GUMBS HAS SHOWN THAT IT IS FEASIBLE TO CONSTRUCT NOVEL, SWITCHABLE LASER SHIELDING SYSTEMS WITH BROAD BAND CAPABILITY AND RAPID SWITCHING RATES FROM THIN POLYMER FILMS. IN VIEW OF THIS CAPABILITY, THIS PROPOSAL OUTLINES A RESEARCH PROGRAM TO DEVELOP AN IMPACT RESISTANT, ABRASION RESISTANT PLASTIC FILTER THAT WILL OPTICALLY SWITCH RAPIDLY AND PASSIVELY, WITH BROAD BAND CAPABILITY AND A POTENTIAL OPTICAL DENSITY RATIO OF AT LEAST 100. IF PHASE I IS SUCCESSFUL, A MORE INTENSIVE STUDY OF THE KINETICS AND MECHANISM OF THE OPTICAL SWITCHING PROCESS WILL BE INITIATED WITH MORE DETAILED CHARACTERIZATIONS OF THE OPTICAL AND BALLISTIC PROPERTIES OF THE PLASTIC. SUBPICOSECOND OPTICS DETECTION EQUIPMENT WILL BE USED FOR MORE PRECISE MEASUREMENTS OF SWITCHING SPEED AND FLASH PHOTOLYSIS WILL BE USED FOR DETERMINING THE LIFETIME OF THE DEVICE.

H-CUBED CORPORATION
9051 RED BRANCH RD
COLUMBIA, MD 21045
CONTRACT NUMBER: DAAB10-88-C-P043
DR PAUL HOWEY
TITLE:
POSITION LOCATION AND INFORMATION COLLECTION SYSTEM
TOPIC# 222 OFFICE: CECOM/EW IDENT#: 25755

SUBMITTED BY

A SMALL PORTABLE-LOCATION AND STATUS SYSTEM SUITABLE FOR A VARIETY OF ARMY TACTICAL OPERATIONS SUCH AS LOCATING DOWNED AVIATORS, FRIENDLY PATROLS, LAND VEHICLES AND AIRCRAFT TO WITHIN TWO DEGREES AZIMUTH AND 200 METERS RANGE OUT TO 20 km IS PROPOSED. THE SEEKER WOULD USE A CODED SYSTEM TO INTERROGATE DEPLOYED BEACON TRANSPONDERS THAT HAVE A CAPABILITY OF TRANSMITTING RANGE DATA AND ALSO DIGITALLY ENCODED WORD MESSAGES OR DATA FROM SENSORS ATTACHED TO THE TRANSPONDER. AZIMUTH OF THE TRANSPONDER WOULD BE DETERMINED BY DIRECTION FINDING EQUIPMENT INCLUDED IN THE CENTRAL MONITOR SYSTEM. INCOMING INFORMATION FROM THE TRANSPONDERS WILL BE PROCESSED BY A COMPUTER AND THE LOCATIONS AND RELATED DATA WILL BE DISPLAYED ON A LCD SCREEN. THE DEPLOYED TRANSPONDERS WOULD REMAIN COVERT (NON TRANSMITTING) EXCEPT THEN THEY ARE INTERROGATED BY CODED MESSAGE FROM THE CENTRA MONITOR STATION. THIS LATTER FEATURE WILL PROVIDE A CAPABILITY OF TRACKING A NUMBER OF TRANSPONDERS AND WILL ALSO MAKE IT POSSIBLE TO ACHIEVE LONG BATTERY LIFE AND LIGHT WEIGHT TRANSPONDERS. THE CENTRAL SEEKER SYSTEM WOULD WEIGH ABOUT 50 LBS AND BE FITTED INTO A SUITCASE SIZE CONTAINER. THE TRANSPONDERS, EXCLUSIVE OF ATTACHED SENSORS, WILL WEIGH ABOUT 1 LB.

HNC INC/HECHT-NIELSEN NEUROCOMPUTER CORP
5501 OBERLIN DR
SAN DIEGO, CA 92121
CONTRACT NUMBER: DAAL01-88-C-0810
DR FRECHET N LEGRAND
TITLE:
NEURAL NETWORK ARCHITECTURE
TOPIC# 91 OFFICE: ETDL/LABCOM IDENT#: 26484

DURING PHASE I OF THE NEURAL NETWORK PROGRAM, HNC WILL: IDENTIFY AND ANALYZE APPROPRIATE HIGH-PAYOFF ARMY BATTLEFIELD PROCESSING PROBLEMS; DERIVE A SET OF NEUROCOMPUTER PROCESSING REQUIREMENTS FOR THESE PROBLEMS; DEVELOP A PRELIMINARY CONCEPTUAL DESIGN FOR A GENERAL PURPOSE BATTLEFIELD NEUROCOMPUTER THAT WILL SATISFY THE REQUIREMENTS FOR APPLICATIONS IN AS MANY OF THESE PROBLEM AREAS AS POSSIBLE. TO ACCOMPLISH THESE OBJECTIVES, HNC WILL VISIT SEVERAL ARMY ACTIVITIES AND ESTABLISH HIGH-PAYOFF ARMY BATTLEFIELD NEUROCOMPUTER APPLICATIONS. THESE APPLICATIONS WILL BE TRANSLATED IN SUCCESSION INTO

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NEURAL NETWORK ARCHITECTURES, NEUROCOMPUTER PROCESSING REQUIREMENTS, AND FINALLY INTO A NEURAL NETWORK HARDWARE ARCHITECTURE. THE NON-DEVELOPMENT AND DEVELOPMENT ITEMS OF THIS HARDWARE ARCHITECTURE WILL BE IDENTIFIED, AND NEW SEMICONDUCTOR CHIPS WILL BE DESCRIBED USING VHSIC SPECIFICATIONS. HNC WILL ALSO DELIVER A CHARACTERISTIC DEMONSTRATION OF NEUROCOMPUTER PROCESSING APPLIED TO A TYPICAL ARMY TARGET RECOGNITION PROBLEM.

II-VI INC
SAXONBURG BLVD
SAXONBURG, PA 16056
CONTRACT NUMBER: DAAB07-88-C-F417
DONALD R NICHOLS
TITLE:
THE IMPACT AND REDUCTION OF CdZnTe SUBSTRATE DEFECTS ON OMVPE HgCdTe EPILAYER PERFORMANCE
TOPIC# 209 OFFICE: CECOM/NV IDENT#: 25775

DEFECTS IN THE CdTe FAMILY OF SUBSTRATES ARE OF CRITICAL IMPORTANCE WHEN GROWING EXPITAXIAL FILMS OF HgCdTe BY LPE, OMVPE OR MBE. PRE-CIPITATES, DISLOCATIONS, AND SUBGRAIN STRUCTURE IN SUBSTRATES DEGRADE THE SURFACE MORPHOLOGY AND MICROSTRUCTURE OF EXPITAXIAL LAYERS, LEADING TO DECREASED EPILAYER YIELDS AND POOR IR DETECTOR PER-FORMANCE. MISMATCH BETWEEN THE LATTICE PARAMETERS OF SUBSTRATE AND EPILAYER CAN LEAD TO HIGHER DISLOCATION DENSITY, POOR SURFACE MORPHOLOGY, AND STRAIN IN THE EPILAYER. PHASE I WILL QUANTIFY THE EFFECT ON CdZnTe SUBSTRATE LATTICE STRAIN, SUBGRAIN STRUCTURE AND MISMATCH ON THE PROPERTIES OF HgCdTe EPILAYERS GROWN BY OMVPE AND ON SUBSEQUENT IR DETECTOR YIELDS. PHASE II IS EXPECTED TO BROADEN THE SCOPE OF THE STUDY TO DETERMINE THE ROLES OF Te PRECIPITATES, ETCH PIT DISTRIBUTION, MICROTWINNING, AND PURITY IN SUBSTRATE-EPILAYER INTERACTIONS.

INTECH INC
12900J AUTOMOBILE BLVD
CLEARWATER, FL 34622
CONTRACT NUMBER: DAAA21-88-C-0136
R W CARPENTER
TITLE:
ENCASEMENT OF STICK PROPELLANT FOR ARTILLERY CHARGES
TOPIC# 9 OFFICE: ARDEC IDENT#: 27023

SUBMITTED BY

CONTAINMENT OF THE STICK PROPELLANT WILL BE ACCOMPLISHED USING HEAT SHRINKABLE POLYOLIFIN FILM. THIS WILL ALLOW REPLACING THE NITROCELLULOSE CARTRIDGE CASE BUT CONTINUING TO USE THE CASE COMPONENT PARTS, SUCH AS THE BASE END CAP. STICK PROPELLANT WILL BE BUNDLED AND ASSEMBLED WITH THE COMPONENT PARTS USING AN ASSEMBLY FIXTURE, OR HOLDER. THE POLYOLIFIN FILM WILL BE SLIPPED OVER THE PARTS AND PASSED THROUGH A HOT AIR TUNNEL CAUSING SHRINKING OF THE FILM AND RETENTION OF ALL COMPONENTS.

INTEGRATED SOFTWARE INC
PO BOX 060295
PALM BAY, FL 32906
CONTRACT NUMBER: DAAB07-88-C-8030
STEVEN VON EDWINS
TITLE:
SPECIFICATION AND VERIFICATION OF TIMING CONSTRAINTS FOR ADA-EMBEDDED-REAL TIME SYSTEMS
TOPIC# 195 OFFICE: CECOM/CSE IDENT#: 25559

THE PROPOSED PROJECT DEFINES METHODS AND TOOLS FOR SPECIFYING TIMING CONSTRAINTS FOR SOFTWARE WRITTEN IN ADA. THE PROJECT WILL ALSO DEFINE COMPANION METHODS AND TOOLS FOR VERIFYING THAT THOSE CONSTRAINTS ARE MET. ISI PROPOSES TO ANALYZE ARMY REQUIREMENTS FOR TIME CONSTRAINED SOFTWARE. RESULTS WILL BE USED TO DERIVE REQUIREMENTS FOR METHODS WHICH SPECIFY TIME CONSTRAINTS AND VERIFY COMPLIANCE. WE WILL DEFINE CANDIDATE METHODS AND SELECT THE ONE WHICH BEST ADDRESSES THE ARMY'S NEEDS. THESE EFFORTS WILL BE AUGMENTED BY ONGOING WORK AT ISI. PROGRAMS ARE UNDERWAY INVOLVING DISTRIBUTED REAL-TIME ADA, ADA RUN-TIME ENVIRONMENTS FOR REAL-TIME APPLICATIONS, HARDWARE BASED REAL-TIME GARBAGE COLLECTION AND TASK MANAGEMENT, AND ALTERNATIVE SCHEDULING AND DISPATCHING SCHEMES FOR REAL-TIME ADA. ISI IS PERFORMING THIS WORK UNDER CONTRACT TO THE AIR FORCE, NAVY, AND THE STARS PROGRAM.

INTEGRATED SYSTEMS INC
2500 MISSION COLLEGE BLVD
SANTA CLARA, CA 95054
CONTRACT NUMBER: DAAA21-88-C-0278
DR M PACHTER
TITLE:
OPTIMAL GUIDANCE FOR PROJECTILES WITH DISCRETE CONTROL
TOPIC# 17 OFFICE: ARDEC IDENT#: 27028

SUBMITTED BY

DEVELOPMENT OF A NONLINEAR OPTIMAL GUIDANCE ALGORITHM FOR COMMAND-GUIDED OR HOMING PROJECTILES THAT USE DISCRETE, IMPULSIVE CONTROL IS PROPOSED. THE NONLINEAR EFFECTS OF DISCRETE, IMPULSIVE CONTROL WILL BE EXPLICITY RECOGNIZED IN THE ALGORITHM USING STATISTIC LINEARIZATION THEORY, AND CONTROL WILL BE SUPERIMPOSED UPON A PSEUDO-PARABOLIC STATE-SPACE MODEL OF THE SYSTEM. ASPECTS OF DIFFERENTIAL GAME THEORY WILL BE APPLIED TO INTEGRATE THE INITIAL TARGETING (GUN-LAYING) AND TERMINAL GUIDANCE ASPECTS OF THE PROBLEM.

INTEGRATED SYSTEMS RESEARCH CORP
6312 VARIEL AVE - STE 210
WOODLAND HILLS, CA 91367
CONTRACT NUMBER: DAAB07-88-C-A046
DR MICHAEL SAMET
TITLE:
APPLICATION OF AN EXPERT SYSTEM TO SUPPORT SCENARIO GENERATION FOR COMMAND AND CONTROL SIMULATION
TOPIC# 198 OFFICE: CECOM IDENT#: 25590

LOW COST, YET POWERFUL AND VERSATILE COMPUTER-BASED COMMAND AND CONTROL (C2) SIMULATION TOOLS ARE NOW AVAILABLE TO SUPPORT C2 TRAINING AND PERFORMANCE ASSESSMENT. THE USE OF SUCH SYSTEMS IN TRAINING AND SIMULATION EXERCISES REQUIRES THE DEVELOPMENT OF REALISTIC SCENARIOS THAT PORTRAY DIFFERENT BATTLEFIELD SITUATIONS AND POSTURES (OFFENSE, DEFENSE, COUNTER-ATTACK, ETC.). SCEANARIO GENERATION, WHICH INVOLVES SUCH TASKS AS DETERMINING FORCE COMPOSITION, UNIT IDENTIFICATION AND PLACEMENT, DRAWING OVERLAYS OF GROUND ENVIRONMENT SYMBOLS (E.G., LINES, AREAS, ETC.), IS A VERY TEDIOUS AND CUMBERSOME TASK THAT CURRENTLY MUST BE PERFORMED MANUALLY FOR THE MOST PART. HOWEVER, SINCE SCENARIO DEVELOPERS ARE GUIDED BY WELL-ESTABLISHED RULES OF DOCTRINE AND TACTICS, IT APPEARS WORTHWHILE TO RESEARCH THE APPLICATION OF A SUITABLE GENERIC EXPERT SYSTEMS MODEL TO FACILITATE THE SCENARIO GENERATION PROCESS. IN THE PROPOSED PROGRAM, ISR PLANS TO INTEGRATE TWO TECHNOLOGIES: AN EXISTING PC-BASED C2 SIMULATION SYSTEM, WITH AN OFF-THE-SHELF EXPERT SYSTEMS GENERATOR. THE RESULT WILL BE A NEW, ARTIFICIAL INTELLIGENCE (AI) METHODOLOGY FOR AIDING AND AUTOMATING SCENARIO GENERATION, APPLIED TO COMPUTER-DISPLAYED C2 MAPS, TACTICAL SYMBOLOGY, AND OTHER SYMBOLS FOR THE GROUND

SUBMITTED BY

ENVIRONMENT.

INTER-SCIENCE INC
105 JORDAN RD
TROY, NY 12180
CONTRACT NUMBER: DAAA21-88-C-0187
JAMES T WOO
TITLE:
DIAMOND-LIKE FILMS FOR EM LAUNCHER INSULATOR APPLICATIONS
TOPIC# 5 OFFICE: ARDEC IDENT#: 27019

MATERIALS, BOTH CONDUCTORS AND INSULATORS, CAPABLE OF WITHSTANDING THE VERY HOSTILE PLASMA CONDITIONS FOUND IN AN ELECTROMAGNETIC LAUNCHER IS CURRENTLY ONE OF THE WEAK LINKS FOR THE DEVELOPMENT OF SUCH SYSTEMS. ONE OF THE BEST SUBSTANCES KNOWN FOR INSULATORS IS DIAMONDS. WE HAVE RECENTLY BEEN ABLE TO PRODUCE EXTREMELY UNIFORM DIAMOND-LIKE FILMS IN OUR LABORATORY. THE FILM IS DISTINGUISHED BY A COMPLETE LACK OF GRAPHITE CONTENT AND UNDER ELECTRON MICROSCOPE, SHOWED NO FINE STRUCTURE DOWN TO MICRON SIZE. SINCE THE MATERIAL IS PRODUCED UNDER PLASMA ASSISTED CONDITIONS, IT SHOULD ALSO BE ABLE TO TOLERATE FAIRLY HOSTILE CONDITIONS AFTER THE MATERIAL IS FORMED. THEREFORE, MATERIALS COATED WITH DIAMOND-LIKE FILMS MAY BE SUITABLE INSULATOR FOR USE IN HYPERVELOCITY EM GUNS. A PHASE I PROGRAM TO PREPARE SAMPLES OF THE MATERIAL ON SUITABLE SUBSTRATES TO BE TESTED IN A PLASMA THAT SIMULATES THE CONDITION TO BE ENCOUNTERED IN EM LAUNCHERS IS PROPOSED. IF THE RESULTS ARE ENCOURAGING, A MORE AMBITIOUS PROGRAM TO COAT MATERIALS FOR INCORPORATION INTO OPERATING EM GUNS CAN BE CARRIED OUT UNDER PHASE II.

INTERACTIVE RADIATION INC (INRAD)
181 LEGRAND AVE
NORTHVALE, NJ 07647
CONTRACT NUMBER: DACA33-89-C-0002
THOMAS NOWICKI
TITLE:
HIGH ACCURACY FIELD RESISTANCE MEASUREMENTS
TOPIC# 169 OFFICE: CRREL IDENT#: 25468

SUBMITTED BY

THIS PHASE I EFFORT WILL ENDEAVOR TO DEVELOP THE DESIGN OF A HAND HELD, BATTERY OPERATED INSTRUMENT CAPABLE OF NUMERICALLY DISPLAYING HIGHLY ACCURATE RESISTANCE AND TEMPERATURE READINGS. A DIGITAL RATHER THAN ANALOG APPROACH IS PROPOSED. AN INTERNAL STABILIZATION SCHEME IS USED TO ISOLATE SENSITIVE COMPONENTS FROM THE ACCURACY DEGRADING EFFECTS OF THE OPERATING AMBIENT TEMPERATURE RANGE (-35 TO +45 DEG C). ANALYSES CONTAINED HEREIN INDICATE THAT RESISTANCE MEASUREMENT ACCURACY OF 40 PPM IS ACHIEVABLE AND THAT THE INTERNAL MICROPROCESSOR IS CAPABLE OF CONVERTING THERMISTOR READINGS TO TEMPERATURE READINGS WITH ACCURACY OF 0.001 DEG C. TOTAL ENERGY REQUIREMENTS ARE ALSO DISCUSSED AND METHODS OF REDUCING BATTERY SIZE AND WEIGHT ARE PROPOSED. SPECIFIC ELECTRONIC COMPONENTS ARE IDENTIFIED WHICH WILL MOST LIKELY BE USED IN PHASE I DEMONSTRATION HARDWARE.

INTERNATIONAL MOBILE MACHINES CORP
100 - N 20TH ST
PHILADELPHIA, PA 19103
CONTRACT NUMBER: DAAB07-88-C
ALLEN D DAYTON
TITLE:
TACTICAL DIGITAL CELLULAR COMMUNICATIONS ARCHITECTURE
TOPIC# 199 OFFICE: CECOM/C3 IDENT#: 25609

THE ARMY'S FUTURE TACTICAL TELEPHONE SYSTEM AT CORPS AND LOWER ECHELONS IS BASED UPON THE MOBILE SUBSCRIBER EQUIPMENT (MSE). MSE WILL PROVIDE A TOTAL TELEPHONE CAPABILITY TO INCLUDE: 16 Kbps TRUCKS, TRI-TAC, DSC AND NATO INTERFACES, DIGITAL SWITCHING, DIGITAL FACSIMILE, SECURE AND NON-SECURE SERVICE, CELLULAR MOBILITY, INTERFACE WITH SINGGRARS SNR. THE MSE ARCHITECTURE WITHIN THE CORPS CONSISTS OF 42 NODE CENTER SWITCHES, LARGE EXTENSION NODES, SMALL EXTENSION NODES, RADIO ACCESS UNITS AND MOBILE SUBSCRIBER TERMINALS. SUBSCRIBER WIRELINE LOOPS ARE THE PRINCIPLE ACCESS METHOD TO THE MSE. A SIGNIFICANT AMOUNT OF WIRELINE MUST BE INSTALLED EACH TIME A UNIT DISPLACES. MSE IS NOT VERY MOBILE IN TERMS OF THE BULK OF THE USERS, AND ITS CAPACITY IS SOMEWHAT LIMITED. ANY SOLUTION MUST CAPATIIZE ON THE MSE CAPABILITIES AND IMPROVE THEM. COMMERCIALLY AVAILABLE DIGITAL CELLULAR TECHNOLOGY COULD BE ADAPTED TO ENHANCE

SUBMITTED BY

MSES. THIS PROPOSAL IS TO STUDY THE PRESENT PROBLEM, ANALYZE THE ARCHITECTURE, RECOMMEND METHODS FOR INCORPORATING DIGITAL CELLULAR AND HIGHLIGHT THE RATIONALE FOR INTEGRATING NEW TECHNOLOGY.

IONIC ATLANTA INC
1347 SPRING ST
ATLANTA, GA 30309
CONTRACT NUMBER: DAAL04-88-C-0048
DR KEITH O LEGG
TITLE:
PLASMA AND ION FLUORINATION FOR CHEMICAL HARDENING OF SYNTHETIC RUBBERS
TOPIC# 84 OFFICE: MTL/LABCOM IDENT#: 26734

ALTHOUGH DESIGNED FOR ANTI-PERSONNEL USE, CHEMICAL WARFARE AGENTS, THEIR HYDROLYSIS PRODUCTS AND THE NECESSARY DECONTAMINATING CHEMICALS ALSO CORRODE POLYMERS, SUCH AS THOSE USED IN SEALS, FABRICS AND VEHICLE COMPONENTS. RECENTLY PLASMA FLUORINATION HAS SHOWN PROMISE AS A MEANS OF CHEMICALLY HARDENING POLYMER SURFACES. FLUORINATION PRIMARILY IMPROVES THE SURFACE BY PREVENTING WETTING BY THE AGENT, SO THAT IT CANNOT ATTACK AND PERMEATE THE SURFACE. THIS PROGRAM IS AIMED AT DEVELOPING THE PLASMA FLUORINATION TECHNIQUE FOR USE ON SYNTHETIC RUBBERS SUCH AS THOSE IN VEHICLE ENGINES. THE PRIMARY EMPHASIS IN PHASE I WILL BE A COMPARISON OF A STANDARD PLASMA FLUORINATION METHOD WITH A NOVEL TECHNIQUE TO DETERMINE WHICH IS THE MOST EFFECTIVE AND EFFICIENT IN TREATING THREE TYPICAL MILITARY RUBBERS. THESE METHODS WILL BE COMPARED WITH FLUORINE ION IMPLANTATION, WHICH PHYSICALLY PLACES FLUORINE ATOMS WELL BELOW THE SURFACE WHILE SIMULTANEOUSLY EXCITING SURFACE FLUORINATION. EFFECTIVENESS OF THE SURFACE TREATMENTS IN PREVENTING WETTING WILL BE EVALUATED BY EXTENSIVE CRITICAL SURFACE TENSION MEASUREMENTS. FINAL EVALUATION WILL BE DONE BY SIMULANT CHALLENGE. THE PHYSICAL AND CHEMICAL DAMAGE DONE TO THE SURFACE BY THE SIMULANT WILL BE EVALUATED BY ELECTRON MICROSCOPY AND ELECTRON SPECTROSCOPY.

J & D SCIENTIFIC INC
2854 S HAVEN DR
ANNAPOLIS, MD 21401
CONTRACT NUMBER: DAAL01-88-C-0821
LARRY D McCORMICK
TITLE:
NANOMETER ETCHING OF GALLIUM ARSENIDE WITH THE SCANNING TUNNELING MICROSCOPE
TOPIC# 105 OFFICE: ETDL/LABCOM IDENT#: 26634

SUBMITTED BY

SCANNING TUNNELING MICROSCOPY (STM) HAS BEEN DEMONSTRATED TO BE VALUABLE IN THE STUDY OF SURFACES. THE RESULTS OF THESE SURFACE STUDIES INDICATE THAT STM CAN ALSO BE USEFUL FOR SURFACE MODIFICATION ON THE NANOMETER SCALE. HOWEVER, BEFORE THIS POTENTIAL CAN BE FULFILLED, IT MUST BE DEMONSTRATED THAT THE STM CAN BE USED REPRODUCIBLY FOR SOLUTION ETCHING. THE GOAL OF THIS RESEARCH IS TO DEMONSTRATE THAT THE STM HAS THE CAPABILITY OF ETCHING GaAs AT THE SUBMICROMETER LEVEL.

J-TEC ASSOCS INC
317 - 7TH AVE SE
CEDAR RAPIDS, IA 52402
CONTRACT NUMBER: DAAJ02-88-C-0012
JEFF SIMPSON
TITLE:
ADVANCED CONCEPT ICE DETECTOR
TOPIC# 37 OFFICE: AVSCOM IDENT#: 27052

THE GENERAL PURPOSE ICE DETECTOR/ACCUMULATOR PROPOSED IN THIS DOCUMENT EMPLOYS TWO ULTRASONIC SENSING MODES. RAYLEIGH WAVES (SURFACE WAVES) ARE USED TO DETECT THE ONSET OF ICING, AND TIME-OF-FLIGHT MEASUREMENTS IN A NORMAL INCIDENT REFLECTION OF ULTRASONIC PULSES FROM THE ICE LAYERS ARE USED FOR MEASURING APPRECIALBE BUILD-UP THICKNESS OF THE ICE (>0.5mm). THE BASIC PRINCIPLES UNDERLYING A TIME-OF-FLIGHT THICKNESS GAUGE REQUIRE A PULSER/RECEIVER FOR GENERATING AND RECEIVING ELECTRICAL VOLTAGE PULSES AND AN ULTRASONIC TRANSDUCER. WHEN THE PROPAGATING ULTRASONIC PULSE ENCOUNTERS AN ACOUSITC DISCONTINUITY, SOME OF THE ENERGY IS REFLECTED. THE TIME REQUIRED FOR THE ULTRASONIC PULSE TO TRANSVERSE THE ICE LAYER TWICE IS (t(2) -t(1)). THE THICKNESS OF THE ICE IS GIVEN BY THE SPEED OF SOUND IN ICE=v AS THE FOLLOWING EQUATION: L=V/2) (t(2)-t(1)) L=THICKNESS OF ICE. ICING ONSET DETECTION - RAYLEIGH WAVES (SURFACE WAVES) PROPAGATES ON THE SURFACE OF A SOLID. AS BUILD UP OCCURS ON THE SURFACE, THEY WILL SCATTER/DAMPEN THE WAVE. THIS DECREASE IN AMPLITUDE OF THE REFLECTED WAVE FROM AN ACOUSTIC DISCONTINUITY CAN BE USED TO DETECT THE AMOUNT OF ICING.

JRS RESEARCH LABS INC
1036 W TAFT AVE
ORANGE, CA 92665
CONTRACT NUMBER: DAAL01-88-C-0815
ROBERT J SHERAGA
TITLE:
PC BASED VHDL DESIGN SYSTEM
TOPIC# 102 OFFICE: ETDL/LABCOM IDENT#: 26601

SUBMITTED BY

THE ANTICIPATED REQUIREMENT TO USE VHDL AS A LANGUAGE FOR DESCRIBING HARDWARE IN DOD SYSTEMS WILL FORCE GOVERNMENT CONTRACTORS TO ACQUIRE OR BUILD SOFTWARE SYSTEMS TO SUPPORT VHDL PROCESSING. THE EXISTING SOFTWARE SYSTEMS RUN ON EXPENSIVE COMPUTER EQUIPMENT. THIS PROPOSAL IS TO PROVIDE A LOW COST SYSTEM, THAT IS HOSTED ON A PC AND ENCOMPASSES THE REQUIREMENTS OF A SIGNIFICANT SEGMENT OF THE DESIGN COMMUNITY. THE PC SYSTEM WOULD BE INTEGRATED WITH THE EXISTING JRS IDAS FOR EVALUATION AND DEMONSTRATION. THE PHASE I EFFORT WILL FOCUS ON THE SYSTEM DESIGN, SPECIFICATION, AND PLANNING ACTIVITIES INVOLVED.

JSH OPTICS
1495 BIMNI DR
DAYTON, OH 45459
CONTRACT NUMBER: DAAB07-88-C-F412
DR JAMES HARRIS
TITLE:
COHERENCE FILTER
TOPIC# 211 OFFICE: CECOM/NV IDENT#: 25786

A STUDY PROGRAM WILL BE DONE TO SHOW HOW A UNIQUE INTERFEROMETRIC CONCEPT CAN BE UTILIZED TO DEVELOP A COHERENT ELECTRO-OPTICAL FILTER. THE PROPOSED CONCEPT COULD BE UTILIZED IN A VARIETY OF ELECTRO-OPTICAL SYSTEMS THAT MUST OPERATE IN THE PRESENCE OF UNWANTED LASER SOURCES. THE WORK PROPOSED WILL BE CONCERNED WITH THE STUDY AND EVALUATION OF VARIOUS FORMS OF THE COHERENCE FILTER.

KAB LABS INC
3116 MERCER LN
SAN DIEGO, CA 92122
CONTRACT NUMBER: DAAB07-88-C-F415
JOHN KONOTCHICK
TITLE:
FEATURE SET EVALUATION FOR CLASSIFIERS
TOPIC# 215 OFFICE: CECOM/NV IDENT#: 25824

KAB LABORATORIES, INC. PROPOSE A PROGRAM TO UTILIZE AND AUGMENT AN

SUBMITTED BY

EXISTING GENERAL PURPOSE FEATURE SET EVALUATION TOOL, THE ON-LINE PATTERN ANALYSIS AND FEATURE EXTRACTION SYSTEM (OLPARS) DEVELOPED BY PAR GOVERNMENT SYSTEMS CORPORATION, FOR EVALUATION OF FEATURE SETS PROPOSED FOR USE IN AUTOMATIC TARGET RECOGNITION. THE OBJECTIVES OF THIS STUDY ARE TO: (1) IDENTIFY AND PROPOSE A COLLECTION OF FEATURE SET EVALUATION ALGORITHM TOOLS WHICH ADDRESS UNIQUE CHARACTERISTICS OF FEATURE SETS USED IN ATR APPLICATIONS; (2) IMPLEMENT AT LEAST ONE NEW PROMISING FEATURE SET EVALUATION ALGORITHM IN FORTRAN AND INTEGRATE IT INTO THE OLPARS SOFTWARE PACKAGE; (3) DEMONSTRATE THE PERFORMANCE OF THIS ALGORITHM AND COMPARE ITS PERFORMANCE WITH OTHER EXISTING ALGORITHMS ALREADY WITHIN OLPARS USING FEATURE SETS DERIVED FROM BOTH SIMULATED AND REAL E/O IMAGERY; (4) PROVIDE DOD WITH A LICENSED VAX-COMPATIBLE COPY OF THE AUGMENTED OLPARS PACKAGE; (5) DOCUMENT PROPOSED FEATURE SET EVALUATION ALGORITHMS AND TEST RESULTS IN A FINAL REPORT.

KAPPLER SAFETY GP
PO BOX 27 - 524 GUNTER AVE
GUNTERSVILLE, AL 35976
CONTRACT NUMBER:
JOHN D LANGLEY
TITLE:
SEAMING TECHNIQUES FOR CHEMICAL PROTECTIVE FABRICS
TOPIC# 144 OFFICE: NRDEC IDENT#: 25533

THIS SBIR PROJECT ATTEMPTS TO DEMONSTRATE GAS TIGHT SEAMS IN CHEMICAL/BIOLOGICAL PROTECTIVE FABRICS SUCH AS TEDLAR, URATHAN, AND CHLOROPRENE. SEAM SEALING TECHNIQUES FOR EVALUATION INCLUDE ULTRASONICS, CEMENTS, AND DIELECTRIC, HEATED BAR, AND HOT AIR WELDING. HEAT SEALED SEAMS IN A SHEAR TYPE CONFIGURATION AND/OR A COMBINATION OF SEWING AND HEAT SEALED STRAPPING WILL BE INVESTIGATED. ALL CANDIDATE SEAMS WILL BE TESTED FOR LIQUID PENETRATION USING AN ASTM F903 PENETRATION CELL. TEST PILLOWS WILL BE MADE FOR THE MOST PROMISING CANDIDATES FOR EVALUATION USING A POSITIVE PRESSURE AIR TEST WITH A MAGNEHELIC GAUGE. ALL PERTINENT RESULTS AND DATA WILL BE SUMMARIZED IN A CLOSING REPORT.

KD COMPONENTS INC
2710 S MAIN ST
SANTA ANA, CA 92707
CONTRACT NUMBER:
MICHAEL W DAY
TITLE:
HIGH ENERGY DENSITY METALIZED PLASTIC FILM CAPACITOR
TOPIC# 51 OFFICE: HDL IDENT#: 27067

SUBMITTED BY

LITTLE RESEARCH HAS BEEN DONE ON ENERGY DENSITY AND EFFECTIVE SERIES RESISTANCE (ESR) REDUCTION IN CERAMIC CAPACITORS. IT IS BELIEVED THAT BOTH COULD BE IMPROVED THROUGH MECHANICAL DESIGN IMPROVEMENTS AND ELECTRODE/TERMINATION MATERIAL IMPROVEMENT.

KLEIN ASSOCS INC
PO BOX 264 - 800 LIVERMORE ST
YELLOW SPRINGS, OH 45387
CONTRACT NUMBER:
DR GARY A KLEIN
TITLE:
COMMAND DECISION TRAINING
TOPIC# 226 OFFICE: ARI IDENT#: 25020

BETTER TRAINING FOR DECISION MAKING IS NEEDED, ESPECIALLY AT EXECUTIVE LEVELS, THROUGH TRAINING PROGRAMS BASED ON THEORIES OF PROFICIENT DECISION MAKING. RECENTLY A NATURALISTIC THEORY OF DECISION MAKING HAS EMERGED, THE RECOGNITION-PRIMED DECISION (RPD) MODEL, WHICH DESCRIBES PROFICIENT DECISION MAKERS WORKING UNDER TIME PRESSURE AND UNCERTAINTY. THE RPD MODEL HAS BEEN EXTENDED TO DISTRIBUTED DECISION MAKING (DDM), PRIMARILY THE PERFORMANCE OF COMMANDERS AND OPERATIONS OFFICERS. THE RPD MODEL PROVIDES SPECIFICATIONS FOR AN EXECUTIVE DECISION-MAKING TRAINING PROGRAM THAT EMPHASIZES DEVELOPMENT OF SITUATION ASSESSMENT, USE OF IMAGERY TO EXPAND ON SELECTED OPTIONS, AND MANAGEMENT OF THE DDM PROCESS. TWO RESEARCH APPLICATIONS ARE PROPOSED. ONE APPLIED A RECOGNITIONAL DECISION TRAINING PROGRAM WITHIN A BUSINESS SCHOOL, USING THE ARI-BASED EXERCISE VARWARS TO VALIDATE THE QUALITY OF THE TRAINING. THE OTHER APPLIES THE TRAINING PROGRAM TO UNDERGRADUATE COMPUTER SCIENCE MAJORS, VALIDATING IN TERMS OF THE CHARACTERISTICS OF THE PROGRAM WRITTEN BY THE TEAM BEING MANAGED. PHASE II WILL GENERATE A THEORETICAL BASIS FOR COMMAND DECISION TRAINING, IDENTIFY A SET OF EFFECTIVE TECHNIQUES, AND PRESENT GUIDELINES AND MATERIALS FOR THEIR USE.

KMS FUSION INC
PO BOX 1567 - 3853 RESEARCH PARK DR
ANN ARBOR, MI 48106
CONTRACT NUMBER: NAS2-12918
JAMES G DOWNWARD
TITLE:
FULLY INTEGRATED FRINGE ANALYSIS SYSTEM
TOPIC# 40 OFFICE: AVSCOM IDENT#: 27055

SUBMITTED BY

LASER HOLOGRAPHIC INTERFEROMETRY CAN PROVIDE THE AERODYNAMICIST WITH QUANTITATIVE MEASUREMENTS OF THE FLOW FIELD SURROUNDING WIND TUNNEL MODELS. HOWEVER, UNTIL RECENTLY, ROUTINE USE OF HOLOGRAPHIC INTERFEROMETRY HAS BEEN IMPRACTICAL BECAUSE ANALYZING FRINGE DATA IS AN EXTREMELY LABORIOUS PROCESS. KMSF IS NOW DEVELOPING SOFTWARE TO PROVIDE THE TYPE OF FLEXIBLE RESEARCH TOOL THAT IS REQUIRED FOR AUTOMATING THE ANALYSIS OF FRINGE DATA. HOWEVER, THE CURRENT DEVELOPMENT WORK HAS NOT YET ADDRESSED SEVERAL KEY TECHNICAL ISSUES, NAMELY; PROVIDING THE ABILITY TO a) CAPTURE AND ANALYZE FRINGE DATA IN NEAR REAL TIME, AND b) GRAPHICALLY DISPLAY THE RECONSTRUCTED THREE-DIMENSIONAL FLOW FIELD. TO ADDRESS THESE ISSUES, KMSF PROPOSES TO DEVELOP A FULLY INTEGRATED FRINGE ANALYSIS SYSTEM WITH THE ABILITY TO a) SIMULTANEOUSLY MEASURE THE FLOW FIELD SURROUNDING AN AIRFOIL FROM DIFFERENT ANGLES, b) RECORD THESE HOLOGRAMS ON A THERMOPLASTIC RECORDER, c) AUTOMATICALLY RECONSTRUCT AND DIGITIZE THESE HOLOGRAMS, d) ANALYZE THE FRINGE DATA, AND e) PROVIDE A THREE-DIMENSIONAL COLOR GRAPHIC DISPLAY OF THE RECONSTRUCTED FLOW FIELD. DURING THE PHASE I EFFORT, KMSF WILL DEVELOP THE FUNCTIONAL DESIGN SPECIFICATION FOR IMPLEMENTING A FULLY INTEGRATED FRINGE ANALYSIS SYSTEM.

KNOWLEDGE SYSTEMS CORP
2000 REGENCY PKWY - STE 212
CARY, NC 27511
CONTRACT NUMBER: DAAA21-88-C-0195
DR WILLIAM METTREY
TITLE:
SOFTWARE/PROBLEM CORRELATOR
TOPIC# 7 OFFICE: ARDEC IDENT#: 27020

THE PROPOSED RESEARCH WILL RESULT IN THE DEVELOPMENT OF AN EXPERT SYSTEM THAT FUNCTIONS AS AN AUTOMATED PROBLEM SOLVING ADVISOR. THIS EXPERT SYSTEM WILL QUERY THE USER TO IDENTIFY CHARACTERISTICS AND REQUIREMENTS OF THE PROBLEM TO BE SOLVED. WHEN NECESSARY, THE EXPERT SYSTEM WILL PARTITION THE PROBLEM INTO SUB-PROBLEMS. IT WILL ADVISE THE USER ABOUT THE MOST EFFECTIVE SOLUTION APPROACHES AND ALSO AID IN THE SELECTION OF APPROPRIATE TOOLS TO IMPLEMENT THESE SOLUTIONS. THE PROBLEM SOLVING ADVISOR WILL CONTAIN KNOWLEDGE ABOUT A NUMBER OF SOLUTION APPROACHES INCLUDING ARTIFICIAL INTELLIGENCE,

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HIGH-ORDER LANGUAGES AND PROGRAMMING METHODOLOGIES, DATABASE SYSTEMS, ALGORITHMS, AND OPERATIONS RESEARCH TECHNIQUES. IN ADDITION, THE EXPERT SYSTEM WILL BE CAPABLE OF JUSTIFYING ITS SELECTIONS.

KRUTH-MICROWAVE ELECTRONICS CO (K-MEC)
2600 CABOVER DR - STE H
HANOVER, MD 21076
CONTRACT NUMBER: DAAB10-88-C-0151
JEFFREY A KRUTH
TITLE:
NOVEL HIGH POWER SOLID STATE AMPLIFIER DESIGNS
TOPIC# 220 OFFICE: CECOM/SWL IDENT#: 25859

JAMMER AMPLIFIERS FOR THE HF TO VHF RANGE NEED TO BE SMALLER, LIGHTER AND MORE CAPABLE. INTEGRATION METHODS BORROWED FROM IC FABRICATION PROMISE GREAT REWARDS. A STUDY IS PROPOSED TO INVESTIGATE CIRCUIT DESIGNS FOR APPLICABILITY TO INTEGRATION. PASSIVE COMPONENT ANALYSIS WILL BE PERFORMED TO SEE WHAT BENEFITS CAN BE GAINED. HYBRIDIZATION APPROACHES ARE FAVORED, BUT MONOLITHIC METHODS WILL BE CONSIDERED. CIRCUIT SYNTHESIS WILL BE CONDUCTED USING DEVICE MODELS DEVELOPED FROM MANUFACTURERS S-PARAMETERS. COMPUTER AIDED DESIGN METHODS WILL BE USED TO ANALYZE/OPTIMIZE VARIOUS TOPOLOGIES. PASSIVE COMPONENTS WILL ALSO BE MODELLED AND ANALYZED. BOTH MOSFETS AND BJTS WILL BE INVESTIGATED FOR SUITABILITY. DATA REPRESENTING THE STATE-OF-THE-ART WILL BE OBTAINED FOR THESE DEVICES. PRACTICAL ASPECTS SUCH AS DEVICE MOUNTING, COOLING AND FABRICATION OF CIRCURITY, ETC. WILL BE INCLUDED. TRAVELING-WAVE STRUCTURES WILL BE CONSIDERED FOR 1-200 MHz POWER MOSFET AMPLIFIER APPLICATION. BUILDING BLOCK TYPE TECHNIQUES FOR COMBINING UNIT AMPLIFIERS WILL BE STUDIED. BREADBOARDS ILLUSTRATION INTEGRATION TECHNIQUES MAY BE CONSTRUCTED. EMPHASIS WILL BE ON PRACTICAL COMPONENT REALIZATIONS AIMED AT INTEGRATION.

LASER TECHNOLOGY ASSOCS INC
148 VESTAL PKWY E
VESTAL, NY 13850
CONTRACT NUMBER: DAAB07-88-C-P035
DR DAVID C BROWN
TITLE:
COMPREHENSIVE EVALUATION OF TUNABLE VISIBLE LASER SOURCES
TOPIC# 204 OFFICE: CECOM/EW IDENT#: 25697

SUBMITTED BY

TUNABLE LASERS ARE REQUIRED FOR MANY MILITARY AND COMMERCIAL APPLICATIONS BUT MUST POSSESS WIDE TUNABILITY, EFFICIENCY, STABILITY, AND LONG-LIFETIME. IN THE PAST FEW YEARS TUNABLE SOLID-STATE LASERS SUCH AS Ti:SAPPHIRE HAVE BEEN DEVELOPED AND WHICH WHEN DOUBLED CAN PROVIDE TUNABLE EMISSION IN THE 500-600 nm VISIBLE REGION. SURPRISINGLY, NO COMPREHENSIVE STUDY HAS BEEN REPORTED THAT COMPARES THE PERFORMANCE OF VARIOUS SOLID-STATE LASERS, NOR HAVE VARIOUS COMPETING LASER MEDIA (E.G. SOLID-STATE, LIQUID DYE, ETC.) BEEN COMPARED. WE PROPOSE TO EVALUATE ALL KNOWN LASER MEDIA TO DETERMINE, FOR EACH SPECTRAL REGION CHOSEN, WHICH LASER BEST COMBINES THE ATTRIBUTES REQUIRED.

LASER TECHNOLOGY ASSOCS INC
148 VESTAL PKWY E
VESTAL, NY 13850
CONTRACT NUMBER: DAAB07-88-C-F408
DR DAVID C BROWN
TITLE:
EFFICIENT DIODE-PUMPED Er:GLASS LASER
TOPIC# 216 OFFICE: CECOM/NV IDENT#: 25834

LASER RANGEFINDERS, DESIGNATORS, AND RADARS OPERATING IN THE EYE-SAFE SPECTRAL REGION ARE REQUIRED FOR VARIOUS ARMY MISSIONS. THE REGION AROUND 1.5 MICRONS IS PARTICULARLY ATTRACTIVE. THE FAVORED CURRENT APPROACH TO PRODUCING EYE-SAFE LASERS IS TO RAMAN SHIFT THE OUTPUT OF Nd:CLASS, Nd:YAG, OR Nd:YLF LASERS. WE PROPOSE TO SHOW THE FEASIBILITY OF DEMONSTRATING AN EFFICIENT, ALL SOLID-STATE, DIODE-PUMPED Er:GLASS LASER OPERATING AT 1.54 MICRONS.

LASER TECHNOLOGY ASSOCS INC
148 VESTAL PKWY E
VESTAL, NY 13850
CONTRACT NUMBER: DAAA21-88-C-0126
DR DAVID C BROWN
TITLE:
COHERENT FILTER
TOPIC# 27 OFFICE: ARDEC IDENT#: 27039

SUBMITTED BY

WE PROPOSE A MEANS OF CONSTRUCTING A COHERENCE FILTER, WHICH IS TRANSMISSIVE BROADBAND FOR VISIBLE INCOHERENT LIGHT, BUT REFLECTING FOR COHERENT RADIATION.

LB&M ASSOCS
111 - SW 'C' AVE
LAWTON, OK 73501
CONTRACT NUMBER:
DR CARROLL THRONESBERY
TITLE:
PATTERN RECOGNITION FOR COMBAT LEADERS
TOPIC# 226 OFFICE: ARI IDENT#: 25021

THERE IS A NEED TO DESIGN AN ARMY TRAINING STRATEGY FOR DEVELOPING DECISION AND THINKING SKILLS REQUIRED OF LEADERS IN COMBAT. AT THE CORE OF THIS STRATEGY MUST BE VALID LEARNING TECHNIQUES. PATTERN RECOGNITION THEORY IS PROPOSED AS A STRONG CANDIDATE TECHNIQUE. THIS SBIR SUGGESTS AN APPROACH FOR CONDUCTING FURTHER RESEARCH INTO PATTERN RECOGNITION AND DESIGNING A PLAN FOR IMPLEMENTING PATTERN RECOGNITION TECHNIQUES WITHIN ARMY LEADERSHIP COURSES. PHASE I WORK WILL LEAD TO THE DEVELOPMENT OF A PROTOTYPE COURSE FOR PHASE II TESTING OF VALIDITY, LEARNING TIME AND DECAY OF SKILLS LEARNED.

LB&M ASSOCS INC
111 SW "C" AVE - STE 200
LAWTON, OK 73501
CONTRACT NUMBER: DAAA15-88-C-0027
DEBORA R GLEASON
TITLE:
ARTIFICIAL INTELLIGENCE FOR LOGISTICS PLANNING SYSTEMS
TOPIC# 73 OFFICE: HEL/LABCOM IDENT#: 26278

THE FLUID SITUATIONS ENCOUNTERED ON THE MODERN BATTLEFIELD WILL DICTATE THAT PROVIDERS OF SUPPORT BE RESPONSIVE, FLEXIBLE AND DEMONSTRATE INITIATIVE. THE REALITIES OF OUR AUSTERE LOGISTICS STRUCTURE REQUIRE THAT THEY BE HIGHLY SYNCHRONIZED TO ORDER TO MEET

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ESSENTIAL NEEDS WITH AVAILABLE RESOURCES. TO MEET THE SUPPORT CHALLENGES THE NEXT BATTLE WILL PRESENT, THE ARMY NEEDS AN AUTOMATED, KNOWLEDGE-BASED SYSTEM WHICH WILL ALLOW LOGISTICS PLANNERS TO PERFORM THEIR DUTIES, REGARDLESS OF ECHELON OR TYPE OF LOGISTICS ORGANIZATION, IN A CLASSIC "MORE-BETTER-FASTER" MANNER. THIS PHASE I EFFORT WILL DEFINE THE REQUIREMENTS FOR A PETROLEUM SUPPLY DECISION SUPPORT SYSTEM (AS A SUBSET WITHIN THE LOGISTICS PLANNING FIELD) AND MODEL THAT DECISION SUPPORT SYSTEM. THIS PROJECT WILL ESTABLISH THE FOUNDATION FOR ALL LOGISTICS PLANNING DECISION SUPPORT SYSTEMS AT ALL LEVELS AND WITHIN THE ARMY'S MAJOR FUNCTIONAL AREAS.

LB&M ASSOCS INC
111 SW 'C' AVE - STE 200
LAWTON, OK 73501
CONTRACT NUMBER: DAAA15-88-C-0035
CRAIG L JENSEN
TITLE:
TARGET VALUE ANALYSIS
TOPIC# 68 OFFICE: BRL IDENT#: 26839

LB&M ASSOCIATES AND PERCEPTRONICS ARE UNIQUELY QUALIFIED TO DEVELOP TECHNIQUES AND INNOVATIVE RECOMMENDATIONS FOR TARGET VALUE ANALYSIS. THE LB&M/PERCEPTRONICS TEAM WILL USE A "TOTAL SYSTEM APPROACH" AND THE REPORT WILL ADDRESS ALL AREAS (DOCTRINE, MATERIEL, FORCE STRUCTURE, AND TRAINING) BUT EMPHASIS WILL BE PLACED ON THE MOST OBVIOUS AREAS OF NEED. THE PHASE I EFFORT WILL PROVIDE A DETAILED CONCEPT FOR DETERMINING DOCTRINAL, SITUATIONAL, AND RELATIONAL TARGET VALUES. IT WILL INCLUDE DEFAULT VALUES FOR GENERAL USE AND WILL BE CAPABLE OF ACCEPTING CHANGES IN GUIDANCE AND IN EACH VALUE THAT MAKES UP THE TOTAL TARGET VALUE. METHODOLOGY FOR ACCOMPLISHING THIS WORK INCLUDES PERFORMING A FUNCTIONAL DECOMPOSITION OF TARGET ATTRIBUTES WITH AN OBJECTIVE TO VIEW THE TOTAL SITUATION FROM THE ENEMY FORCE PERSPECTIVE. THE TOTAL SYSTEM WILL PROVIDE CONSISTENCY IN VALUING TARGETS THROUGHOUT A COMMAND AND WILL ENSURE ALL AVAILABLE INFORMATION IS EVALUATED FOR RELATIVE IMPORTANCE. THE PLAN AND METHODOLOGY FOR PERFORMING THE FOLLOW-ON PHASE II DETAILED ANALYSIS ALSO WILL BE PROVIDED AS PART OF THE PHASE I EFFORT. THIS PHASE WILL FOCUS ON DETAILED ANALYSES REQUIRED TO PROVIDE A SOLID, SUPPORTABLE BASIS FOR TVA PROGRAMS AND THE JUSTIFICATION AND SUPPORT IN THE BUDGET PROCESS.

SUBMITTED BY

LICA SYSTEMS INC
10400 EATON PL - STE 312
FAIRFAX, VA 22030
CONTRACT NUMBER: DAAB07-88-C-L808
KENNETH M IRISH
TITLE:
ADVANCED INTEGRATED SERVICES DATA DISTRIBUTION FOR TACTICAL C3I
TOPIC# 193 OFFICE: CECOM/ASC IDENT#: 25540

THE ARMY'S CURRENT TACTICAL COMMUNICATIONS ARCHITECTURE CONSISTS OF THREE VERY CAPABLE BUT INDEPENDENT SYSTEMS: THE ARMY DIGITAL DATA SYSTEM (ADDS), THE MOBILE SUBSCRIBER EQUIPMENT (MSE), AND THE COMBAT NET RADIO FUNCTIONAL SYSTEM (CNR). FULLY AUTOMATED INTERFACES BETWEEN THESE SYSTEMS DO NOT EXIST. IN ADDITION, EACH SYSTEM HAS BEEN TAILORED FOR ONLY ONE TYPE OF COMMUNICATION SERVICE AND IN THE CASE OF ADDS ONLY HANDLE ONE SERVICE (E.G., DATA). WITH THE ADVENT OF DIGITAL COMMUNICATION SYSTEMS IT IS NOW POSSIBLE TO COMBINE SERVICES (E.G., VOICE, DATA, GRAPHICS, FACSIMILE AND VIDEO) INTO A SINGLE INTEGRATED DIGITAL COMMUNICATION SYSTEM. THE COMMERCIAL COMMUNICATION WORLD IS MOVING TO PROVIDE INTEGRATED SERVICES. THIS PROPOSED EFFORT IS TO DEVELOP THE RATIONAL AND ARCHITECTURE FOR A TACTICAL INTEGRATED SERVICES DIGITAL COMMUNICATION SYSTEM EMPLOYING MSE, CNR, EPLRS.

LIGHTWAVE ELECTRONICS CORP
897-5A INDEPENDENCE AVE
MOUNTAIN VIEW, CA 94043
CONTRACT NUMBER: DAAB07-88-C-F414
DR RICHARD WALLACE
TITLE:
EFFICIENT HIGH-POWER DIODE-PUMPED SOLID STATE LASERS
TOPIC# 216 OFFICE: CECOM/NV IDENT#: 25835

DIODE LASER PUMPED SOLID-STATE LASERS ARE EFFICIENT, COMPACT, ALL SOLID-STATE SOURCES OF COHERENT OPTICAL RADIATION. MAJOR ADVANCES IN THE LINEAR POWER DENSITY OF LASER DIODES HAVE RECENTLY OCCURRED.

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THIS IS A PROPOSAL TO INVESTIGATE AND DEMONSTRATE AN INNOVATIVE TECHNIQUE FOR USING THESE NEW HIGH BRIGHTNESS DIODES IN A SIMPLE AND EFFICIENT END PUMPED ARRANGEMENT TO MAKE ALL SOLID-STATE LASERS. THESE LASERS WOULD HAVE OUTPUT POWERS IN THE 1-10 WATT RANGE.

LIGHTWAVE ELECTRONICS CORP
897-5A INDEPENDENCE AVE
MOUNTAIN VIEW, CA 94043
CONTRACT NUMBER: DAAL02-88-C-0007
DR THOMAS KANE
TITLE:
OPTICAL TRANSMISSION OF MICROWAVE SIGNALS USING TWO ULTRA-STABLE LASERS
TOPIC# 47 OFFICE: HDL IDENT#: 27062

OPTICAL TRANSMISSION OF MICROWAVE SIGNALS AS HIGH AS 100 GHz CAN BE ACHIEVED BY MIXING ON A PHOTO-DETECTOR TWO SINGLE FREQUENCY OPTICAL SIGNALS. MONOLITHIC, LASER DIODE-PUMPED SOLID STATE LASER ARE CAPABLE OF PROVIDING THE SINGLE FREQUENCY OPTICAL SIGNAL. THESE LASERS ARE EXTREMELY SMALL, MECHANICALLY STABLE, AND ELECTRICALLY VERY EFFICIENT. TO PRODUCE A VERY STABLE YET FREQUENCY AGILE MICROWAVE SOURCE USING TWO LASERS, WE PROPOSE TO INVESTIGATE A LASER OF EXCELLENT FREQUENCY STABILITY AND TO LOCK TWO OF THESE LASERS TOGETHER AT A PRECISE DIFFERENCE FREQUENCY. IN PHASE I WE WOULD GAIN AN UNDERSTANDING OF THE NOISE SOURCES IN OUR EXISTING SINGLE FREQUENCY LASERS, INVESTIGATE RAPID TUNING OF THESE LASERS, AND THEN CONSTRUCT TWO OF THESE UNITS WHICH CAN BE LOCKED TOGETHER.

LINKNET
710 SILVER SPUR RD - STE 285
ROLLING HILLS EST, CA 90274
CONTRACT NUMBER: DAAB07-88-C-A042
DR HARRY H TAN
TITLE:
TACTICAL DIGITAL CELLULAR COMMUNICATIONS ARCHITECTURES FOR MSE
TOPIC# 199 OFFICE: CECOM/C3 IDENT#: 25610

THE OBJECTIVE OF THE PROPOSED EFFORT IS TO RECOMMEND AN INTEGRATED

SUBMITTED BY

SERVICES DIGITAL CELLULAR ARCHITECTURE FOR GROUND-BASED MILITARY MOBILE COMMUNICATIONS NETWORK. THE ARCHITECTURE IS APPLICABLE TO THE MOBILE SUBSCRIBER EQUIPMENT (MSE) SYSTEM OF THE U.S. ARMY. THE INNNOVATION CONTAINED IN THIS PROPOSAL LIES IN TWO AREAS, NAMELY THE SYSTEM ARCHITECTURE OF THE NETWORK AND THE LOGICAL STRUCTURE OF THE NETWORK. THE SYSTEM ARCHITECTURE OF THE NETWORK FOLLOWS THE EXPERIENCE OF THE CELLULAR RADIO TELEPHONE NETWORK. IN PARTICULAR THE CAPACITY COMPUTATION, THE CALL PROCESSING, THE CELL SIZES ETC. PROVIDE AMBLE GROWTH POTENTIAL IF THE NUMBER OF MOBILE SUBSCRIBERS GROWS. THE PROPOSAL POINTS OUT IMPORTANT AREAS WHERE COMMERCIAL CELLULAR TECHNOLOGIES ARE NOT APPLICABLE. THE LOGICAL STRUCTURE OF THE NETWORK FOLLOWS THE ISDN (INTEGRATED SERVICES DIGITAL NETWORK) APPROACH. SPECIFICALLY THE PROPOSAL ADDRESSES THE FLEXIBILITY OF ACCEPTING EITHER DATA OR VOICE SUBSCRIBERS. SPECIFIC RESEARCH AREAS ARE INDICATED TO SUPPORT BOTH VOICE AND DATA COMMUNICATION, AND INTER- & INTRA-SYSTEM DISTRIBUTION.

LNR COMMUNICATIONS INC
180 MARCUS BLVD
HAUPPAUGE, NY 11788
CONTRACT NUMBER: DAAL01-88-C-0817
R DEELY
TITLE:
SPREAD SPECTRUM DETECTION CIRCUITRY
TOPIC# 101 OFFICE: ETDL/LABCOM IDENT#: 26590

SPREAD SPECTRUM AND RELATED LOW PROBABILITY OF INTERCEPT (LPI) RADAR AND COMMUNICATIONS SIGNALS PRESENT AN EXTREME CHALLENGE TO INTERCEPT OR ESM RECEIVERS BY VIRTUE OF THEIR BROAD BANDWIDTH, BELOW-NOISE-LEVEL SPECTRAL DENSITY, NOISE-LIKE SPECTRAL SHAPE, AND UNKNOWN CODE, MAKING IT IMPOSSIBLE FOR THE INTERCEPTOR TO DESPREAD THE SIGNAL AND RECOVER THE PURE DATA SIGNAL EMBEDDED THEREIN. DESPITE THESE FORMIDABLE OBSTACLES, CERTAIN RECEIVER TECHNIQUES EXIST THAT MAKE IT POSSIBLE TO DETECT THE PRESENCE AND DETERMINE SOME OF THE CHARACTERISTICS OF SPREAD SPECTRUM AND OTHER LPI SIGNALS. ACCORDINGLY, A PHASE I STUDY IS PROPOSED TO INVESTIGATE ALTERNATIVE SPREAD-SPECTRUM DETECTION TECHNIQUES AND USE THE BEST COMBINATION THEREOF TO CONFIGURE AN OPTIMUM SPREAD SPECTRUM DETECTOR (SSD) SUBSYSTEM (AND ASSOCIATED SIGNAL SIMULATOR) DESIGN. THE PROPOSED SSD WILL USE AN

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OPTIMUM COMBINATION OF RADIOMETRIC, SCANNING, COMPRESSIVE AND MULTIPLICATIVE "FEATURE" DETECTION TECHNIQUES TO PROVIDE AUTOMATIC "REAL TIME" DETECTION OF THE PRESENCE OF VARIOUS SPREAD SPECTRUM SIGNALS AND TO DETERMINE THEIR KEY PARAMETERS, E.G. CHIP RATE, HOP RATE. FREQUENCY, PRF, PULSE WIDTH AND/OR FREQUENCY DEVIATION, ALL WITH SUFFICIENT SENSITIVITY AND DYNAMIC RANGE.

MAGNASONICS INC
215 SIERRA DR SE
ALBUQUERQUE, NM 87108
CONTRACT NUMBER: DAAD05-88-C-0044
GEORGE A ALERS
TITLE:
MEASUREMENT OF HARDNESS ON ARMOR PLATE BY A COMBINED ULTRASONIC-MAGNETIC PROBE
TOPIC# 157 OFFICE: TECOM/CSTA IDENT#: 25305

SINCE THE HARDNESS OF ARMOR PLATE IS ACHIEVED BY CAREFULLY CONTROLLED HEAT TREATMENTS THAT MODIFY BOTH THE CHEMISTRY AND MICROSTRUCTURE OF THE SURFACE LAYER, ANY PROCEDURE USED TO QUICKLY MONITOR THE LEVEL OF HARDNESS MUST SIMULTANEOUSLY MEASURE THE CHEMICAL COMPOSITION, THE MICROSTRUCTURE AS WELL AS THE STATE OF RESIDUAL STRESS IN THE SURFACE AND THEN COMBINE THESE PROPERTIES INTO A UNIQUE PREDICTION OF THE HARDNESS VALUE. IT IS PROPOSED HERE TO PROVIDE A SINGLE HANDHELD PROBE THAT CAN MAKE CRITICAL ULTRASONIC AND MAGNETIC MEASUREMENTS ON A SMALL AREA OF THE SURFACE AND USE THE DATA THUS OBTAINED TO UNIQUELY DEFINE THE HARDNESS. THE DESIGN OF THE PROBE USES ELECTROMAGNETIC ACOUSTIC TRANSDUCERS (EMATS) TO EXCITE AND DETECT RAYLEIGH AND SH WAVES FOR MEASURING THE STRESS AND TEXTURE OF A THIN SURFACE LAYER. IN ADDITION, THE PULSED ELECTROMAGNET USED BY THE EMATS WILL BE USED TO GENERATE BARKHAUSEN NOISE FROM WHICH THE DEFECT STRUCTURE OF THE SURFACE CAN BE INFERRED. MEASUREMENTS OF THE MAGNETIC PROPERTIES OF THE SURFACE WILL ALSO BE MADE BY USING THE TIME DEPENDENT FIELDS UNDER THE EMAT PULSED MAGNET. OUT OF THESE MEASUREMENTS, AT LEAST FIVE INDEPENDENT PHYSICAL PROPERTIES OF AN AREA OF THE SURFACE UNDER THE PROBE CAN BE DETERMINED. BY MANIPULATING THESE QUANTITIES WITH A COMPUTER, A UNIQUE VALUE FOR THE HARDNESS OF THE SURFACE LAYER WILL BE PREDICTED.

MARK RESOURCES INC
2665 - 30TH ST/STE 200
SANTA MONICA, CA 90405
CONTRACT NUMBER: DAAD07-88-C-0058
AUGUST W RIHACZEK
TITLE:
REAL-TIME RADAR DATA PROCESSING
TOPIC# 151 OFFICE: TECOM/WSMR IDENT#: 25276

SUBMITTED BY

WHITE SANDS MISSILE RANGE AND OTHER TEST RANGES ARE USING TARGET MOTION RESOLUTION (TMR) FOR THE ACCURATE MEASUREMENT OF MISSILE TRAJECTORY PARAMETERS AND FLIGHT DYNAMICS. THESE MEASUREMENTS ARE CURRENTLY PERFORMED IN POST-FLIGHT PROCESSING, AND ARE MANPOWER INTENSIVE AS WELL AS TIME CONSUMING. THE GOAL OF THE PROPOSED PROGRAM IS TO EXAMINE THE FEASIBILITY OF AUTOMATING THE TMR PROCESSING STEPS SO THAT TRAJECTORY PARAMETERS CAN BE OBTAINED IN NEAR-REAL TIME. TO PROVE CONCEPT FEASIBILITY, THREE DISTINCT TASKS WILL BE PERFORMED. FIRST, WE WILL RESEARCH THE TECHNIQUE FOR AUTOMATING THE MOTION COMPENSATION PROCESSING FOR TARGETS OF INTEREST. SECOND, ALGORITHMS WILL BE SPECIFIED FOR MEASURING SPIN RATE, CONING MOTIONS, AND EVENT TIMING FROM MOTION COMPENSATED RADAR DATA. FINALLY, THE COMPUTER ARCHITECTURE REQUIRE TO IMPLEMENT THE AUTOMATED TMR IN REAL TIME WILL BE SPECIFIED.

MARK RESOURCES INC
2665 - 30TH ST/STE 200
SANTA MONICA, CA 90405
CONTRACT NUMBER: DHHO-88-C
AUGUST W RIHACZEK
TITLE:
ALGORITHM DEVELOPMENT
TOPIC# 120 OFFICE: MICOM IDENT#: 26000

THE GOAL OF THE PROPOSED PROGRAM IS TO DEVELOP AN EFFICIENT ALGORITHM FOR THE DETECTION AND DISCRIMINATION OF STATIONARY GROUND TARGETS IN A CLUTTER BACKGROUND. THE PROPOSED APPROACH DEPARTS FROM THE CONVENTIONAL METHODS IN THAT IT IS BASED ON A NEW SIGNAL PROCESSING TECHNOLOGY WHICH HAS BEEN UNDER DEVELOPMENT FOR THE PAST SEVERAL YEARS AT MARK RESOURCES. THIS SIGNAL PROCESSING TECHNOLOGY IS AN EXTENSION AND ADAPTATION OF CONVENTIONAL RANGE/DOPPLER PROCESSING TO THE PECULIAR BACKSCATTERING PROPERTIES OF MANMADE TARGETS. IT WILL BE COMBINED WITH POLARIZATION DIVERSITY TO SOLVE THE DETECTION AND DISCRIMINATION PROBLEM. IN A RATHER BASIC FORM, THE NEW ALGORITHM HAS ALREADY BEEN DEMONSTRATED.

MARTINGALE RESEARCH CORP
100 ALLENTOWN PKWY - STE 211
ALLEN, TX 75002
CONTRACT NUMBER: DAAA21-88-C-0194
DR ROBERT L DAWES
TITLE:
A NEURAL NETWORK KALMAN FILTER FOR MULTI-SENSOR BASED ROBOTIC CONTROL
TOPIC# 21 OFFICE: ARDEC IDENT#: 27031

SUBMITTED BY

THE PROPOSED RESEARCH BUILDS UPON THE CONTRACTOR'S PROPRIETARY NEURAL NETWORK SPACE-TIME MEMORY, THE PARAMETRIC AVALANCHE, TO DETERMINE A SET OF DESIGN CHARACTERISTICS FOR NEUROCOMPUTING ARCHITECTURES THAT WILL EFFECTIVELY SUPPORT REAL TIME ACQUISITION AND TRACKING OF MULTIPLE TARGETS USING MULTIPLE SENSORS, AND DEPLOY AND CONTROL MULTIPLE SIMULTANEOUS RESPONSES. THE APPROACH TO THIS PROBLEM IS TO USE THE PARAMETRIC AVALANCHE TO IMPLEMENT A KALMAN FILTER WHICH IS CAPABLE OF TRACKING AND PREDICTING THE EVOLUTION OF LARGE NUMBERS OF OBSERVABLE OBJECTS WITH WIDELY DIFFERING DYNAMICS, AND IS ALSO CAPABLE OF LEARNING TO PREDICT AND (GIVEN ACCESS TO EFFECTORS) TO CONTROL NOVEL SPACE-TIME PATTERNS.

MATERIALS & ELECTROCHEMICAL RSCH (MER)
4233 S FREMONT AVE
TUCSON, AZ 85714
CONTRACT NUMBER: DAAED7-88-C-R069
J C WITHERS
TITLE:
A WHISKER REINFORCED CERAMIC ALLOY FOR MILITARY DIESEL ENGINES
TOPIC# 124 OFFICE: TACOM IDENT#: 25925

CERAMICS HAVE BEEN DEMONSTRATED TO OFFER A SIGNIFICANT OPPORTUNITY FOR HIGH TEMPERATURE DIESEL ENGINES. PRECEDING DOMESTIC AND FOREIGN PROGRAMS HAVE IDENTIFIED THE LIMITATIONS OF CURRENTLY AVAILABLE CERAMICS WHICH INCLUDE BRITTLENESS AND FRICTION AND WEAR PROPERTIES. A PROGRAM IS PROPOSED TO DEVELOP A WHISKER REINFORCED CERAMIC ALLOY THAT WILL RESULT IN A TOUGH CERAMIC ALLOY WITH FRICTION AND WEAR CHARACTERISTICS THAT WILL NOT REQUIRE LUBRICATION FOR 1100 DEG F OPERATION. SUCH A CERAMIC COMPOSITE WILL PERMIT MILITARY DIESEL ENGINES WITH INCREASED FUEL ECONOMY, HIGH POWER DENSITY AND REDUCED HEAT REJECTION.

MATERIALS MODIFICATION INC
2946 SLEEPY HOLLOW RD - STE 2H
FALLS CHURCH, VA 22044
CONTRACT NUMBER: DAAED7-88-C-R070
DR T S SUDARSHAN
TITLE:
ACCELERATED CORROSION TESTING OF VEHICLE COMPONENTS
TOPIC# 126 OFFICE: TACOM IDENT#: 25941

SUBMITTED BY

IN RECENT YEARS THE CORROSIVITY OF THE TACTICAL WHEELED VEHICLE ENVIRONMENT HAS BECOME MORE SEVERE DUE TO INCREASED USE OF ROAD SALTS, INCREASED ATMOSPHERIC POLLUTANTS (SO(2) AND NO(x)), AND CHANGES IN CLIMATIC CONDITIONS IN SELECTED GEOGRAPHIC REGIONS OF THE WORLD. THE COMBINED EFFECTS OF THE ABOVE CONDITIONS AND MARINE SALTS HAVE SIGNIFICANTLY DECREASE THE LIFE EXPECTANCY OF SELECTED VEHICLES AND VEHICLE COMPONENTS. INCREASED U.S. ARMY "OFF-THE-SHELF" ACQUISITIONS COMBINED WITH THE RAPID ADVANCES IN MATERIALS AND PROCESSES USED FOR CORROSION PROTECTION NECESSITATES THE DEVELOPMENT OF A PREDICTIVE METHODOLOGY AND RANKING CRITERIA FOR CORROSION OF VEHICLES AND COMPONENTS. IN THIS PHASE I EFFORT, THE GOAL IS TO DEVELOP A FEASIBILITY PLAN THAT WILL ALLOW ACCELERATED TESTING OF VEHICLES/COMPONENTS AND SIMULATE 15-20 YEARS OF FIELD LIE WITH A ONE YEAR SIMULATED CHAMBER ENVIRONMENT. THE DIFFERENT REQUIREMENTS OF THE CHAMBER, THE TYPES OF ENVIRONMENTS PRESENT IN THE DIFFERENT GEOGRAPHICAL REGIONS, THE CORRELATION BETWEEN ACCELERATED TESTS AND FIELD CONDITIONS, THE ABILITY TO PROGRAM THE CONTROLLED ENVIRONMENTS, AND THE INCORPORATION OF ALL CURRENT ARMY PROGRAMS RELATED TO CORROSION WILL BE ADDRESSED IN PHASE I. SUCCESSFUL COMPLETION OF PHASE I WOULD RESULT IN THE DETAILED IMPLEMENTATION IN PHASE II.

MATHEMATICAL TECHNOLOGIES INC
PO BOX 2476 - 148 WATERMAN ST/STE 2
PROVIDENCE, RI 02906
CONTRACT NUMBER: DAAB07-88-C-F211
DR DONALD E McCLURE
TITLE:
IMPROVED FORWARD-LOOKING INFRARED (IR) IMAGE SEGEMENTATION BY ITERATIVE TECHNIQUES: ALGORITHMS FOR REAL-TIME PROCESSING
TOPIC# 218 OFFICE: CECOM/NV IDENT#: 25850

ALGORITHMS WILL BE DEVELOPED FOR ENHANCEMENT AND SEGMENTATION OF FLIR IMAGES, WITH A VIEW TOWARD REAL-TIME IMPLEMENTATIONS ON SEQUENCES OF IMAGES ACQUIRED AT VIDEO-FRAME RATES. THE METHODOLOGY PIONEERED BY PERSONNEL ON THIS PROJECT, USING PROBABILISTIC MARKOV RANDOM FIELD MODELS AND COMPUTATIONAL METHODS SUCH AS SIMULATED ANNEALING (STOCHASTIC RELAXATION WITH ANNEALING), WILL BE EXTENDED IN TWO DIRECTIONS: (1) NEW DETERMINISTIC VERSIONS OF THE ALGORITHMS

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WILL BE APPLIED TO INFRARED IMAGERY, SUBSEQUENT TO CAREFUL MODELING OF ENVIRONMENTAL AND SENSOR EFFECTS ON THE OBSERVED IMAGES; (2) THE MARKOVIAN MODELS WILL BE EXTENDED TO USE TEMPORAL AS WELL AS SPATIAL INFORMMATION FOR IMAGE RESTORATION. FINALLY, THE ALGORITHMS WILL BE DESIGNED AND OPTIMIZED FOR POSSIBLE REAL-TIME IMPLEMENTATION ON A STATE-OF-THE-ART PARALLEL IMAGE PROCESSING SYSTEM. THE SUCCESS IN ATTAINING THE LAST OBJECTIVE WILL DETERMINE THE FEASIBILITY OF PERFORMING TRUE REAL-TIME ENHANCEMENT AND SEGMENTATION OF FLIR IMAGES AS A PRECURSOR TO HIGHER-LEVEL TASKS OF OBJECT DETECTION/RECOGNITION.

MCS INC
PO BOX 9105
McLEAN, VA 22102
CONTRACT NUMBER: DAAB07-88-C-P049
ROBERT J EIN
TITLE:
ELECTRONIC INTELLIGENCE (ELINT) PERFORMANCE SIMULATOR
TOPIC# 202 OFFICE: CECOM/EW IDENT#: 25657

THE PROPOSED SYSTEM WILL PROVIDE THE EVALUATOR WITH A POWERFUL ANALYSIS TOOL IN THE DETERMINATION OF THE EFFECTIVENESS OF THE I/EW SYSTEM UNDER EVALUATION IN AN OPERATIONAL ENVIRONMENT. THE PROPOSED SIMULATION SYSTEM WILL OPERATE USING PARAMETRIC INFORMATION THAT HAS BEEN EXTRACTED FROM AN ALL SOURCE I/EW DATA BASE. SECURITY ENTRY SCHEMES WILL BE EMBEDDED IN THE TEMPESTED IBM PC/AT TO PROVIDE SECURITY OF THE ENTIRE SIMULATION AND ANALYSIS ENVIRONMENT. THE PROPOSED SYSTEM WILL OPERATE IN VARIOUS SCENARIO CONFIGURATIONS THAT WILL TAKE INTO CONSIDERATION PLATFORMS THAT THE SYSTEM WILL BE DEPLOYED ON, E.G., GROUND BASED, IN MANNED AIRCRAFT AND/OR IN UAV'S. THESE SCENARIOS WILL ALSO TAKE INTO CONSIDERATION GEOMETRIC DISTRIBUTION OF EMITTERS WITH RESPECT TO THE COLLECTION SYSTEM, FIELDS OF VIEW, VARIATIONS IN MIXES OF BOTH THREATS AND I/EW SUBSYSTEMS, EMITTER CHARACTERISTICS, ENVIRONMENTAL DYNAMICS, ETC. THE PROPOSE SYSTEM WILL INCORPORATE IN THE SIMULATION THE APPROPRIATE MEASURES OF TECHNICAL PERFORMANCE (MOP'S) AND MEASURES OF OPERATIONAL EFFECTIVENESS (MOE'S) THAT PROVIDE THE USER CONCLUSIVE RESULTS FROM THIS SIMULATION.

MEGAPELS INC
23232 PERALTA - STE 104
LAGUNA HILLS, CA 92653
CONTRACT NUMBER: DAAD01-88-C-0039
WILLIAM F O'NEIL
TITLE:
ELECTRO OPTICAL YAW CARD
TOPIC# 154 OFFICE: TECOM/YPG IDENT#: 25295

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A REPLACEMENT FOR YAW CARDS IS PROPOSED USING ELECTRO-OPTIC SENSORS AND COMPUTER ANALYSIS OF THE DATA. RESPONSE TIMES UNDER ONE SECOND ARE ACHIEVABLE WITH THE PROPOSED SYSTEM. THE SYSTEM OFFERS LOW RECURRING COST, COUPLED WITH IMPROVED ACCURACY. THE DATA COLLECTED PERMITS EVALUATING ROUND VELOCITY AND DISPERSION IN ADDITION TO ATTITUDE. IT ALSO PROVIDES GROWTH POTENTIAL TO OBTAIN DATA UNDER TEST CONDITIONS NOT CURRENTLY ACCESSIBLE.

MEMBRANE TECHNOLOGY & RESEARCH INC
1360 WILLOW RD
MENLO PARK, CA 94025
CONTRACT NUMBER: DAAA15-88-C-0025
DR AMULYA ATHAYDE
TITLE:
A MEMBRANE OXYGEN EXTRACTION UNIT FOR LIFE SUPPORT IN A CHEMICALL CONTAMINATED ENVIRONMENT
TOPIC# 29 OFFICE: CRDEC IDENT#: 27043

IN THE EVENT OF WAR, IT IS LIKELY THAT TOXIC VAPORS MAY BE ENCOUNTERED BY TROOPS UNDER ATTACK. THIS PROPOSAL DESCRIBES THE USE OF A MEMBRANE SYSTEM ABLE TO SELECTIVELY REMOVE OXYGEN FROM FEED AIR. WITH A SUITABLE MEMBRANE, IT IS POSSIBLE TO PRODUCE A PERMEATE GAS CONTAINING 25-30 VOL% OXYGEN AND LESS THAN 1% OF THE ORIGINAL CHEMICAL AGENT IN THE FEED AIR. THE MEMBRANE SYSTEM CAN BE MADE COMPACT, LIGHTWEIGHT AND REQUIRES NO CHANGE OF ABSORPTION CARTRIDGES OR FILTERS. THE TECHNOLOGY FOR PRODUCING THE MEMBRANE MODULES AND SYSTEMS IS ALREADY DEVELOPED, BUT SUITABLE MEMBRANE MATERIALS ARE LACKING. THESE MATERIALS WILL BE DEVELOPED IN THE PHASE I PROGRAM. IN THE PHASE II PROGRAM, A PROTOTYPE UNIT WOULD BE CONSTRUCTED AND EVALUATED.

MENTOR TECHNOLOGIES INC
53-50 - 206TH ST
BAYSIDE, NY 11364
CONTRACT NUMBER:
DR MITCHELL R BELZER
TITLE:
MULTISENSOR MULTITARGET TRACKING USING THE DECENTRALIZED SQUARE ROOT INFORMATION FILTER
TOPIC# 48 OFFICE: HDL IDENT#: 27064

SUBMITTED BY

VLSI (VERY LARGE SCALE INTEGRATION) TECHNOLOGY HAS BEEN DEVELOPED TO THE POINT WHEFE HIGH SPEED FLOATING POINT PROCESSORS MAY BE CONCATENATED TO FORM COMPACT SUPERCOMPUTERS WITH FAR GREATER THROUGHPUT THAN UNIPROCESSOR MACHINES. MTI PROPOSES TO DESIGN AND DEVELOP A MULTIPROCESSOR COMPUTER ARCHITECTURE FOR REAL-TIME DIGITAL FILTERING OR MULTISENSOR TRACKING DATA. THE ARCHITECTURE WILL BE OPTIMIZED FOR IMPLEMENTATION OF OUR NEW DECENTRALIZED SQUARE ROOT INFORMATION FILTER (DSRIF). PHASE I RESEARCH WILL DEMONSTRATE FEASIBILITY OF THE DSRIF AS A MEANS FOR SOLVING THE LINEAR LEAST SQUARES ESTIMATION PROBLEM IN DECENTRALIZED FORM. PHASE II RESEARCH WILL FOCUS UPON DEVELOPMENT AND TESTING OF A PROTOTYPE DEVICE.

MESO INC
28 RESEARCH DR - LANGLEY EXECUTIVE CTR
HAMPTON, VA 23666
CONTRACT NUMBER: DAAD07-88-C-0059
CRAIG A MATTOCKS
TITLE:
A THREE DIMENSIONAL MESOSCALE ATMOSPHERIC SIMULATION SYSTEM FOR USE IN VARIOUS MOBILE BATTLEFIELD ENVIRONMENTS
TOPIC# 64 OFFICE: ASL IDENT#: 27076

A PORTABLE, AUTONOMOUS NUMERICAL WEATHER PREDICTION SYSTEM DESIGNED TO OPERATE ON A MINICOMPUTER WILL BE DEVELOPED FOR USE AS A TACTICAL DECISION AID UNDER BATTLEFIELD CONDITIONS. IT WILL BE ABLE TO PREDICT THE EVOLUTION OF NATURAL OBSCURANTS SUCH AS RAIN, FOG, AND DUST AND WILL BE CAPABLE OF FORECASTING TRAJECTORIES OF PLUMES OF COMBAT-GENERATED OBSCURANTS LIKE DUST, BLAST SMOKE, AND TOXIC CLOUDS PRODUCED THROUGH CHEMICAL WARFARE. OPERATIONAL WEATHER FORECASTS WILL BE GENERATED USING A REGIONAL VERSION OF THE SOPHISTICATED MESOSCALE ATMOSPHERIC SIMULATION SYSTEM (MASS), A FULLY THREE-DIMENSIONAL PRIMITIVE EQUATION MODEL CAPABLE OF PREDICTING PRECIPITATION IN REGIONS OF COMPLEX TERRAIN AND IN REGIONS CHARACTERIZED BY INTRICATE LAND/WATER DISTRIBUTIONS. THUS, ESTIMATES OF GROUND TRAFFICABILITY CAN ALSO BE EXTRACTED FROM ITS DETAILED FORECAST PRODUCTS. BASED ON MINI-SUPERCOMPUTER BENCHMARK TIMING FIGURES, IT IS ANTICIPATED THAT A 9 HOUR FORECAST WILL BE PRODUCED IN LESS THAN 2 HOURS, GIVING THE TACTICAL COMMAND STAFF AT LEAST 7 HOURS OF FORECAST UTILITY.

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INITIAL TESTS OF THE OPERATIONAL NUMERICAL WEATHER PREDICTION SYSTEM WILL BE CONDUCTED USING CLIMATOLOGICAL WEATHER DATA FOR 120 kM BY 120 km AREA IN THE HONDURAS/NICARAGUA BORDER REGION OF CENTRAL AMERICA.

METRI-WAVE INC
77 - N OAK KNOLL AVE/#114
PASADENA, CA 91101
CONTRACT NUMBER: DAAL02-88-C-0067
DR WYMAN WILLIAMS
TITLE:
A MILLIMETER WAVE IC WAFER PROBE WITH A BUILT-IN VECTOR NETWORK ANALYZER
TOPIC# 46 OFFICE: HDL IDENT#: 27061

NETWORK ANALYZER SYSTEMS CURRENTLY USED TO EVALUATE MILLIMETER WAVE INTEGRATED CIRCUITS ARE DESIGNED TO MAKE MEASUREMENTS IN COAXIAL CABLE OR RECTANGULAR WAVEGUIDE. THE NECESSITY OF MAKING A TRANSITION FROM THESE TYPES OF WAVEGUIDES TO ON-CHIP PLANAR WAVEGUIDES TO MEASURE MMICs GIVES RISE TO PROBLEMS OF MODE CONVERSION. A RECENT INVENTION BY THE AUTHORS ALLOWS ALL THE COMPONENTS OF A VECTOR NETWORK ANALYZER TO BE INTEGRATED ON A SINGLE CHIP, USING A PLANAR TRANSMISSION LINE OF THE SAME TYPE AS THAT TO BE MEASURED. THIS APPROACH SHOWS PROMISE FOR GREATLY REDUCING MODE CONVERSION PROBLEMS AND YIELDING A POWERFUL YET INEXPENSIVE BROADBAND VECTOR NETWORK ANALYZER FOR MMIC PROBING SYSTEMS. WE PROPOSE A SYSTEM IN WHICH WAFER PROBES WOULD BE CONSTRUCTED WITH A VECTOR NETWORK ANALYZER INTEGRATED INTO EACH PROBE. OUR FEASIBILITY STUDY WILL CONCENTRATE ON A COPLANAR WAVEGUIDE IMPLEMENTATION, BUT THE PROBES COULD BE BUILT USING ANY DESIRED PLANAR TRANSMISSION LINE, TO MATCH THAT OF THE IC BEING MEASURED IN IMPEDANCE AND DIMENSIONS.

MICRO ANALYSIS & DESIGN
9132 THUNDERHEAD DR
BOULDER, CO 80302
CONTRACT NUMBER:
RON LAUGHERY
TITLE:
INTEGRATING MICRO SAINT AND HOS
TOPIC# 228 OFFICE: ARI IDENT#: 25056

SUBMITTED BY

THE DEVELOPERS OF TWO COMPUTER MODELING AND SIMUATION SYSTEMS ARE JOINING FORCES TO INTEGRATE THEIR SYSTEMS INTO A SINGLE PACKAGE. MICRO SAINT, DEVELOPED BY MICRO ANALYSIS AND DESIGN, AND HOS, DEVELOPED BY ANALYTICS, INC. REPRESENT VASTLY DIFFERENT APPROACHES TO MODELING HUMAN PERFORMANCE. HOWEVER, BOTH APPROACHES COULD BE COMBINED TO FORM A MODELING TOOL FOR HUMAN ENGINEERS WHICH IS GREATER THAN THE SUM OF ITS PARTS. MICRO ANALYSIS AND DESIGN AND ANALYTICS WILL WORK TOGETHER TO INTEGRATE MICRO SAINT AND HOS INTO A SINGLE SYSTEM FOR MODELING HUMAN OPERATOR PERFORMANCE IN MILITARY SYSTEMS. THE FIRST PHASE WILL BE A PROOF-OF-CONCEPT AND A SOFTWARE SPECIFICATION. ALSO, A LIMITED VERSION OF THE SOFTWARE WILL BE DEVELOPED TO TEST ITS FEASIBILITY. IN PHASE II, ALL SOFTWARE DEVELOPMENT AND INTEGRATION WILL BE PERFORMED.

MICRO SYSTEMS CONSULTANTS
31 ORCHARD LN
MARLTON, NJ 08053
CONTRACT NUMBER:
MASOOD GHADAKSAZ
TITLE:
SELECTIVE NARROW-NOTCH FILTERING FOR WIDE BANDWIDTHS
TOPIC# 58 OFFICE: HDL IDENT#: 27072

IN NOTCH FILTERS, HISTORICAL DESIGN HAS PLACED EMPHASIS ON HIGH UNLOADED Q TO OBTAIN HIGH REJECTION AT NOTCH FREQUENCY. THIS TYPICALLY RESULTS IN DESIGNS USING LARGE CAPACITANCE VALUES IN RELATION TO INDUCTANCE. THE RESULTING LC RATIOS YIELD HIGH Q BUT POOR RESPONSE (STEEPNESS OF THE CURVE). TO IMPROVE THE RESPONSE SEVERAL ADDITIONAL RESONATORS MUST BE COUPLED AS A NETWORK. MICRO SYSTEMS CONSULTANTS HAS DEVELOPED A TECHNIQUE TO OVERCOME THE RATIO MISMATCH PROBLEM THAT INHERENTLY CAUSE NOTCH FILTERS TO PERFORM POORLY AND BE LARGER AND DIFFICULT TO ADJUST. OUR DESIGN USES A LOSSLESS RESONATOR THAT WILL PROVIDE NOTCH FILTERING WITH A REJECTION OF 60 dB AT THE NOTCH FREQUENCY. THE FILTER WILL BE COMPACT, LOW COST AND DIGITALLY CONTROLLED. IT WILL PROVIDE ELECTRONICALLY TUNABLE NARROW BAND NOTCH FILTERING WITH WIDE PASSBANDS AROUND THE NOTCH. THE DESIGN ALLOWS FOR FAST FREQUENCY HOPPING AND CAN BE USED WITH FREQUENCY AGILE (HOPPING) COMMUNICATION OR RADAR RECEIVERS TO

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ENHANCE RECEIVER PERFORMANCE IN A JAMMING ENVIRONMENT.

MICRO-PROBE CORP
1725 - 220TH ST SE/#104
BOTHELL, WA 98021
CONTRACT NUMBER: DAMD17-88-C-8201
DR RICH B MEYER JR
TITLE:
CHEMOTHERAPY OF LEISHMANIA WITH OLIGODEOXYNUCLEOTIDE PROBES
TOPIC# 181 OFFICE: MEDICAL IDENT#: 25408

WE WILL INVESTIGATE THE ABILITY OF OLIGODEOXYNUCLEOTIDES COMPLEMENTARY TO THE SPLICED LEADER SEQUENCE OF LEISHMANIA ENRIETTII TUBULIN mRNA'S TO INHIT TRANSLATION AND TO KILL THE CELLS IN CULTURE. VARIOUS CHEMICAL MODIFICATIONS WILL BE MADE TO ENHANCE THE EFFECT OF THE OLIGOS. SUCCESSFUL AGENTS MAY BE VALUABLE, SELECTIVE CHEMOTHERAPEUTIC AGENTS AGAINST OTHER LEISHMANIA SPECIES IF MAD COMPLEMENTARY TO mRNA LEADERS FROM THOSE SPECIES.

MISSION RESEARCH CORP
PO DRAWER 719
SANTA BARBARA, CA 93102
CONTRACT NUMBER:
ROBERT D EISLER
TITLE:
EFFECT OF COATINGS AND PROCESSING ON FAILURE MECHANISMS OF POLYCARBONATE MATERIALS
TOPIC# 140b OFFICE: NRDC IDENT#: 27083

MATERIAL REQUIREMENTS FOR TRANSPARENT ARMOR INCLUDE OPTICAL CLARITY OVER A RANGE OF WAVELENGTHS, IMPACT RESISTANCE, AND MANIFESTATION OF DUCTILE FAILURE WHEN THE COMPONENT IS SUBJECT TO IMPACT. THIS LAST REQUIREMENT INCLUDES RESISTANCE TO CRACK PROPAGATION AND SPALLATION AND THE PREDOMINANCE OF LOCAL YIELDING ABOUT THE CONTACT AREA RESULTING IN A WELL DEFINED HOLE AS OPPOSED TO RADIAL OR CONCOIDAL FRACTURES. THIS DUCTILE FAILURE MODE RESULTS IN OPTICAL COMPONENTS RETAINING CLARITY OVER MOST OF THE OPTICAL SURFACE EXCEPT IN AREAS

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LOCAL TO THE CONTACT REGION. CONSISTENT WITH THE ABOVE, ORGANIC PLASTICS HAVE DISTINCT ADVANTAGES OVER INORGANIC GLASSES FOR BALLISTIC PROTECTION. THE MAIN DISADVANTAGE OF PLASTIC HOWEVER IS ITS SUSCEPTIBILITY TO SCRATCHING AND DEGRADATION DUE TO EXPLOSURE OF ULTRAVIOLET RADIATION WHICH PROMOTES DEGRADATION OF OPTICAL AND MECHANICAL PROPERTIES. THESE DISADVANTAGES HOWEVER CAN BE MITIGATED BY INCLUSION OF SURFACE COATINGS. UNDER CERTAIN CONDITIONS HOWEVER PLASTICS BEHAVE IN A BRITTLE FASHION AND CRACKS AND SPALLS UNDER BALLISTIC IMPACT. THIS BEHAVIOR IS OFTEN ASSOCIATED WITH THE PRESENCE OF PROTECTIVE COATINGS ON THE PLASTIC. THE CURRENT EFFORT INVESTIGATES THE STRESS WAVE RESPONSE OF THE COATING AND PLASTIC ASSEMBLY RESULTING FROM BALLISTIC IMPACT AND INTERACTION OF REFLECTED WAVES WITH SURFACE FLAWS AS A MEANS OF EXPLAINING THE MECHANISMS UNDERLYING THIS BRITTLE BEHAVIOR LEADING TO METHODOLOGIES FOR PREVENTION.

MRC RESEARCH CO
PO BOX 7330
HUNTSVILLE, AL 35807
CONTRACT NUMBER: DAAA15-88-C-0047
TIMOTHY D MORGAN
TITLE:
DEVELOPMENT OF DRAFTING CAPABILITY FOR THE BRL SOLID MODELING SYSTEM
TOPIC# 69 OFFICE: BRL IDENT#: 26851

THIS PROPOSED PHASE I SBIR RESEARCH EFFORT IS TO DESIGN A DRAFTING CAPABILITY FOR THE BRL SOLID MODELING SYSTEM. THE EXISTING 3-D DESIGN FILE FORMAT WILL BE USED TO DEVELOP THE 2-D DRAWINGS. THE DRAWINGS WILL BE DIMENSIONED AND LABELED ACCORDING TO A SET OF NATIONAL STANDARDS THE USER WILL DESIGNATE. THE SYSTEM WILL SUPPORT A VARIETY OF STANDARD PLOTTERS.

MYK TECHNOLOGY INC
1140-P CENTRE DR
INDUSTRY, CA 91789
CONTRACT NUMBER: DAAB07-88-C-A033
DR YU-WEN CHANG
TITLE:
MILLIMETER WAVE NET COMMUNICATION
TOPIC# 197 OFFICE: CECOM/C3 IDENT#: 25580

SUBMITTED BY

COVERT COMMUNICATION, IN A COUNTERMEASURE HEAVY ENVIRONMENT, CAN USE MILLIMETER WAVE LINE-OF-SIGHT COMMUNICATION IN PACKET SWITCHING CONFIGURATIONS TO EXTEND LINK RANGE, AND INCREASE LINK SURVIVABILITY. INNOVATIVE CONCEPT IS PROPOSED FOR QUICK BEAM LOCK-ON, COHERENT DATA COMMUNICATION, AND MULTI-BEAM/MULTI-STATION COMMUNICATION.

NEUSHUL MARICULTURE INC
475 KELLOGG WY
GOLETA, CA 93117
CONTRACT NUMBER: DAMD17-88-C-8198
JOHN A BENSON
TITLE:
ALGAL TOXINS: PRODUCTION DETECTION AND THERAPY
TOPIC# 176 OFFICE: MEDICAL IDENT#: 25381

SOME OF THE LOW MOLECULAR WEIGHT TOXINS PRODUCED BY ALGAE (PHYCOTOXINS) ARE AMONG THE MOST POTENT LETHAL MATERIALS KNOWN. PHYCOTOXIN STANDARDS, WHETHER THEY COME FROM PRIMARY (ALGAE) OR SECONDARY (ALGAE-CONSUMING ANIMALS) SOURCES, ARE VERY IMPORTANT STARTING POINTS FOR MEDICAL AND MARICULTURAL RESEARCH, BUT THE SUPPLY IS NOW VERY LIMITED AND IRREGULARLY AVAILABLE. THUS, AN IMPORTANT FIRST STEP IN STUDYING PHYCOTOXINS IS TO PRODUCE PURE SUPPLIES OF SPECIFIC TOXINS. THEORETICALLY, IT IS NOW POSSIBLE TO PRODUCE A SPECIFIC TOXIN AND THEN A SPECIFIC MONOCLONAL "ANTITOXIN" TO IT. CONSEQUENTLY, THE SPECIFIC OBJECTIVES OF THIS TWO-YEAR PROPOSAL ARE: 1) TO PRODUCE mg QUANTITIES OF TWO, AND POSSIBLE SEVERAL, ALGAL TOXINS PRODUCED BY DINOFLAGELLATES; 2) TO USE BIO-ASSAYS, HIGH-PERFORMANCE-LIQUID CHROMATOGRAPHY AND THIN-LAYER CHROMATOGRAPHY TO DETECT AND SEPARATE THESE TOXINS AND TO VALIDATE THE PURITY OF OUR INDIVIDUAL AND MIXED TOXIN STANDARDS; 3) TO MAKE SIGNIFICANT PROGRESS TOWARD PRODUCTION OF PURIFIED MONOCLONAL ANTIBODIES TO SAXITOXIN AT LEAST, AND POSSIBLY TO SEVERAL OTHER PURIFIED TOXINS.

NOISE COM INC
111 MOORE ST
HACKENSACK, NJ 07601
CONTRACT NUMBER: DAAL01-88-C-0808
KURT STERN
TITLE:
MILLIMETER WAVE CIRCUIT INTEGRATION OF MICROSTRIP AND WAVEGUIDE COMPONENTS
TOPIC# 99 OFFICE: ETDL/LABCOM IDENT#: 26579

SUBMITTED BY

THIS PROGRAM WILL DEVELOP AN EFFICIENT MILLIMETER WAVEGUIDE AND MICROSTRIP INTEGRATION FOR THE 75 GHz TO 110 GHz BAND. THIS INTEGRATION WILL PROVIDE A TRANSITION SUITABLE TO INTERFACE WITH SEMICONDUCTORS. THE WAVEGUIDE AND MICROSTRIP INTEGRATION WILL BE INCORPORATED INTO A SOLID STATE NOISE GENERATOR. FREQUENCY OF THE END PRODUCT NOISE GENERATOR WILL INCLUDE THE 94 GHz POINT.

ODETICS INC (AIM DIVISION)
1515 S MANCHESTER AVE
ANAHEIM, CA 92802
CONTRACT NUMBER: DAAA21-88-C-0164
STEPHEN J BARTHOLET
TITLE:
ALL-ELECTRIC AUTOMATIC 155 MM BREECH LOADER
TOPIC# 24 OFFICE: ARDEC IDENT#: 27035

THE ARMY'S LATEST UPGRADE TO THE 155mm SELF- PROPELLED HOWITZER HAS A HYDRAULIC PROJECTILE LOADER ASSIST SYSTEM WHICH HAS NOT PROVED IDEAL IN A BATTLEFIELD ENVIRONMENT. THIS PROPOSAL ADDRESSES THE CONCEPTUAL DEVELOPMENT OF AN IMPROVED ELECTRIC-POWERED SEMI-AUTOMATIC BREECH LOADER WHICH WILL LOAD BAG CHARGES FOR CURRENT CONFIGURATION SELF-PROPELLED HOWITZERS. THE BREECH LOADER WILL ALSO AUTOMATICALLY LOAD A WIDE VARIETY OF PROJECTILES, INCLUDING THE ARMY'S DEVELOP-MENTAL UNI-CHARGE MODULES, IN FUTURE SELF-PROPELLED HOWITZERS. ODETICS PROPOSES TO CONCEPTUALLY DESIGN THIS SYSTEM AND TO CONSTRUCT A KINEMATIC MODEL OF THE DESIGN TO VERY ITS DYANAMIC FUNCTIONALITY.

ONTAR CORP
129 UNIVERSITY RD
BROOKLINE, MA 02146
CONTRACT NUMBER: DAAA15-88-C-0021
DR JOHN SCHROEDER
TITLE:
OPTIMAL TARGET-CLUTTER DISCRIMINATION FOR AUTONOMOUS HOMING MUNITIONS
TOPIC# 225 OFFICE: AMSAA IDENT#: 25137

SUBMITTED BY

THE PROPOSED WORK WILL PROVIDE THE ARMY WITH A SOFTWARE PACKAGE TO DEFINE, IMPLEMENT AND EVALUATE DISCRIMINANTS FOR AUTONOMOUS HOMING MUNITIONS. DURING THE PROGRAM: A DATA BASE OF VISIBLE, INFRARED, AND MILLIMETER WAVE DATA WILL BE ASSEMBLED; A SET OF DISCRIMINANTS BASED ON TARGET SIZE, SHAPE, RADIANCE, EDGENESS, CONTRAST AND TEXTURE WILL BE DEFINED AND A MULTIVARIATE STATISTICAL ANALYSIS PACKAGE FOR DISCRIMINANT EVALUATION WILL BE IMPLEMENTED. MULTIVARIATE ANALYSIS IS AN IDEAL TOOL TO EVALUATE DISCRIMINANTS. IT CAN PROVIDE BOTH AND ERROR MEASURE TO EVALUATE EACH DISCRIMINANT SEPARATELY AND DETERMINE OPTIMUM COMBINATIONS FOR ALGORITHM DEVELOPMENT.

OPERATIONAL TECHNOLOGIES ASSOCS INC
7611-B WILLOW RD
FREDERICK, MD 21701
CONTRACT NUMBER: DAAJ02-88-C-0010
DOUGLAS R BROWN
TITLE:
ROBOTICS MAINTENANCE TASK ASSESSMENT
TOPIC# 33 OFFICE: AVSCOM IDENT#: 27049

THE USE OF NUCLEAR, BIOLOGICAL, CHEMICAL (NBC) WARFARE AGAINST U.S. ARMED FORCES WOULD DRASTICALLY REDUCE THE EFFECTIVENESS OF ARMY AVIATION UNITS BY DEGRADING VITAL MAINTENANCE CAPABILITIES. A REDUCTION IN THIS TREMENDOUSLY IMPORTANT MILITARY RESOURCE IS UNACCEPTABLE. THE OBJECTIVE OF THIS PROJECT IS TO PERFORM AN IN-DEPTH ASSESSMENT OF THE FEASIBILITY OF AND BENEFITS FROM THE USE OF STATE-OF-THE-ART ROBOTICS TO ASSIST MECHANICS IN THE FIELD MAINTENANCE OF HELICOPTERS IN AN NBC ENVIRONMENT. ISOLATION AND REVIEW OF LITERATURE WHICH IS PERTINENT TO THE NBC-HELICOPTER PROBLEM WILL DETERMINE THE CURRENT STATE-OF-THE-ART OF ROBOTICS AS IT RELATES TO THE PROBLEM. AN ASSESSMENT WILL THEN BE MADE TO DETERMINE TECHNOLOGIES WHICH ARE POTENTIALLY CAPABLE OF ASSISTING IN PERFORMING CRITICAL MAINTENANCE TASKS WHICH HAVE BEEN IDENTIFIED. FACTORS TO BE CONSIDERED INCLUDE THE BENEFITS VS. SHORTFALLS, PAY-OFFS IN TERMS OF TIME/MANPOWER SAVINGS, INCREASED PRODUCTIVITY, EFFICIENCY, RELIABILITY, MAINTAINABILITY, AND OVERALL SYSTEMS EFFECTIVENESS.

ORPHIC SYSTEMS INC
1700 WALNUT ST
PHILADELPHIA, PA 19103
CONTRACT NUMBER:
DR H KRITIKOS
TITLE:
ARTIFICIAL INTELLIGENCE ENHANCED SIGNAL AND INFORMATION PROCESSIN
TOPIC# 48 OFFICE: HDL IDENT#: 27065

SUBMITTED BY

THE OBJECTIVE OF THE PROPOSED RESEARCH EFFORT IS TO IDENTIFY KNOWLEDGE REPRESENTATION TECHNIQUES FOR THE ENHANCEMENT OF SIGNAL AND INFORMATION PROCESSING. IT IS PROPOSED THAT THE SHORTCOMINGS OF CURRENT SIGNAL PROCESSING TECHNIQUES ARE OVERCOME BY INCORPORATING REAL-TIME EXPERT SYSTEMS AND TACTICAL TERRAIN INFORMATION. THE SHORTCOMINGS THAT ARE CONSIDERED INCLUDE (BUT ARE NOT LIMITED TO) VULNERABILITY TO JAMMERS, UNACCEPTABLY HIGH PROBABILITY OF FALSE ALARM, AND VAIOUS DECEPTION TECHNIQUES SUCH AS AEROSOL ABSORBERS AND CHAFF. THE FOCUS OF OUR EFFORTS IS THE MANIPULATION OF OBJECTS AND EVENTS VIS-A-VIS A TACTICAL TERRAIN DATABASE, REAL-TIME DATA FUSION FROM MULTIPLE SENSORS AND DISTRIBUTED PROBLEM-SOLVING. THE APPROPRIATE IMPLEMENTATION OF THESE CONCEPTS WILL RESULT IN THE ACQUISITION OF APPROPRIATELY FILTERED ESM INFORMATION, AND SECURE COMMUNICATION LINKS.

ORTEL CORP
2015 W CHESTNUT ST
ALHAMBRA, CA 91803
CONTRACT NUMBER: DAAL02-88-C-0008
DR KAM Y LAU
TITLE:
ULTRA-WIDE BAND OPTOELECTRONIC MICROWAVE MIXER FOR PHASED ARRAY RADAR
TOPIC# 47 OFFICE: HDL IDENT#: 27063

A COMBINATION OF OPTOELECTRONICS AND MMIC TECHNOLOGY HAS BEEN CITED AS A MUST FOR IMPLEMENTATION OF FUTURE PHASED ARRAY RADAR SYSTEMS WHERE TENS OF THOUSANDS OF ELEMENTS ARE INVOLVED. AN IMPORTANT ELEMENT IN SUCH SYSTEMS IS WIDE BAND MIXERS. SINCE THE MICROWAVE SIGNALS ARE CARRIED IN OPTICAL FORM, IT IS HIGHLY DESIRABLE TO PERFORM THE FUNCTION OF RF MIXING IN OPTICAL FORM WITHOUT HAVING TO FIRST CONVERT IT BACK TO AN ELECTRICAL SIGNAL. ULTRA-WIDE BAND MIXING CAN BE DONE USING HIGH SPEED PHOTOCONDUCTOR TECHNOLOGY THAT OFFERS BANDWIDTHS OF OVER 10GHz. WE PROPOSE TO STUDY THE MIXER OPERATION AT MULTI-GIGAHERTZ FREQUENCIES AS WELL AS IMPLEMENTING PHOTOCONDUCTIVE MIXERS THAT OPERATES AT 1.3 MICROMETER OPTICAL WAVELENGTH, SUITABLE FOR USE WITH 1.3 MICROMETER HIGH SPEED LASERS AND ULTRA-LOW LOSS SINGLE MODE OPTICAL FIBERS.

SUBMITTED BY

PACIFIC MONOLITHICS
245 SANTA ANA CT
SUNNYVALE, CA 94086
CONTRACT NUMBER: DAAL01-88-C-0824
JUZER MOGRI
TITLE:
HIGH-SPEED DIGITAL-TO-ANALOG CONVERTERS
TOPIC# 94 OFFICE: ETDL/LABCOM IDENT#: 26548

WE PROPOSE TO INVESTIGATE INNOVATIVE ARCHITECTURES FOR THE ECONOMICAL PRODUCTION OF HIGH RESOLUTION, HIGH SPEED DAC'S WITHOUT THE EXTREME PROCESS CONTROL AND HAND TRIMING NOW REQUIRED. SINCE THE GOAL IS TO DEVELOP, EVENTUALLY, 1 GHz, 14 BIT RESOLUTION DAC'S, THE IMPLEMENTATION MUST BE REALIZED IN GaAs AS OPPOSED TO SILICON. HOWEVER, THE PROBLEM OF MAINTAINING PROCESS UNIFORMITY AND PROCESS CONTROL IN GaAs PROCESSING DOES NOT IMMEDIATELY LEND ITSELF TO THE FABRICATION OF PRECISION COMPONENTS. WE PROPOSE TO ADDRESS EACH SOURCH OF DAC ERROR OR PERFORMANCE DEGRADATION SYSTEMATICALLY AND EITHER MINIMIZE ITS EFFECT OR, PREFERABLY, ELIMINATE IT BY CIRCUMVENTING THE PROBLEM TOTALLY THROUGH ARCHITECTURAL REDESIGN. AT THE SAME TIME WE WILL INVESTIGATE INNOVATIVE ARCHITECTURES LIKE A SEGMENTED LADDER APPROACH THAT WOULD DIRECTLY AFFECT PERFORMANCE. IN PARTICULAR, WE WILL INVESTIGATE A NOVEL TECHNIQUE TO INCREASE SYSTEM BANDWIDTH WHILE AT THE SAME TIME LEADING TO A SIGNIFICANT REDUCTION IN GLITCH ENERGY AT THE OUTPUT OF THE DAC. THIS TECHNIQUE IS DESCRIBED IN THE MAIN BODY OF THIS PROPOSAL. ADDITIONALLY, WE PROPOSE TO IMPLEMENT THE BEST DESIGN PRACTICES FOR MINIMIZING SOURCES OF ERROR LIKE DATA SKEW, GROUND NOISE, LAYOUT INDUCED NOISE, SUPERPOSITION ERROR, ETC.

PACIFIC MONOLITHICS
245 SANTA ANA CT
SUNNYVALE, CA 94086
CONTRACT NUMBER: DAAL01-88-C-0025
RAVI RAMACHANDRAN
TITLE:
LOW COST MONOLITHIC RECEIVER MODULE
TOPIC# 100 OFFICE: ETDL/LABCOM IDENT#: 26583

SUBMITTED BY

THE BEST RESULTS IN MILLIMETER WAVE RECEIVERS REPORTED SO FAR HAS BEEN ACHIEVED WITH SEPARATE CHIPS FOR THE COMPONENTS AND WITH OPTIMIZED PROCESSING FOR EACH. THIS IS A VERY HIGH COST APPROACH BECAUSE OF THE SPECIALIZED PROCESSING AND ASSEMBLY TIME REQUIRED. HERE WE PROPOSE TO DESIGN AND DEVELOP A SINGLE CHIP, LOW COST, HIGH PERFORMANCE, MILLIMETER WAVE RECEIVER IC. THIS GaAsIC WILL INCORPORATE LOW NOISE AMPLIFIERS, MIXERS, IF AMPLIFIERS AND LOCAL OSCILLATORS ON A SINGLE IC. THE VERY LOW INTERCONNECTION PARASITICS ACHIEVED BY THIS TECHNIQUE WILL RESULT IN HIGH PERFORMANCE NOT REALIZABLE WITH HYBRID TECHNIQUES OR SEPARATE CHIPS. THE ASSEMBLY TIME IS ALSO GREATLY REDUCED RESULTING IN LOW COST. PHASE I WILL COMPRISE OF A FEASIBILITY STUDY OF THE VARIOUS COMPONENTS OF THE RECEIVER AND INVESTIGATION OF SPECIAL TECHNIQUES FOR COMBINING ALL THESE COMPONENTS ON A SINGLE IC. PHASE II OF THE PROJECT WILL INVOLVE THE CIRCUIT DESIGN AND SIMULATION OF THE INDIVIDUAL COMPONENTS, AND LAYOUT, INTEGRATION AND FABRICATION OF THE COMPLETE RECEIVER IC. SUCH A MONOLITHIC RECEIVER IC WILL FIND WIDE APPLICATIONS IN MILLIMETER WAVE SATELLITE COMMUNICATIONS, RADAR, AND MISSILE SEEKER SYSTEMS, REDUCING THE COST, SIZE, AND WEIGHT OF SUCH SYSTEM CONSIDERABLY.

PARA-SOFT CORP
27415 TRABUCO CIR
MISSION VIEJO, CA 92692
CONTRACT NUMBER: DAAD07-88-C-0063
ALEX HO
TITLE:
PARALLEL NEURAL MODELS FOR KNOWLEDGE REPRESENTATION
TOPIC# 65 OFFICE: ASL IDENT#: 27077

BOTH SEQUENTIAL AND PARALLEL VERSIONS OF A MULTI-LAYER PERCEPTRONS MODEL USE TO RECOGNIZE CLOUD TYPES WILL BE IMPLEMENTED IN A LISP PROGRAMMING ENVIRONMENT. THE LEARNING PHASE OF THE MODEL IS COMPUTATIONAL INTENSIVE. THUS, IT IS NATURAL TO IMPLEMENT SUCH A MODEL ON PARALLEL PROCESSORS WHICH PROMISE UNLIMITED INCREASE IN COMPUTING POWER. THE MODEL LEARNS FROM A SMALL SET OF SIMPLE TRAINING SAMPLES OF CLOUD TYPES. IT WOULD BE ABLE TO RECOGNIZE NEW SAMPLES WITH STRUCTURES SIMILAR TO WHAT IS LEARNED AND LABEL THEM

SUBMITTED BY

WITH THE CORRECT CLASSIFICATION.

PERCEPTICS CORP
PELLISSIPPI CTR
KNOXVILLE, TN 37933
CONTRACT NUMBER:
JOSEPH A VRBA
TITLE:
KNOWLEDGE REPRESENTATION FOR WEATHER MAPS AND IMAGERY
TOPIC# 65 OFFICE: ASL IDENT#: 27078

TO MOVE TOWARDS MACHINE REASONING ABOUT WEATHER MAPS AND IMAGES, IT IS PROPOSED TO DEVELOP A SCHEME TO REPRESENT KNOWLEDGE ABOUT MAPS AND IMAGES FOR EFFICIENT USE IN AN ARTIFICIAL INTELLIGENCE (LISP PROGRAMMING) ENVIRONMENT. IT IS PROPOSED TO ORGANIZE THE SYSTEM AS A CONTROL ROUTINE TOGETHER WITH THE KNOWLEDGE REPRESENTATION AND THE LOWER LEVEL ALGORITHMS FOR RECOGNIZING AND MANIPULATING MAP COMPONENTS (ISOLINES, FRONTS, TROUGHS, CYCLONES) AND FOR LOCATING IMAGE COMPONENTS (CLOUD BOUNDARIES). THE KNOWLEDGE REPRESENTATION WILL CONSIST OF TWO PARTS: "REFERENCE EXPERTISE" ABOUT THE COMPONENTS AND THEIR STRUCTURAL RELATIONSHIPS, AND "WORKING MEMORY" OF DETAILS ABOUT THE MAPS AND IMAGES CURRENTLY BEING PROCESSED. THE CONTROL PROGRAM WILL INTEGRATE THE MAP AND IMAGE PROCESSING ALGORITHMS WITH THE KNOWLEDGE REPRESENTATION TO COORDINATE AND SEQUENCE THE SYSTEM. THE PHILOSOPHY OF THIS APPROACH IS THAT THE LOWER LEVEL PROCESSING PROVIDES INFORMATION ABOUT THE COMPONENTS, WHICH MUST THEN BE GIVEN A ROBUST, CONSISTENT, SYMBOLIC/STRUCTURAL INTERPRETATION BY THE HIGHER LEVEL KNOWLEDGE-BASED COMPUTATION. CODE WILL BE IMPLEMENTED FOR A SUBSET OF THE KNOWLEDGE REPRESENTATION FOR WEATHER MAPS AND IMAGES. THE PROBABILITY OF SUCCESS IS HIGH BECAUSE THE INVESTIGATORS HAVE CONSIDERABLE EXPERIENCE IN DESIGNING AND IMPLEMENTING SYSTEMS IN WHICH HIGHER LEVEL KNOWLEDGE INTERACTS WITH LOWER LEVEL PROCESSING IN PATTERN AND IMAGE ANALYSIS.

PHLOGISTRONICS
96 WASHINGTON AVE
WALTHAM, MA 02154
CONTRACT NUMBER: DAAL01-88-C-0811
SCOTT HYNEK
TITLE:
THERMOELECTRIC BATTERY CHARGER FOR FIELD USE
TOPIC# 104 OFFICE: ETDL/LABCOM IDENT#: 26629

SUBMITTED BY

WE PLAN TO BUILD AND TEST A THERMOELECTRIC BATTERY CHARGER THAT IS INTEGRAL WITH A 1-QT SAUCEPAN, WITH THE THERMOELECTRIC ARRAY FIRMLY AFFIXED TO THE BOTTOM OF THE PAN, YET PROTECTED FROM THE FIRE, AND THE EM-SILENT BATTERY CHARGER CIRCUITRY WITHIN THE HANDLE. SAUCEPAN, GENERATOR, CIRCUITRY, AND CABLE TOGETHER WILL WEIGH LESS THAN 5 LB. WHEN PLACED ATOP A COOKING FIRE, AND WHEN CONTAINING WATER, IT WILL PROVIDE A CONSTANT ONE-AMPERE CURRENT, SUITABLE FOR CHARGING THE BB-586/U 13.2-VOLT SEALED NICKEL CADMIUM BATTERY USED IN FIELD COMMUNICATION SETS, DISCONNECTING AUTOMATICALLY WHEN THE TEMPERATURE-CORRECTED BATTERY VOLTAGE INDICATES A FULL CHARGE.

PHOTONIC SYSTEMS INC
1900 S HARBOR CITY BLVD
MELBOURNE, FL 32901
CONTRACT NUMBER: DAAL02-88-C-0064
DENNIS R PAPE
TITLE:
HIGH DYNAMIC RANGE ACOUSTO-OPTIC BRAGG CELL TRANSDUCER DESIGN
TOPIC# 43 OFFICE: HDL IDENT#: 27058

OPTICAL TECHNOLOGY IS CAPABLE OF PERFORMING COMPUTATIONALLY INTENSIVE SIGNAL PROCESSING FUNCTIONS SUCH AS FOURIER TRANSFORMATION, CORRELATION, AND AMBIGUITY FUNCTION CALCULATION, IN REAL-TIME AT SPEEDS MUCH FASTER THAN THAT OFFERED BY DIGITAL OR OTHER ANALOG PROCESSING TECHNOLOGIES. DESPITE RECENT DEMONSTRATIONS OF HIGH SPEED, COMPACT, RUGGED, ACOUSTO-OPTIC CHANNELIZERS AND CORRELATORS, THEIR RESTRICTED DYNAMIC RANGE PERFORMANCE MAY ULTIMATELY LIMIT THEIR USEFULLNESS IN MANY SIGNAL PROCESSING APPLICATIONS. THIS PROPOSAL ADDRESSES THE NEED FOR SIGNIFICANT DYNAMIC RANGE IMPROVEMENT IN ACOUSTO-OPTIC BRAGG CELLS. OUR APPROACH IS TO DEVELOP AN APODIZED PHASED ARRAY TRANSDUCE DESIGN METHODOLOGY THAT EXPLICITLY USES DYNAMIC RANGE AS A DESIGN CRITERIA. WE PROPOSE TO MINIMIZE THE ELASTIC TWO-TONE THIRD ORDER INTERMODULATION PRODUCTS BY LIMITING THE POWER IN THE UPPER HARMONIC ACOUSTIC WAVES. THIS WILL BE ACCOMPLISHED WITH A TRANSDUCER DESING UTILIZING ACOUSTIC BEAM STEERING AND APPROPRIATE MANAGEMENT OF ACOUSTIC DIFFRACTION AND ATTENUATION. THIS NEW DESIGN METHODOLOGY WILL BE APPLICABLE TO ALL CURRENT ACOUSTO-OPTIC DESIGNS. A SLOW SHEAR TeO(2) BRAGG CELL, A DEVICE WITH PARTICULARLY POOR DYNAMIC

SUBMITTED BY

RANGE PERFORMANCE, WILL BE FABRICATED AND CHARACTERIZED USING THIS TECHNIQUE.

PHRAXOS RESEARCH & DEVELOPMENT INC
2716 OCEAN PARK BLVD - STE 1020
SANTA MONICA, CA 90405
CONTRACT NUMBER: DAAL01-88-C-0813
JESSE A CASTANEDA
TITLE:
HIGH FREQUENCY MODELING OF MICROSTRIP AND CO-PLANAR CIRCUIT ELEME
TOPIC# 108 OFFICE: ETDL/LABCOM IDENT#: 26644

EFFICIENT NUMERICAL APPROACHES, VALID AT HIGH FREQUENCIES, WILL BE DEVELOPED FOR THE CHARACTERIZATION OF VARIOUS MILLIMETERWAVE MICROSTRIP AND CO-PLANAR COMPONENTS SUCH AS COUPLED LINES, DISCONTINUITIES, AND SO ON. EXISTING AND NEWLY DEVELOPED HIGH FREQUENCY ANALYSES AND COMPUTER CODES WILL BE ADAPTED FOR IMPLEMENTATION ON A MICROCOMPUTER. BOTH OPEN AND SHIELDED CONFIGURATIONS WILL BE CONSIDERED. THE MODELS WILL INCLUDE ALL THE PHYSICAL PHENOMENA SUCH AS RADIATION LOSS, SURFACE WAVES, AND HIGHER ORDER EFFECTS. ALL MATERIAL LAYER EFFECTS ARE FULLY AND ACCURATELY INCORPORATED INTO THE SOLUTION. THE RESULTS ARE ACCURATE TO THE EXTENT THAT THE MATERIALS ARE ACCURATELY CHARACTERIZED. THE IMMEDIATE PURPOSE IS TO DEMONSTRATE THE FEASIBILITY OF ADAPTING HIGH FREQUENCY MODELS OF MICROSTRIP AND CO-PLANAR ELEMENTS TO MICROCOMPUTER CODES.

PHYSICAL DYNAMICS INC
PO BOX 1883
LA JOLLA, CA 92038
CONTRACT NUMBER: DAAL04-88-C-0021
DR WALTER N PODNEY
TITLE:
SUPERCONDUCTING ELECTROMAGNETIC SENSOR FOR NONDESTRUCTIVE EVALUATION OF STRESS IN METALS
TOPIC# 77 OFFICE: MTL/LABCOM IDENT#: 26691

WE PROPOSE TO DEVELOP A NON-CONTACTING ELECTROMAGNETIC SYSTEM TO

SUBMITTED BY

MEASURE RESIDUAL STRESS IN FERROMAGNETIC ARMOR PLATE. WE USE A SUPERCONDUCTIVE (SQUID) MAGNETIC GRADIOMETER IN A NOVEL CONFIGURATION AS THE SENSOR. IT IS COMBINED WITH A MAGNETIZING SOURCE CONSISTING OF A NESTED SET OF SUPERCONDUCTING COILS. THE PROPOSED SYSTEM CAN MEASURE A NUMBER OF MAGNETIC AND ELECTRICAL CHARACTERISTICS SIMULTANEOUSLY. COMBINED MEASUREMENT OF THE PARAMETERS GIVES RESIDUAL STRESS. THE SUPERCONDUCTIVE SYSTEM OFFERS GREAT IMPROVEMENTS IN SENSITIVITY AND SPATIAL RESOLUTION OVER CONVENTIONAL MAGNETIC AND ELECTROMAGNETIC NDE SYSTEMS. FURTHERMORE, ITS UNMATCHED SENSITIVITY AT FREQUENCIES OF FEW HERTZ EXTENDS THE PENETRATION DEPTH BY NEARLY TWO ORDERS OF MAGNITUDE OVER THAT OF CONVENTIONAL SYSTEMS. CONSEQUENTLY, IT PROVIDES A UNIQUE TOOL FOR TESTING THICK ARMOR PLATE. A PROTOTYPE SYSTEM TO BE FABRICATED AND TESTED IN PHASE II WORK USES LIQUID HELIUM TEMPERATURE (4K) SUPERCONDUCTORS. NONETHELESS, THE NEW CLASS OF LIQUID NITROGEN TEMPERATURE (77K) SUPERCONDUCTORS RECENTLY DISCOVERED OFFERS THE PROMISE OF A CONVENIENT AND ECONOMICAL SYSTEM.

PHYSICAL OPTICS CORP
2545 - W 237TH ST
TORRANCE, CA 90505
CONTRACT NUMBER: DAAB07-88-C-F413
DR JOANNA JANNSON
TITLE:
CONTACT LENS FOR LASER PROTECTION
TOPIC# 214 OFFICE: CECOM/NV IDENT#: 25813

IN PHASE I OF THIS PROJECT, PHYSICAL OPTICS CORPORATION (POC) WILL EXAMINE THE FEASIBILITY OF TAKING HARD (POLYMETHYL METHACRYLATE) AND SOFT (POLYHYDROXYETHYL METHACRYLATE) CONTACT LENSES AND FITTING THEM WITH HOLOGRAPHIC AND/OR ABSORPTION DYE TECHNOLOGY SUCH THAT THE CONTACT LENSES WILL THEN FILTER OR ABSORB SPECIFIC LASER WAVELENGTHS. THE OBJECTIVE OF THIS LASER PROTECTION TECHNOLOGY WILL BE TO REDUCE TRANSMISSION APPROXIMATELY 4 ORDER OF MAGNITUDE AT THE SPECIFIC THREAT WAVELENGTHS AND TO MAXIMIZE PHOTOPIC/SCOTOPIC THROUGHPUT FOR THE OUT-OF-BAND WAVELENGTHS. EACH SET OF CONTACT LENSES WILL ADDRESS ONE OR MORE SPECIFIC WAVELENGTHS OR BANDS. METHODS OF RECORDING THE HOLOGRAPHIC FILTERS DIRECTLY IN THE CONTACT LENS MATERIAL WILL BE EXAMINED AS WELL AS THE FEASIBILITY OF ADHERING A HOLOGRAPHIC

SUBMITTED BY

FILTERS TO THE SURFACE OF THE CONTACT LENSES. THE ABSORPTION DYES WILL BE INCORPORATED DIRECTLY INTO THE CONTACT LENS MATERIAL. AN IMPORTANT PART OF THE PHASE I PROGRAM IS TO DETERMINE WHICH MATERIALS AND METHODS MAY BE USED SUCH THAT THEY ACCOMPLISH THEIR TECHNICAL OBJECTIVES AND YET ARE STILL COMPATIBLE WITH SAFE USE IN THE HUMAN EYE.

PHYSICAL RESEARCH INC
25550 HAWTHORNE BLVD - STE 2300
TORRANCE, CA 90505
CONTRACT NUMBER: DAAA15-88-C-0052
DR REZA TOOSSI
TITLE:
DISPLAY-INTERACTIVE EYE MOVEMENT MONITOR BASED UPON IMAGE PROCESSING TECHNIQUE
TOPIC# 72 OFFICE: HEL/LABCOM IDENT#: 26266

THE PROPOSED UNOBTRUSIVE TECHNIQUE FOR MONITORING EYE MOVEMENTS AND DETERMINING THE FIXATION POINT ON THE DISPLAY SCREEN IS BASED ON THE STATE-OF-THE-ART REAL-TIME IMAGE PROCESSING SYSTEM EQUIPPED WITH FAST SERVO-CONTROLLED MECHANISMS FOR THE ADJUSTMENT OF THE VIDEO CAMERA'S FOCUING, ZOOMING, AND ORIENTATION IN SPACE. THE FEASIBILITY OF AVAILABLE UNOBTRUSIVE TECHNIQUES OF EYE-MOVEMENT TRACKING (I.E., CORNEAL REFLEX, DOUBLE-PURKINJE, AND PUPIL ELLIPTICITY), IN CONJUNCTION WITH THE IMAGE PROCESSING SYSTEM WILL BE STUDIED. SPEED, RESOLUTION, RELIABILITY, COMPACTNESS AND SELF-CALIBRATION CAPACITY OF EACH METHOD WILL BE DETERMINED. FACTORS SUCH AS EASE OF USE, OPERATOR,S COMFORT, AND COST WILL BE CONSIDERED. BASED ON THESE STUDIES, THE APPROPRIATE SYSTEM WILL BE SELECTED AND OPTIMAL DESIGN PARAMETERS WILL BE DETERMINED FOR THE FINAL DESIGN AND CONSTRUCTION TO BE CARRIED OUT IN PHASE II EFFORTS.

PIEZO SYSTEMS
186 MASSACHUSETTS AVE
CAMBRIDGE, MA 02139
CONTRACT NUMBER: DAAA15-88-C-0037
ROBERT E CARTER
TITLE:
ULTRASONIC FLEXURAL RESONANCE PUMP
TOPIC# 30 OFFICE: CRDEC IDENT#: 27045

SUBMITTED BY

A MINIATURE ULTRASONIC PUMP IS PROPOSED WHICH CONSISTS OF ONLY TWO PARTS - A PERFORATED BASE PLATE AND A SCULPTED METAL-PIEZOCERAMIC COMPOSITE WHICH IS DRIVEN AT AN ULTRASONIC RESONANCE THE PUMPING PRINCIPLE HAS ALREADY BEEN DEMONSTRATED TO PRODUCE IN EXCESS OF 20 INCHES H20 PRESSURE. THE DEVICE ITSELF HAS NO WEAR SURFACES AND A THEORETICALLY INFINITE LIFE.

POTOMAC SYNERGETICS INC (PSI)
PO BOX 953
McLEAN, VA 22101
CONTRACT NUMBER: DAMD17-88-C-8196
V J CORCORAN
TITLE:
PASSIVE PROTECTOR OF OPTICAL SENSORS II (PAPOOSE II)
TOPIC# 175 OFFICE: MEDICAL IDENT#: 25370

POTOMAC SYNERGETICS, INC. (PSI), A WOMAN-OWNED, SMALL BUSINESS, PROPOSES TO PERFORM THE RESEARCH AND DEVELOPMENT REQUIRED TO IMPROVE CONCEPTS, DEVICES AND MECHANISMS THAT OFFER SUBSTANTIAL OCULAR PROTECTION FROM MULTIPLE LASER WAVELENGTHS WITHOUT DEGRADING ESSENTIAL VISUAL PERFORMANCE. ONLY TECHNIQUES THAT ARE ADAPTABLE TO STANDARD SPECTACLE GOGGLE AND VISOR CONFIGURATIONS WILL BE CONSIDERED. THE APPROACH TAKEN ON THIS PROGRAM IS AN IMPROVEMENT OVER THE WORK DONE ON PAPOOSE FOR THE U.S. ARMY LETTERMAN RESEARCH INSTITUTE. SINCE THAT TIME, IMPROVEMENTS IN MATERIALS HAVE BEEN MADE TO THE POINT WHERE IT IS NOW REASONABLE TO THINK OF EYE PROTECTION DEVICES THAT RESEMBLE EYEGLASSES. THE FEATURES OF THE PAPOOSE ARE: PASSIVE (NO POWER REQUIRED); NEGLIGIBLE INSERTION LOSS; REFLECTANCE IS POWER DEPENDENT; RELIABILITY AND MAINTAINABLE; AUTOMATICALLY ACTIVATED (NO SENSOR REQUIRED); WAVELENGTH INDEPENDENT THROUGHOUT THE RANGE OF INTEREST PAPOOSE II ADDS THE FEATURES OF COMPACT AND LIGHTWEIGHT; FAST RISE TIME (<1 ns); LARGE ACCEPTANCE ANGLE; VIRTUALLY UNLIMITED APERATURE, AND LOW COST.

PRECISION ACOUSTIC DEVICES INC
200 HAMMOND AVE
FREMONT, CA 94539
CONTRACT NUMBER: DAAL03-88-C-0025
DR JOHN D FRASER
TITLE:
AN AIR COUPLED TRANSMISSION MODE ACOUSTIC MICROSCOPE FOR ON-LINE NON-DESTRUCTIVE EVALUATION
TOPIC# 89 OFFICE: ARO/LABCOM IDENT#: 26460

SUBMITTED BY

ULTRASONIC NDE SYSTEMS SUFFER A MAJOR DIFFICULTY WHICH PREVENTS THEIR USE IN MANY INTERESTING APPLICATIONS. THIS IS, OF COURSE, THE NECESSITY OF PROVIDING A FLUID COUPLING TO THE SAMPLE BEING INSPECTED. THIS PREVENTS THE USE OF THESE SYSTEMS IN VERY HOT ENVIRONMENTS, OR WHERE THE MATERIALS BEING PROCESSED CANNOT BE CONTAMINATED WITH WATER OR OTHER FLUIDS. WE PROPOSE TO USE A TRANSMISSION TYPE ULTRASONIC MICROSCOPE OPERATING IN AIR IN THE 1 MHz FREQUENCY RANGE TO ADDRESS THESE APPLICATIONS. WE SEE SUCH A SYSTEM IN USE FOR IN-PROCESS EVALUATION OF MANY STRUCTURAL MATERIALS SUCH AS COMPOSITES AND GREEN CERAMICS. THE KEY TO THESE TYPE OF SYSTEMS IS THE DESIGN AND CONSTRUCTION OF HIGHLY EFFICIENT AIR-COUPLED TRANSDUCERS AND DRIVING AND RECEIVING ELECTRONICS. WE WILL MAKE MORE EFFICIENT AND BROADBAND ULTRASONIC TRANSDUCERS IN AIR THAN HAS BEEN PREVIOUSLY DONE. THESE DEVICES WOULD HAVE AN INSERTION LOSS OF ABOUT 35 dB, SIMILAR TO THAT MANY STANDARD ULTRASONIC SEARCH UNITS.

PRECISION COMBUSTION INC
25 SCIENCE PARK
NEW HAVEN, CT 06511
CONTRACT NUMBER: DAAED7-88-C-R072
WILLIAM C PFEFFERLE
TITLE:
DIESEL COLD START USING CATALYTICALLY ASSISTED IGNITION
TOPIC# 129 OFFICE: TACOM IDENT#: 25988

IT WOULD BE VERY DESIRABLE TO DEVELOP A RELIABLE COLD START/COLD RUN TECHNOLOGY WHICH WOULD ENABLE RAPID START-UP WITH LOW ENERGY REQUIREMENTS, NO OPERATING PERFORMANCE LOSSES, NO USE OF AUXILIARY FUELS, AND FULLY MOBILE CAPABILITIES. SUCH A TECHNOLOGY WOULD SIGNIFICANTLY IMPROVE RELIABILITY OF OPERATIONS IN COLD CONDITIONS, ESPECIALLY WHERE IMMEDIATELY AVAILABLE MOBILITY IS IMPORTANT. THIS PROPOSAL OFFERS A CATALYTICALLY ASSISTED IGNITION SYSTEM TO ENABLE VERY COLD DIESEL STARTING. IN ADDITION TO RESOLVING COLD START/COLD RUN PROBLEMS, THIS TECHNOLOGY ALSO HOLDS THE OPPORTUNITY TO IMPROVE STARTUP IN GENERAL AND TO IMPROVE STARTUP PROBLEMS ASSOCIATED WITH LOWER CETANE FUELS. PHASE I WILL ENTAIL PROOF-OF-CONCEPT TESTING COMBUSTING DIESEL FUEL IN FRIGID AIR AND DEVELOP ENGINEERING DESIGN CONSIDERATIONS FOR PHASE II. PHASE II WILL DEVELOP, BUILD AND COLD-

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TEST A PROTOTYPE DIESEL ENGINE.

PRECISION NAVIGATION INC
PO BOX 6150
STANFORD, CA 94309
CONTRACT NUMBER: DACA72-88-C-0001
GEORGE HSU
TITLE:
FEASIBILITY OF A REDUCED POWER-CONSUMPTION MAGNETOMETER FOR USE IN A DIGICOMP LENSATIC COMPASS
TOPIC# 164 OFFICE: ETL IDENT#: 25117

THE OBJECTIVE OF THE PROPOSED PROGRAM IS THE INVESTIGATION OF THE USE OF THE VARIABLE PERMEABILITY MAGNETOMETER, DEVELOPED BY PRECISION NAVIGATION, INC. (PNI), FOR A HAND-HELD DIGITAL LENSATIC COMPASS (DIGICOM). THIS TECHNOLOGY HAS BEEN DEMONSTRATED TO HVE POWER CONSUMPTION REQUIREMENTS WHICH ARE OVER AN ORDER OF MAGNITUDE BELOW CURRENT FLUX-GATE TECHNOLOGY, WITH COMPARABLE SIZE REQUIREMENTS. PRIMARY RESEARCH WILL BE DIRECTED TOWARDS OPTIMIZING THE POWER CONSUMPTION OF THE EXISTING DESIGN AND WILL PROVIDE QUANTIFIED ESTIMATES OF OPERATING LIFE FROM COMMERCIALLY AVAILABLE BATTERIES. RESEARCH WILL ALSO BE CONDUCTED INTO THE FEASIBILITY OF INCORPORATION OF PERFORMANCE FEATURES NOT PRESENTLY AVAILABLE IN THE M2 LENSATIC COMPASS. THESE INCLUDE: A CLINOMETER, ALREADY DESIGNED AND BUILT BY PNI FOR TILT COMPENSATION OF THE COMPASS, MEMORY FOR STORING READINGS, CALCULATOR FUNCTIONS, AUTOMATIC MAGNETIC DECLINATION CORRECTION, TIMEKEEPING. THE POSSIBLE IMPACT OF EACH FEATURE ON POWER CONSUMPTION WILL BE ADDRESSED. IN ADDITION, OVERALL SIZE AND WEIGHT ISSUES WILL BE ADDRESSED.

PRINCETON SCIENTIFIC ENTERPRISES INC
1108 KINGSTON RD
PRINCETON, NJ 08540
CONTRACT NUMBER: DAAA15-88-C-0042
DAVID W BLAIR
TITLE:
ATMOSPHERIC PRESSURE BURNER SYSTEM WITH PRECISION MOTION STAGE
TOPIC# 71 OFFICE: BRL IDENT#: 26858

SUBMITTED BY

THIS IS A PROPOSAL TO DESIGN, CONSTRUCT, TEST AND DELIVER A LABORATORY BURNER SYSTEM WITH MICROPROCESSOR CONTROL OF FOUR DEGREES OF POSITIONAL FREEDOM (xyz0) AND OF TWO FLOWRATES. THE BURNER WILL HAVE A UNIVERSAL BASE UPON WHICH LIQUID COOLED BURNER TIPS CAN BE INSTALLED. TWO TIPS, A JET TIP AND A FLAT FLAME TIP, WILL BE PROVIDED UNLESS OTHER TYPES ARE REQUESTED. THE POSITIONING STAGE WILL BE ASSEMBLED FROM STEPPER MOTOR DRIVEN OPTICAL POSITIONING TABLES TO GIVE LINEAR RESOLUTIONS OF 0.000050 IN. AND ANGULAR RESOLUTIONS OF 0.2 ARC MIN. THE MOTORS WILL BE DRIVEN BY A FOUR AXIS PROGRAMMABLE MICROSTEP CONTROLLER WHICH WILL INCLUDE IEEE-488 AND RS-232C INTERFACES TO PROVIDE THE ALTERNATIVE OF CONTROL BY EXTERNAL COMPUTERS. THE FLOW CONTROLLER WILL ALSO BE MICROPROCESSOR CONTROLLED AND, WHILE INITIALLY CONFIGURED TO CONTROL TWO FLOWS, IT WILL BE CAPABLE OF EXPANSIONS TO CONTROL ADDITIONAL FLOWS. IT WILL ACCEPT EXTERNAL COMPUTER CONTROL IF SUITABLE INTERFACES ARE PROVIDED. THE ENTIRE SYSTEM WILL BE DESIGNED TO EVENTUALLY INTERFACE WITH AN EXTERNAL COMPUTER WHICH CAN OUTPUT COMMANDS, ACCEPT (AND WITH NECESSARY SOFTWARE REDUCE) DATA AND REPORT EXPERIMENTAL RESULTS IN NEAR REAL TIME; THUS PROVIDING FOR FULLY AUTOMATED EXPERIMENTS.

PROGRAMMING ENVIRONMENTS INC (PEI)
4043 STATE HWY 33
TINTON FALLS, NJ 07753
CONTRACT NUMBER: DAEA18-88-C-0044
ROBERT M POSTON
TITLE:
THE FEASIBILITY OF AUTOMATICALLY TRANSLATING ADA CODE TO SOFTWARE TEST CASES
TOPIC# 159 OFFICE: TECOM/EPG IDENT#: 25313

THE LACK OF TOOLS AND TRAINED PERSONNEL TO GENERATE SOFTWARE TEST CASES IS A MAJOR PROBLEM IN MILITARY AND COMMERCIAL COMMUNITIES TODAY. NOW BEING EXPANDED UNDER A PHASE II SBIR PROJECT IS A LANGUAGE INDEPENDENT TOOL CALLED "T" THAT AUTOMATICALLY GENERATES SOFTWARE TEST CASES FROM REQUIREMENTS SPECIFICATIONS. THE INFORMATION CONTAINED IN A "T" SOFTWARE DESCRIPTION IS VERY SIMILAR TO THE INFORMATION CONTAINED IN AN ADA-VISIBLE SPECIFICATION PACKAGE. IT IS FEASIBLE TO BUILD A TRANSLATOR THAT WILL TAKE THE INFORMATION

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FROM AN ADA-VISIBLE SPECIFICATION AND PROCESS IT INTO "T" FOR AUTOMATIC TEST CASE GENERATION? BASED ON PEI'S PREVIOUS WORK ON "T" WITHIN THE SBIR PROGRAM, THE ANSWER IS MOST PROBABLY, "YES."

PROGRAMMING ENVIRONMENTS INC (PEI)
4043 STATE HWY 33
TINTON FALLS, NJ 07753
CONTRACT NUMBER: DAAB07-88-C-8021
DWAYNE L KNIRK
TITLE:
THE FEASIBILITY OF CHIPR: A TOOL TO SUPPORT COMPUTER-AIDED CHANGE IMPACT PREDICTION IN SOFTWARE CONFIGURATION ITEMS
TOPIC# 206 OFFICE: CECOM/CSE IDENT#: 25720

THE DIFFICULTY OF APPLYING SOUND CM TECHNIQUES IN AN ENGINEERING DISCIPLINE SUCH AS SOFTWARE DEVELOPMENT AND MAINTENANCE IS COMPOUNDED BY THE INHERENT COMPLEXITY AND EASE OF CHANGE OF SOFTWARE CONFIGURATION ITEMS. WE PROPOSE TO DEMONSTRATE THE FEASIBILITY OF AN INTERACTIVE COMPUTER-BASED TOOL THAT WILL SUPPORT THE CASUAL AND EXPERT USER IN THE PREDICTION OF THE IMPACT OF PROPOSED CHANGES TO THE SYSTEM UNDER MANAGEMENT. THE TOOL IS CALLED CHIPR (CHANGE IMPACT PREDICTOR). THE NAME IS PRONOUNCED "CHIPPER." CHIPR WILL USE STATISTICAL SEARCH TECHNIQUES, ON A FULL-TEXT, FREE-FORM INFORMATION BASES, TO PROVIDE COMPUTER-AIDED CHANGE IMPACT PREDICTIONS. A PROVEN, ADAPTIVE, USER-FRIENDLY INTERFACE WILL BE USED FOR CHIPR. THE FEASIBILITY DEMONSTRATION WILL USE A UNIX-BASED COMPUTER SYSTEM, STANDARD UNIX UTILITIES, AND OTHER AVAILABLE TOOLS TO EMULATE A FULL-TEXT INFORMATION BASE THAT CAN BE SEARCHED IN CONTEXT. STATISTICAL DATA AND RETRIEVED TEXT WILL BE PRESENTED TO THE USER FOR ADDITIONAL REFINEMENT OF THE SEARCH CRITERIA. REPORTS WILL BE GENERATED, PRESENTING COMPREHENSIVE INFORMATION RELEVANT TO CHANGE IMPACT PREDICTION.

QUAN-SCAN INC
77 N OAK KNOLL AVE - #114
PASADENA, CA 91101
CONTRACT NUMBER: DAAL01-88-C-0827
DR PAUL E WEST
TITLE:
NANOMETER LITHOGRAPHY USING SCANNING TUNNELING MICROSCOPY
TOPIC# 105 OFFICE: ETDL/LABCOM IDENT#: 26635

SUBMITTED BY

THE ARMY SEEKS APPLICATIONS OF SCANNING TUNNELING MICROSCOPY TO PERFORM LITHOGRAPHY ON MICROELECTRONICS DEVICES. THE EMERGING TECHNOLOGY OF SCANNING TUNNELING MICROSCOPY (STM) IS CAPABLE OF IMAGING SURFACES TO ATOMIC RESOLUTION. QUAN-SCAN PROPOSES TO STUDY THE FEASIBILITY OF APPLYING STM TECHNOLOGY TO ACHIEVE NANOMETER SURFACE ITHOGRAPHY AND DETERMINE WHETHER THE TECHNIQUES CAN PROVE USEFUL FOR FABRICATION OR REPAIR OF 100-ANGSTROM SIZED STRUCTURES. THE EFFORT WILL INVOLVE INVESTIGATING ALTERNATIVE CHEMICAL SYSTEMS FOR DOING LITHOGRAPHIC PROCESSES, DETERMINING THE INSTRUMENTATION REQUIREMENTS FOR DOING LITHOGRAPHY, AND EXAMINING POTENTIAL APPLICATIONS OF THE TECHNIQUES TO MICROELECTRONICS DEVICES.

QUANNAH CORP
2 BOBWHITE
ROBSTOWN, TX 78380
CONTRACT NUMBER: DAAED7-88-C-R080
JOHN P WISNEWSKI
TITLE:
LAB EVALUATION OF ENGINE WEAR AS A FUNCTION OF DUST
TOPIC# 135 OFFICE: TACOM IDENT#: 26085

AIRBORNE DUST, IF NOT FILTERED, CAN RAPIDLY CAUSE DAMAGE AND PERFORMANCE DEGRADATION IN HEAVY-DUTY DIESEL ENGINES. NEVERTHELESS, QUANTITATIVE DATA DESCRIBING THIS PHENOMENON ARE GENERALLY LACKING, AND QUESTIONS CONTINUOUSLY ARISE CONCERNING THE RELATIONSHIP AMONG DUST SIZE, CONCENTRATION LEVEL, FILTER PERFORMANCE, AND ENGINE WEAR. THIS UNCERTAINTY MAKES IT DIFFICULT TO SPECIFY FILTRATION LEVELS THAT WILL ASSURE ADEQUATE AND COST-EFFECTIVE ENGINE PROTECTION. TO MINIMIZE ENGINE WEAR AND THE RISK OF PREMATURE ENGINE FAILURE, AIR FILTERS MUST PREVENT WEAR-CAUSING PARTICLES FROM ENTERING THE ENGINE. IN ADDITION, OIL FILTERS MUST REMOVE PARTICLES THAT PENETRATE THE INLET AS WELL AS PARTICLES THAT ARE GENERATING DURING ENGINE OPERATION. IN ORDER TO INVESTIGATE CAUSE AND EFFECT RELATIONSHIPS, A LABORATORY PROGRAM IS PROPOSED TO MEASURE ENGINE WEAR AS A FUNCTION OF INTAKE AIR QUALITY USING RADIOACTIVE TRACER TECHNIQUES (RTT). THESE MEASUREMENTS WILL PROVIDE A BASIS FOR QUANTIFYING ENGINE WEAR AS A FUNCTION OF SPECIFIC DUST PARAMETERS, AND IN PARTICULAR, THE PARTICLE SIZE DISTRIBUTIONS THAT MUST BE REMOVED BY THE AIR AND OIL

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FILTERS WILL BE DETERMINED. BY CORRELATING DUST LEVELS TO FILTER PERFORMANCE, OIL AND AIR FILTER SPECIFICATION REQUIREMENTS CAN BE DEFINED. FURTHERMORE, BECAUSE ENGINES IN MILITARY VEHICLES OFTEN RUN HOTTER THAN NORMAL, THE INFLUENCE OF HIGH TEMPERATURE OPERATION WILL ALSO BE INVESTIGATED. THIS WILL MEASURE ABRASIVE WEAR DUE TO THE SYNERGISTIC IMPACT OF DUST INGESTION AND LUBRICATION DEGRADATION, WHICH IS LIKELY WHEN OPERATING AT HIGHER THAN NORMAL ENGINE TEMPERATURES. OVERALL, THIS EXPERIMENTAL PROGRAM WILL DEVELOP A BODY OF KNOWLEDGE FROM WHICH MEANINGFUL CORRELATIONS AND DECISIONS CAN BE MADE CONCERNING ENGINE WEAR, DUST SIZE, AND FILTER PERFORMANCE.

RADIATION MONITORING DEVICES INC
44 HUNT ST
WATERTOWN, MA 02172
CONTRACT NUMBER: DAAD07-88-C-0055
DR GERALD ENTINE
TITLE:
SIMULATION OF GAMMA RAY DOSE RATES AND SPECTRA
TOPIC# 149 OFFICE: TECOM/WSMR IDENT#: 25264

THE WHITE SANDS MISSILE RANGE GAMMA RAY FACILITY IS USED TO QUALIFY MILITARY EQUIPMENT FOR RADIATION HARDNESS. ISOTOPIC SOURCES OF 60 Co AND 137 Cs ARE USED TO PRODUCE INTENSE GAMMA RAY FIELDS THAT ALLOW TESTING OF ELECTRONIC SYSTEMS IN ENVIRONMENTS THAT APPROXIMATE ANTICIPATED NUCLEAR BATTLEFIELD CONDITIONS. RECENTLY IT HAS BECOME CLEAR THAT DOSE ENHANCEMENT EFFECTS PRODUCED BY A LOW ENERGY COMPONENT IN THE RADIATION FIELD MAKES THESE TESTS DIFFICULT TO RELATE TO THE FUNDAMENTAL DAMAGE MECHANISMS OR TO THE RESULTS OF TESTS AT OTHER FACILITIES. TO CLARIFY THIS SITUATION AND TO REESTABLISH TEST STANDARDS ON A SOUND BASIS, RESEARCHERS AT THE TESTING FACILITY NEED ACCURATE INFORMATION ON THE SPECTRAL AND DIRECTIONAL PROPERTIES OF THE RADIATION FIELD. WE PROPOSED TO RESEARCH THESE ISSUES, BEGINNING IN PHASE I WITH A MONTE CARLO CALCULATION OF THE GAMMA RAY SPECTRUM AT THE FACILITY. IN PHASE II WE WILL EXTEND OUR RESEARCH TO EVALUATE THE DETAILED INTERACTION MECHANISMS TO SPECIFY SYSTEMS AND ALSO CALCULATE THE EXPECTED EFFECTS OF SUGGESTED CHANGES TO THE FACILITY.

RADIATION MONITORING DEVICES INC
44 HUNT ST
WATERTOWN, MA 02172
CONTRACT NUMBER: DAAL04-88-C-0051
DR MICHAEL R SQUILLANTE
TITLE:
CHARACTERIZATION OF SPRAY PYROLYED THIN FILM SUPERCONDUCTORS
TOPIC# 231 OFFICE: MTL/LABCOM IDENT#: 27080

SUBMITTED BY

THE RECENT DISCOVERY OF SUPERCONDUCTIVITY AT HIGH TEMPERATURE (90 DEG K) IN COPPER CONTAINING CERAMICS HAS RESULTED IN A RAPID ACCELERATION IN SUPERCONDUCTOR RESEARCH. PRODUCTION TECHNIQUES ARE BEING EXAMINED FOR THE FABRICATION OF BULK AND THIN FILM SAMPLES. THE CURRENTLY USED PROCESSES FOR MAKING THIN FILMS OF SUPERCONDUCTORS ARE PRIMARILY LIMITED TO EXPENSIVE, SMALL SCALE, LABORATORY TECHNIQUES. TO OPEN THE POSSIBILITY OF COST EFFECTIVE APPLICATIONS, THIS PROPOSAL SETS FORTH A PROGRAM TO INVESTIGATE AND UNDERSTAND A NOVEL PROCESS FOR THE DEPOSITION OF HIGH TEMPERATURE CERAMIC SUPERCONDUCTOR FILMS: CHEMICAL SPRAY PYROLYSIS. SPRAY PYROLYSIS IS EXTREMELY ATTRACTIVE BECAUSE IT IS INHERENTLY LOW COST AND SIMPLE, AND IT READILY LENDS ITSELF TO HIGH THROUGHPUT INDUSTRIAL PROCESSES. THE OBJECTIVES OF THIS RESEARCH ARE TO CHARACTERIZE THE PROPERTIES OF SPRAYED FILMS, EXAMINE MODIFICATIONS OF THE FILMS SUCH AS INCORPORATING DOPANTS AND THE REPLACEMENT OF SMALL PERCENTAGES OF THE CONSTITUENT ELEMENTS AND EXAMINE THE TYPES OF ELECTRONIC DEVICES WHICH COULD BE FABRICATED ON THESE FILMS.

RAYEX CORP
15215 SHADY GROVE RD - STE 203
ROCKVILLE, MD 20850
CONTRACT NUMBER: DAMD17-88-C-8203
DR J W MOTZ
TITLE:
A PORTABLE MULTI-MODE X-RAY IMAGING SYSTEM WITH ONE-SIDED CT CAPABILITY
TOPIC# 192 OFFICE: MEDICAL IDENT#: 25454

RAYEX CORPORATION PROPOSES TO DEVELOP A UNIQUE X-RAY IMAGING SYSTEM SPECIALLY DESIGNED FOR COMBAT CASUALTY CARE. THIS SYSTEM WILL HAVE THE CAPABILITY OF OPERATING IN FOUR DIAGNOSTIC OPERATING MODES, INCLUDING (1) A CT MODE AND (2) A PARTIAL CT MODE, EACH OF WHICH IS CARRIED OUT IN A ONE-SIDED GEOMETRY TO PROVIDE RESPECTIVELY COMPLETE OR PARTIAL CT-TYPE TOMOGRAPHIC SLICES HAVING ARBITRARY ORIENTATION AND SHAPE, (3) A CONVENTIONAL RADIOGRAPHY MODE FOR FLAT-PLANE TRANSMISSION IMAGES, AND (4) A FLUOROSCOPY MODE FOR REAL-TIME IMAGES. THE IMAGES IN THE CT MODES WILL HAVE ADJUSTABLE SPATIAL RESOLUTIONS FROM 2 TO 5 LINE PAIRS PER CM WITH CORRESPONDINGLY LONGER SCAN TIMES.

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THE TOTAL SYSTEM WILL HAVE ONE THIRD THE WEIGHT AND COST OF CONVENTIONAL CT SYSTEMS, AND WILL OFFER IMMEDIATE ACCESS TO WOUNDED SOLDIERS WITH ITS ONE-SIDED GEOMETRY.

REMTECH INC
2603 ARTIE ST - STE 21
HUNTSVILLE, AL 35805
CONTRACT NUMBER: DAEA18-88-C-0047
ROBERT T CAMP JR
TITLE:
IDENTIFICATION AND ELIMINATION OF NUISANCE AND FALSE ALARMS DURIN TESTING OF INTRUSION DETECTION SYSTEMS
TOPIC# 160 OFFICE: TECOM/EPG IDENT#: 25318

DURING THE TESTS OF SOME INTRUSION DETECTION SYSTEMS (IDS), VARIOUS SPURIOUS ALARMS HAVE BEEN PRODUCED, THE ORIGINS OF WHICH ARE NOT KNOWN. THESE INTERFERING SIGNALS ARE CLASSIFIED AS EITHER NUISANCE ALARMS OR FALSE ALARMS. THIS PROPOSED PHASE I INVESTIGATION WILL OBTAIN DATA ABOUT THE PERSONNEL TRAINING AND SKILLS, IDA HARDWARE SPECIFICATIONS, AND THE ENVIRONMENTAL VARIABLES THAT MAY AFFECT THE OPERATION OF THE IDS. A SYNTHESIS OF THESE DATA, TAKEN TOGETHER WITH INFORMATION ABOUT ACOUSTIC SIGNATURES OF ITRUDERS, WILL ENABLE FORMULATION OF A THEORY ABOUT THE MOST LIKELY SOURES OF THE UNWANTED SIGNALS. THE FINAL REPORT OF THIS PHASE I EFFORT WILL CONTAIN RECOMMENDATIONS FOR FUTURE FIELD TESTS IN ACTUAL SOURCES OF THE FALSE ALARMS. PHASE II WOULD ALSO INCLUDE PRACTICAL TRIALS OF METHODS THAT WOULD REDUCE OR ELIMINATE FALSE ALARMS.

SCHWARTZ ELECTRO-OPTICS INC
3404 N ORANGE BLOSSOM TRAIL
ORLANDO, FL 32804
CONTRACT NUMBER: DAAA21-88-C-0173
ROBERT A OLSON
TITLE:
HYBRID ACTIVE/PASSIVE IR SENSOR FOR SMART SUBMUNITIONS
TOPIC# 13 OFFICE: ARDEC IDENT#: 27026

PRESENT-DAY SENSORS FOR SMART SUBMUNITIONS ARE LIMITED IN THEIR

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PERFORMANCE AGAINST COMPLEX BACKGROUNDS, ADVERSE WEATHER CONDITIONS, AND COUNTERMEASURES. SCHWARTZ ELECTRO-OPTICS (SEO) PROPOSES TO IMPROVE THE TARGET-DISCRIMINATION EFFECTIVENESS OF SMART SUBMUNITIONS BY COMBINING AN ACTIVE LASER RANGEFINDER AND A PASSIVE IR SENSOR TO REDUCE THE FALSE ALARM RATE UNDER ADVERSE CONDITIONS. THE HYBRID ACTIVE/PASSIVE SYSTEM COMBINES COMPLEMENTARY TECHNIQUES -- ONE DEPENDING ON TARGET REFLECTANCE AND THE OTHER ON TARGET TEMPERATURE/ EMISSIVITY -- TO ACHIEVE A TARGET DISCRIMINATION CAPABILITY GREATER THAN THAT POSSIBLE WITH EITHER TECHNIQUE ALONE. A MAJOR OBJECTIVE OF THE RESEARCH WILL BE TO DETERMINE THE MAXIMUM POSSIBLE COMMONALITY OF THE TWO TECHNOLOGIES, THEREBY MINIMIZING COST (SIZE, WEIGHT, DOLLARS) AND MAXIMIZING SENSOR CAPABILITY.

SCIENCE & ENGINEERING ASSOCS INC
PO BOX 3722
ALBUQUERQUE, NM 87190
CONTRACT NUMBER: DAAL02-88-C-0067
DR BARBARA MELANDER
TITLE:
MULTICONDUCTOR CABLE PARAMETER MEASUREMENT CONCEPTS
TOPIC# 56 OFFICE: HDL IDENT#: 27071

THIS SMALL BUSINESS INNOVATIVE RESEARCH EFFORT WILL PROVIDE A PROTOTYPE MEASUREMENT SYSTEM WHICH CAN BE USED TO DETERMINE THE ROOM COUPLING PARAMETERS TO INTERIOR WIRES OF A MULTICONDUCTOR CABLE. KNOWLEDGE OF THE COUPLING PARAMETERS WILL ALLOW CALCULATION OF CURRENTS AND VOLTAGES ON INTERIOR WIRES INDUCED FROM SHIELD CURRENTS DUETO AN INCIDENT EMP OR DIRECT LIGHTNING STRIKE. THE PROTOTYPE MEASUREMENT SYSTEM WILL UTILIZE A CONTINUOUS WAVE DATA ACQUISITION SYSTEM AND A RECTANGULAR QUADRAXIAL TEST FIXTURE. PHASE II WILL INCLUDE VALIDATING THE PROTOTYPE SYSTEM FOR SEVERAL SIZES OF MULTICONDUCTOR CABLE, USING EXISTING SOFTWARE TO PERFORM FOURIER ANALYSIS ON TEST RESULTS, AN TESTING OTHER QUADRAXIAL GEOMETRIES.

SCS TELECOM INC
107 HAVEN AVE
PORT WASHINGTON, NY 11050
CONTRACT NUMBER: DAAB10-88-C-0153
DR TUVIA APELEWICZ
TITLE:
EFFICIENT HF/VHF POWER AMPLIFIERS (INTEGRATED HF/VHF POWER CIRCUI
TOPIC# 220 OFFICE: CECOM/SWL IDENT#: 25861

SUBMITTED BY

THE RESEARCH PROPOSED FOR THIS SBIR FOCUSES ON MODIFYING A NEW CLASS OF POWER AMPLIFIER, THE SM CLASS, FOR OPERATION IN THE RANGE OF 100-400 WATTS AND 1-400 MHz. THE SM POWER AMPLIFIER OPERATES BY COMBINING THE OUTPUTS OF DISCRETE SETS OF SWITCHING TRANSISTORS, WITH EACH SET OF TRANSISTORS OPERATING IN SATURATION AS THE INPUT SIGNAL MOVES THROUGH ITS THRESHOLD RANGE. AS EACH TRANSISTOR SET CONDUCTS, THE REMAINING SETS ARE CUTOFF. THE COMBINED OUTPUT WAVEFORM REPRESENTS AN ACCURATE, BUT AMPLIFIED, REPLICA OF THE INPUT WAVEFORM. THE BASIC SM DESIGN WAS DEVELOPED BY SCS TELECOM, INC AND INITIAL CALCULATIONS INDICATE THAT EFFICIENCIES OF UP TO 80-90% AND SPURIOUS NOISE COMPONENTS NEAR ZERO ARE ACHIEVABLE WITH THIS DESIGN. THIS WILL RESULT IN LOW WEIGHT, EXTREMELY EFFICIENT POWER AMPLIFIERS FOR A WIDE RANGE OF MILITARY COMMUNICATIONS AND ELECTRONIC WARFARE SYSTEMS. COMMERCIAL COMMUNICATIONS SYSTEMS WILL ALSO BENEFIT FROM THIS DESIGN AS COSTS DROP WITH THE INCREASED AVAILABILITY OF HIGH POWER IC'S.

SEAGULL TECHNOLOGY INC
1310 HOLLENBECK AVE
SUNNYVALE, CA 94087
CONTRACT NUMBER: DAAED7-88-C-R079
DR DOUGLAS K SHIRACHI
TITLE:
EXPERT SYSTEM PROGNOSTIC MONITOR
TOPIC# 134 OFFICE: TACOM IDENT#: 26073

THIS EFFORT WILL ESTABLISH THE FEASIBILITY OF USING EXPERT SYSTEM TECHNOLOGY TO DESIGN A LOW-COST ON-BOARD PROGNOSTIC MONITORING SYSTEM AND ASSOCIATED OFF-VEHICLE PROGNOSTIC WORKSTATION. THE SYSTEM'S PURPOSE IS TO MONITOR THE STATUS OF ARMY VEHICLE SUBSYSTEMS, PREDICT WHEN POTENTIAL FAULTS MAY OCCUR, AND PROVIDE VEHICLE DATA BASES FOR OFF-VEHICLE FAILURE TREND ANALYSIS. FIRST AN INVESTIGATION OF THE BRADLEY VEHICLE FAILURE MODES AND DATA INDICATING INCIPIENT FAILURE WILL ESTABLISH THAT THE INFORMATION EXISTS TO ESTABLISH THE SYSTEM. SECOND, EXPERT SYSTEM FAULT PROGNOSIS TECHNIQUES WILL BE APPLIED TO SAMPLE SUBSYSTEM PROBLEMS TO ASCERTAIN THAT THESE TECHNOLOGIES ARE APPLICABLE TO ARMY VEHICLE PROGNOSTIC MONITORING. THEN, THE SENSORS, COMPUTERS, EXPERT SYSTEM TOOLS, SOFTWARE, AND AUXILIARY EQUIPMENT

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NECESSARY TO BUILD A PROTOTYPE PROGNOSTIC MONITORING SYSTEM WILL BE IDENTIFIED. THIS WILL INCLUDE ESTABLISHING THE SPLIT BETWEEN ON-BOARD AND OFF-BOARD DATA PROCESSING. A PRELIMINARY FUNCTIONAL DESIGN OF THE SYSTEM WILL BE MADE, AND THIS WILL BE USED TO DEFINE THE STEPS FOR SUBSEQUENT DEMONSTRATION SYSTEM DEVELOPMENT.

SEMETEX CORP
3445 KASHIWA ST
TORRANCE, CA 90505
CONTRACT NUMBER: DAAA21-88-C-0174
ARAM TANIELIAN
TITLE:
ADVANCED SEEKERS FOR SMART MUNITIONS
TOPIC# 13 OFFICE: ARDEC IDENT#: 27027

RECENTLY A NONLINEAR OPTICAL PROCESSOR HAS BEEN INTRODUCED THAT CAN PERFORM REAL-TIME PATTERN RECOGNITION OF A SCENE CONTAINING MULTIPLE OBJECTS WITH MULTIPLE REFERENCE PATTERNS IN PARALLEL AND IT CAN OPTICALLY AND/OR ELECTRICALLY UPDATE BOTH THE INPUT SCENE AND THE REFERENCE SIGNALS IN REAL-TIME. THEORETICAL AND NUMERICAL STUDIES HAVE SHOWN THAT THE PERFORMANCE OF THIS NONLINEAR CORRELATOR IS SUBSTANTIALLY SUPERIOR TO THE EXISTING CONVENTIONAL OPTICAL CORRELATORS IN THE AREAS OF LIGHT EFFICIENCY, AUTOCORRELATION PEAK TO SIDELOBE RATION, AUTOCORRELATION BANDWIDTH, AND DISCRIMINATION SENSITIVITY. THE NONLINEAR OPTICAL PROCESSOR PRODUCES DELTA FUNCTION LIKE CORRELATION SIGNALS WITH SIGNIFICANTLY HIGHER AUTOCORRELATION PEAK INTENSITY, LOWER AUTO CORRELATION SIDELOBES, AND LOWER CROSS CORRELATION VALUES. IT IS PROPOSED THAT THE RESULTS OF THOSE THEORETICAL AND NUMERICAL INVESTIGATORS BE CONFIRMED BY MEASUREMENTS TO BE MADE ON AN EXPERIMENTAL MODEL OF THE REAL-TIME NONLINEAR OPTICAL CORRELATOR.

SENSCI CORP
7837-H ROLLING RD
SPRINGFIELD, VA 22153
CONTRACT NUMBER: DAAB07-88-C-F209
LAWRENCE J ACCHIONE
TITLE:
TWO COLOR SEARCH FLIR
TOPIC# 308 OFFICE: CECOM/NV IDENT#: 27084

SUBMITTED BY

DESIGN AND DEVELOP A TWO COLOR SEARCH FLIR WITH OPTICAL PRE-FILTERING TO ALLOW HUMAN OBSERVERS AND ATR'S TO RAPIDLY FIND TARGETS USING COLOR CONTRAST.

SETS INC
1110 UNIVERSITY AVE
HONOLULU, HI 96826
CONTRACT NUMBER: DACA72-88-C-0003
THOMAS F LUNDEEN
TITLE:
HYPERSPECTRAL IMAGE EXPLOITATION
TOPIC# 162 OFFICE: ETL IDENT#: 25099

THIS PROPOSAL RESPONDS TO DOD TECHNICAL SUBTOPIC A88-162: HYPERSPECTRAL/IMAGE EXPLOITATION, WHICH REQUEST THE DESIGN AND IMPLEMENTATION OF SOFTWARE FOR HYPERSPECTRAL IMAGE EXPLOITATION. THE RESULT WOULD BE THE DEVELOPMENT OF A INTEGRATED SYSTEM WHICH WOULD ALLOW THE ARMY TO EVALUATE THE POTENTIAL APPLICATIONS FOR APPLYING HYPERSPECTRAL IMAGING SPECTROSCOPY FOR THE DETECTION AND IDENTIFICATION OF MILITARY TARGETS AND BACKGROUNDS. TO OBTAIN THE DESIRED GOAL, WE PROPOSE DURING PHASE I TO DO THE NECESSARY RESEARCH AND DEVELOP THE TECHNIQUES NEEDED TO DEMONSTRATE THE FEASIBILITY OF THE OVERALL DESIGN AND APPROACH. THE PRIMARY AREAS OF RESEARCH WILL BE IN THE 1) REVIEW AND EVALUATION OF EXISTING SYSTEMS, 2) INCORPORATION OF LABORATORY SPECTRA AS A INTEGRAL PART OF THE DATA ANALYSIS, 3) DEVELOPMENT OF MODELS FOR ATMOSPHERIC AND OTHER LOCAL ENVIRONMENTAL CORRECTIONS TO THE DATA, AND 4) THE USE OF INTELLIGENT PROCESSING PROCEDURES. RESULTS OF PHASE I WOULD BE A SET OF DESIGNS AND ALGORITHMS THAT OCULD BE USED DURING PHASE II TO DEVELOP A WORKING PROTOTYPE SYSTEM.

SIGCOM INC
408 OAKBROOK CIR
URBANA, IL 61801
CONTRACT NUMBER: DAAL03-88-C-0022
MICHAEL B PURSLEY
TITLE:
ADAPTIVE PROTOCOLS FOR SPREAD-SPECTRUM PACKET RADIO NETWORKS
TOPIC# 86 OFFICE: ARO/LABCOM IDENT#: 26409

SUBMITTED BY

THE PROPOSED INVESTIGATION OF ADAPTIVE PROTOCOLS FOR SPREAD-SPECTRUM PACKET RADIO NETWORKS HAS FOUR PRIMARY TECHNICAL OBJECTIVES. FIRST, IT WILL PROVIDE A BETTER UNDERSTANDING OF THE INTERRELATIONSHIPS BETWEEN SIGNALING TECHNIQUES, ARCHITECTURES, AND ADAPTIVE PROTOCOLS FOR SURVIVABLE PACKET RADIO NETWORKS. SECOND, A NEW ADAPTIVE DISTRIBUTED ROUTING ALGORITHM WILL BE DEVELOPED FOR USE IN SPREAD-SPECTRUM PACKET RADIO NETWORKS. THIRD, ANALYSIS AND SIMULATION WILL PROVIDE A QUANTITATIVE DEMONSTRATION OF THE PERFORMANCE OF THE NEW ROUTING TECHNIQUE WHEN USED WITH ADAPTIVE PROTOCOLS FOR TRANSMISSION AND FORWARDING IN A FREQUENCY-HOP PACKET RADIO NETWORK THAT IS SUBJECTED TO HOSTILE INTERFERENCE. FOURTH, WE WILL IMPROVE EXISTING SIMULATION CAPABILITIES FOR FREQUENCY-HOP PACKET RADIO NETWORKS.

SIGMATECH INC
555 SPARKMAN DR NW - STE 1630
HUNTSVILLE, AL 35816
CONTRACT NUMBER: DAHO-88-C-0864
GURMEJ S SANDHU
TITLE:
ALGORITHM DEVELOPMENT
TOPIC# 120 OFFICE: MICOM IDENT#: 26004

THE OBJECTIVE OF THIS RESEARCH IS TO DEVELOP IMPROVED DETECTION AND CLASSIFICATION ALGORITHMS FOR TACTICAL AIRBORNE MILLIMETER WAVE (MMW) SEEKERS EMPLOYING POLARIMETRIC PROCESSING. THE PROPOSED RESEARCH IS BASED UPON NONCOHERENT TARGET INFORMATION (NTI) FEATURES (1) EXTRACTION BY WIDEBAND CIRCULAR POLARIZATION DUAL-CHANNEL ACTIVE MMW SEEKERS. THE NTI FEATURES ARE NEAR-COMPLETE IN TARGET INFORMATION SENSE AND THEY MAP THE PSEUDO-GEOMETRIC IMAGE (APPARENT SIZE AND APPARENT SHAPE) OF THE TARGET. THE RESEARCH IS FOCUSED ON THE INTEGRATED USE OF KNOWLEDGE-BASED/EXPERT SYSTEM AND ADAPTIVE SIGNAL PROCESSING TECHNIQUES. AN EXPERT SYSTEM IS ABLE TO MONITOR ALL SUB-SYSTEM FUNCTIONS SIMULTANEOUSLY, FOR EXAMPLE, CROSS-COUPLING BETWEEN THE CHANNELS, THEN USE HEURISTICS, RULES AND AN APRIORI DATA BASE TO OPTIMIZE DETECTION AND CLASSIFICATION PERFORMANCE. EMPHASIS IS PLACED ON DEVELOPING AND EVALUATING THE JOINT CAPABILITY OF SYMBOLIC AND HEURISTIC METHODS IN AN EXPERT SYSTEM WITH ADAPTIVE SIGNAL PROCESSING TECHNIQUES BASED UPON THE ASSOCIATED UNDERLYING PRINCIPLES

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OF INFORMATION THEORY, ESTIMATION THEORY, DECISION THEORY AND MODERN CONTROL THEORY. ADDITIONALLY, TACTICAL SYSTEM IMPLEMENTATION REQUIRES REAL-TIME OPERATIONS, WEIGHT AND SIZE LIMITATIONS OF SIGNAL PROCESSING HARDWARE AND SOFTWARE.

SILICON FILMS CORP
9410 DE SOTA AVE - UNIT G
CHATSWORTH, CA 91311
CONTRACT NUMBER: DAAED7-88-C-R081
STEPHEN C MILLER
TITLE:
LASER REJECTION FILTERS FOR MANNED VEHICLES
TOPIC# 136 OFFICE: TACOM IDENT#: 26094

LASER DEVICES POSE AN EYE SAFETY HAZARD TO FIELD PERSONNEL. THERE IS A NEED TO ELIMINATE THE LASER WAVELENGTHS FROM VISION DEVICES WITHOUT COMPROMISING THE LUMINOUS EFFICIENCY OR COLOR BALANCE. THIS CAN BE ACHIEVED BY COATING VEHICLE WINDOWS FOR EXAMPLE, WITH INTERFERENCE FILTERS THAT REFLECT SPECIFIC NARROW SPECTRAL BANDS. WE PROPOSE TO DEPOSIT PROTECTIVE COATINGS ON LARGE AREAS (200 cm[2]) IN THE FORM OF RUGATE FILTERS USING A PROPRIETARY PLASMA ENHANCED CVD PROCESS. RUGGED SILICON:CARBON ALLOYS OF VARYING COMPOSITION ARE GROWN UNDER COMPUTER CONTROL TO PROVIDE A CONTINUOUSLY VARYING REFRACTIVE INDEX PROFILE (RUGATE). THE PROCESS IS SCALABLE TO VERY LARGE AREAS AND DEPOSITIONS HAVE DEMONSTRATED OPTICAL AND MECHANICAL PROPERTIES THAT ARE SUPERIOR TO OTHER THIN FILM METHODS. THE RESEARCHERS AND OUR CONSULTANT HAVE BEEN INVOLVED IN THIN FILM R&D FOR MANY YEARS, INCLUDING LASER REJECTION FILTER DEVELOPMENT FOR THE ARMY AND OTHER AGENCIES. THE EASE WITH WHICH THE PROCESS CAN BE SCALED AND IT'S ABILITY TO COAT COMPLEX TOPOGRAPHIES, READILY LENDS IT TO ECONOMICAL PRODUCTION.

SIMULA INC
10016 - S 51ST ST
PHOENIX, AZ 85044
CONTRACT NUMBER: DAAJ02-88-C-0008
JOSEPH W COLTMAN
TITLE:
INVESTIGATION OF FIBER-REINFORCED THERMOPLASTIC MATERIALS FOR USE IN ENERGY-ABSORBING SUBFLOOR STRUCTURES
TOPIC# 32 OFFICE: AVSCOM IDENT#: 27048

SUBMITTED BY

THE MISSION AND PERFORMANCE REQUIREMENTS OF U.S. ARMY AIRCRAFT ARE CONTINUALLY BECOMING MORE STRINGENT. TO MEET THESE MMORE DEMANDING REQUIREMENTS, SIGNIFICANT WEIGHT REDUCTIONS MUST BE MADE. THE USE OF COMPOSITE MATERIALS IN PRIMARY AIRCRAFT STRUCTURES IS ONE OF THE TECHNOLOGIES BEING DEVELOPED TO HELP MEET THESE GOALS. WHILE THE TECHNOLOGY TO INCORPORATE ADVANCED COMPOSITES INTO PRIMARY AIRCRAFT STRUCTURES IS BEING DEVELOPED, THE FULL POTENTIAL OF THESE MATERIALS IS NOT BEING REALIZED WITH THE CURRENTLY AVAILABLE THERMOSETTING MATRIX RESINS DUE TO THEIR LACK OF DAMAGE TOLERANCE AND DUCTILITY. THE PROPOSED PROGRAM IS DIRECTED AT IMPLEMENTING THERMOPLASTIC MATRIX COMPOSITES IN ENERGY-ABSORBING HELICOPTER SUBFLOOR STRUCTURAL COMPONENTS. THE SUCCESSFUL COMPLETION OF THIS PROGRAM WILL YIELD THE SELECTION OF THERMOPLASTIC COMPOSITE MATERIALS THAT CAN BE IMPLEMENTED INTO DIFFERENT KEEL BEAM DESIGN CONCEPTS WHICH PROVIDE EFFECTIVE ENERGY ABSORPTION CAPABILITY UNDER CRASH LOADS WHILE STILL MAINTAINING POST-CRUSH INTEGRITY. THIS SELECTION WILL BE MADE BY EXAMINING EXISTING TECHNOLOGY, SCREENING CANDIDATE THERMOPLASTIC COMPOSITE MATERIALS, AND CONCEPTUAL DESIGN OF ENERGY-ABSORBING KEEL BEAM STRUCTURES. CONSIDERATION WILL BE GIVEN TO PERFORMANCE, PRODUCIBILITY, COST, AND WEIGHT.

SIPIN A J CO INC
505 EIGHTH AVE
NEW YORK, NY 10018
CONTRACT NUMBER: DAAA15-88-C-0038
A J SIPIN
TITLE:
NBC PROTECTIVE MASK BLOWER
TOPIC# 30 OFFICE: CRDEC IDENT#: 27044

THERE IS A NEED FOR A MINIATURE BLOWER TO BE USED TO REDUCE THERMAL STRESS, PROTECT RESPIRATION AND INHIBIT FOGGING IN NUCLEAR, BIOLOGICAL, CHEMICAL (NBC) PROTECTIVE MASKS. AN OPTIMALLY SMALL AND LIGHT BLOWER COMPATIBLE WITH DELIVERY REQUIREMENTS IS DESIRABLE. TO MINIMIZE BATTERY WEIGHT, MAXIMUM EFFICIENCY OF THE BLOWER AND THE MOTOR IS REQUIRED. SOME EXISTING BLOWERS CAN MEET THE SIZE AND FLOW REQUIREMENTS, BUT WITH LOW EFFICIENCIES. CANDIDATE BLOWER CONFIGURATIONS HAVE BEEN GENERATED. BLOWER AND MOTOR TYPES WILL BE INVESTIGA-

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TED TO OBTAIN AN OPTIMALLY SMALL AND EFFICIENT DESIGN.

SOFTWARE ARCHITECTURE & ENGINEERING INC
1600 WILSON BLVD - STE 500
ARLINGTON, VA 22209
CONTRACT NUMBER: DAAL03-88-C-0033
DR THOMAS E SHIELDS
TITLE:
SOFTWARE TECHNOLOGY TO SUPPORT REAL-TIME EMBEDDED ARTIFICIAL INTELLIGENCE BASED APPLICATIONS
TOPIC# 87 OFFICE: ARO/LABCOM IDENT#: 26417

THE CONSTRAINTS OF REAL-TIME APPLICATIONS CANNOT BE SATIFIED SIMPLY BY CHOOSING A MORE EFFICIENT IMPLEMENTATION OF "CLASSICAL" AI TECHNIQUES. THE APPLICATION MUST BE EXPLICITLY ANALYYED, DESIGNED AND BUILT FOR REAL-TIME PERFORMANCE. THE USE OF GENERALIZED AI STRUCTURES AND REASONING PARADIGMS CANNOT MEET REAL-TIME PERFORMANCE REQUIREMENTS, ESPECIALLY ON CONVENTIONAL, STANDARD MILITARY HARDWARE. THE SCOPE OF THE PROPOSED EFFORT IS TO EXPLORE THE FEASIBILITY OF ALTERNATIVE SOFTWARE ARCHITECTURES AND STRATEGIES FOR IMPLEMENTATION OF REAL-TIME SYMBOLIC COMPUTATIONS. THE CLASS OF COMPUTATION TO BE ADDRESSED ARE THOSE WHICH ARE IMPLEMENTED AS SEARCH-INTENSIVE, NP-COMPLETE ALGORITHMS. THE NECESSITY TO USE ALGORITHMS OF THIS TYPE RAISES THE QUESTION OF WHETHER OR NOT REAL-TIME PERFORMANCE CAN EVER BE RELIABLY REALIZED BY AI APPLICATIONS.

SOFTWARE PRODUCTIVITY SOLUTIONS INC
PO BOX 361697
MELBOURNE, FL 32936
CONTRACT NUMBER: DAAA21-88-C-0142
DR J KAYE GRAU
TITLE:
KNOWLEDGE BASE ASSEMBLER
TOPIC# 23 OFFICE: ARDEC IDENT#: 27034

THE OBJECTIVE OF THIS SBIR IS TO DEVELOP THE SPECIFICATION FOR AN AUTOMATED TRANSLATION SYSTEM WHICH WILL TAKE A KNOWLEDGE BASE AS

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INPUT AND OUTPUT A TARGET LANGUAGE THAT CAN BE COMPILED. THIS PROCESS WILL ALLOW THE PROTOTYPING OF KNOWLEDGE BASED APPLICATIONS IN A HIGH-LEVEL LANGUAGE OR TOOL. THIS SBIR WILL DEVELOP THE DATA/WORKING MEMORY MAPPINGS, A TRANSFORMATIONAL GRAMMAR FOR THE KNOWLEDGE BASE, AND SPECIFY A STANDARD INTERFACE PACKAGE FOR INCORPORATING THE CONVERTED KNOWLEDGE BASE INTO THE TARGET ENVIRONMENT.

SOLIDLITE CORP
16150 - NE 85TH ST/STE 217
REDMOND, WA 98052
CONTRACT NUMBER: DAAB07-88-C-F424
LARRY G DeSCHAZER
TITLE:
COST EFFECTIVE HOST MATERIAL FOR DIODE-PUMPED NEODYMIUM LASERS
TOPIC# 212 OFFICE: CECOM/NV IDENT#: 25802

THE RESEARCH AND DEVELOPMENT OF HIGH-PULSE-ENERGY, DIODE-ARRAY-PUMPED, SOLID-STATE LASERS IS INHIBITED BY THE COST OF THE DIODE ARRAYS. WHILE PROGRAMS ARE ADDRESSING THE COST OF DIODES, IT IS ALSO IMPORTANT TO REDUCE THE NUMBER OF ARRAYS REQUIRED TO ACHIEVE THE MULTI-JOULE LEVEL OUTPUTS DESIRED BY MANY APPLICATIONS. A DRAMATIC REDUCTION IN THE NUMBER OF ARRAYS REQUIRED CAN BE ACHIEVED BY USING A LASER MATERIAL WITH A LONGER OPTICAL STORAGE LIFETIME THAN THOSE CURRENTLY USED. THE DEVELOPMENT OF A HOST, OPTIMIZED FOR HIGH ENERGY DIODE ARRAY PUMPING, WOULD GREATLY ACCELERATE THE DEVELOPMENT OF PULSED DIODE-PUMPED SOLID-STATE LASERS, AS DEVELOPMENT AND DEMONSTRATION COST COULD BE REDUCED BY AS MUCH AS A FACTOR OF TWO. SINCE ONE-MICRON NEODYMIUM LASERS ARE CURRENTLY THE OPTIMAL SOLID STATE SOURCE FOR NIR/VISIBLE 532-nm SOURCES, THIS PROPOSAL SEEKS TO DEVELOP LONG-LIFETIME, EASILY GROWABLE NEODYMIUM DOPED LASER MATERIALS FOR DIODE-PUMPED MULTI-JOULE LASERS.

SPEECH SYSTEMS INC
18356 OXNARD ST
TARZANA, CA 91356
CONTRACT NUMBER: DAAL02-88-C-0016
DR PHIL SHINN
TITLE:
APPLICATION OF NEURAL NETS TO STAGED SPEECH RECOGNITION
TOPIC# 49 OFFICE: HDL IDENT#: 27066

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NEURAL NETWORK COMPUTATION IS PARTICULARLY SUITED TO FINDING OPTIMAL SOLUTIONS TO PROBLEMS THAT HAVE A LARGE NUMBER OF POSSIBLE SOLUTIONS. THE TASK OF SPEECH RECOGNITION IS TO TRANSFORM ONE OF AN INFINITELY VARYING SET OF ACOUSTICS WAVE-FORMS INTO ONE ORTHOGRAPHIC TEXT STRING OUT OF THE INFINITE SET OF ENGLISH SENTENCES. GIVEN THE STRUCTURE OF THE PROBLEM OF SPEECH RECOGNITION, IT MAKES SENSE TO LOOK FOR CONVERGENCE STRATEGIES. FURTHERMORE, SINCE HUMAN BRAINS ARE MADE OF NEURONS AND BRAINS ARE THE ONLY PROCESSES THAT DO SPEECH RECOGNITION WELL, IT IS WISE TO APPLY NEURONAL COMPUTATIONAL MODELS TO THE TASK. WE PROPOSE TO EXPLORE THE APPLICATION OF NEURAL NETWORK PROCESSING STRATEGIES TO THE LATER STAGE OF SSI'S SPEECH RECOGNITION SYSTEM, WITH THE GOAL OF IMPLEMENTING A SECTION OF THIS COMPONENT AS A NEURAL NETWORK. THE FINAL REPORT OF THE PHASE I WORK WILL SHOW ANY POSSIBLE GAINS IN RECOGNITION SPEED, ACCURACY AND SPEAKER INDEPENDENCE.

SPIRE CORP
PATRIOTS PK
BEDFORD, MA 01730
CONTRACT NUMBER: DAAL04-88-C-0050
DR ANTON GREENWALD
TITLE:
THIN CONDUCTIVE FILMS FOR DIFFUSION BARRIERS AND CONTACTS TO STABILIZE YBa(2)Cu(3)O(7) SUPERCONDUCTORS
TOPIC# 231 OFFICE: MTL/LABCOM IDENT#: 27081

NEW CERAMIC POLYCRYSTALLINE SUPERCONDUCTING MATERIALS SUCH AS YBA(2)Cu(3)O(7) ARE NOT STABLE, SHOWING BOTH LOSS OF OXYGEN AND RAPID DEGRADATION OF PROPERTIES IN AIR AS CHEMICAL REATIONS REMOVE BARIUM FROM THE TRINARY METAL OXIDE CRYSTAL LATTICE, CREATING MORE-STABLE BINARY METAL OXIDE COMPOUNDS. THE PROPOSED RESEARCH WOULD EXAMINE THIN CONDUCTIVE FILMS KNOWN TO ACT AS DIFFUSION BARRIERS AND DETERMINE THE FEASIBILITY OF USING THEM TO STABILIZE THE 1-2-3 COMPOUNDS. SPECIFIC MATERIALS ARE SUGGESTED IN PROPRIETARY SECTIONS OF THIS PROPOSAL. THE BARRIER WOULD BE DEPOSITED UPON A SUBSTRATE, THEN A THIN FILM OF YBa(2)Cu(3)O(7) WOULD BE DEPOSITED, THEN ANOTHER BARRIER LAYER. THE TIME REQUIRED FOR SUPERCONDUCTING PROPERTIES TO DEGRADE, WHEN COMPARED TO UNCOATED OR SILVER COATED MATERIALS, WOULD DETERMINE THE FEASIBILITY OF THIS APPROACH USING THE SUGGESTED COM-

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POUNDS. OTHER PROPERTIES, SUCH AS CONTACT RESISTANCE AND ADHERENCE WOULD ALSO BE MEASURED.

SPRINGBORN MATERIALS SCIENCE INC
10 SPRINGBORN CTR
ENFIELD, CT 06082
CONTRACT NUMBER: DAAK70-88-C-0015
DR BERNARD BAUM
TITLE:
DEVELOPMENT OF NOVEL CURING TECHNIQUES FOR THERMOSETTING POLYMERS AND ADHESIVES
TOPIC# 116 OFFICE: BRDEC IDENT#: 26229

THE MAIN OBJECTIVE OF THIS PROGRAM IS TO DETERMINE THE FEASIBILITY OF DEVELOPING A THERMOSETTING POLYMERIC ADHESIVE AND CURING METHOD THAT WILL NOT REQUIRE CURE CYCLES IN AN OVEN OR A PRESS AT ELEVATED TEMPERATURES AND PRESSURES. THE PROGRAM WILL ENCOMPASS A STUDY OF THE RESPONSIVENESS OF THERMOSETTING EPOXY ADHESIVES TO DIELECTRIC, INDUCTION, ULTRASONIC, ULTRE-VIOLET, AND INFRARED ELECTROMAGNETIC ENERGIES. ENERGY SENSITIZERS WILL BE INVESTIGATED FOR IMPROVING THE ADHESIVE'S RESPONSIVENESS TOWARDS ENERGIES SHOWING LIMITED EFFECTS. A FINAL EVALUATION OF THE PHYSICAL PROPERTIES RELATING TO THE CURE OF THE ADHESIVE WILL BE USED TO DETERMINE FEASIBILITY OF DEVELOPING A NOVE CURING THERMOSETTING POLYMERIC ADHESIVE.

SSG INC
150 BEAR HILL RD
WALTHAM, MA 02154
CONTRACT NUMBER: DAAA15-88-C-0055
WALLACE K WONG
TITLE:
INFRARED INTERFEROMETER WITH NO MOVING PARTS
TOPIC# 233 OFFICE: CRDEC IDENT#: 27046

THE PROPOSED NOVEL INFRARED SPECTROMETER WITH NO MOVING PARTS USES WAVEFRONT DIVISION AND THEN WAVEFRONT SUPERPOSITION TO GENERATE A SPATIALLY EXTENDED INTERFEROGRAM WHICH CAN BE COMPLETELY DETECTED

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SIMULTANEOUSLY USING A LINEAR ARRAY OF DETECTORS. THIS INTERFEROGRAM CAN BE DETECTED AND TRANSFORMED INTO THE SOURCE SPECTRUM IN PSEUDO REAL TIME. IF THE MOST ADVANCE FPA, COMPUTER, AND ALGORITHMS ARE EMPLOYED, A CONCEPTUAL DESIGN WILL PRODUCE 500 TO 1,000 SPECTRA PER SECOND. THIS DEVICE CONCEPT HAS BEEN DEMONSTRATED IN THE VISIBLE SPECTRUM USING AN EG&G RETICON 1024 ELEMENT PHOTODIODE ARRAY IN TWO OPTICAL CONFIGURATIONS. THE PROPOSED EFFORT IS TO APPLY THIS CONCEPT TO THE INFRARED REGION OF 8-14 MICROMETERS IN WAVELENGTH WHERE DETECTION OF CHEMICAL EFFLUENCE HAS SHOWN MOST PROMISE. SPECIFICALLY, (1) SEVERAL CANDIDATE OPTICAL CONCEPTS WILL BE COMPARED WITHIN THE CONTEXT OF CHEMICAL DETECTION AT A DISTANCE, (2) A CONCEPTUAL DESIGN USING THE MOST APPLICABLE OPTICAL APPROACH WILL BE PRODUCED FOR FURTHER DEVELOPMENT DURING PHASE II, (3) ASSEMBLE AND TEST A "BENCH" TYPE SYSTEM TO DEMONSTRATE THE FEASIBILITY OF THE CONCEPTUAL DESIGN IN THE LWIR.

STEINBRECHER CORP
185 NEW BOSTON ST
WOBURN, MA 01801
CONTRACT NUMBER: DAAL01-88-C-0826
DEAN F PETERSON
TITLE:
PLANAR IMPATT AMPLIFIERS AND COMBINERS
TOPIC# 92 OFFICE: ETDL/LABCOM IDENT#: 26538

A PLANAR APPROACH TO MILLIMETER-WAVE CIRCUIT DESIGN ALLOWS INEXPENSIVE PHOTOLITHOGRAPHIC TECHNIQUES TO BE APPLIED TO CIRCUIT DEVELOPMENT AND MANUFACTURE, THUS LOWERING THE COST AND ENHANCING PERFORMANCE AND REPEATABILITY FOR THESE CIRCUITS. SUCH AN APPROACH WILL ALLOW THE PRECISE MACHINING REQUIREMENTS ASSOCIATED WITH (METALLIC) WAVEGUIDE DESIGNS TO BE RELAXED, AND WILL LEAD THE WAY TOWARD FUTHER INTEGRATION OF MILLIMETER-WAVE SYSTEMS IN THE FORM OF MONOLITHIC MILLIMETER-WAVE INTEGRATED CIRCUITS. A SINGLE-DIODE IMPATT PLANAR UNIT-AMPLIFIER DESIGN, THE SUBJECT OF THE PROPOSED PHASE I EFFORT, IS THE LOGICAL FIRST STEP TOWARD THE DEVELOPMENT OF HIGH-POWER MILLIMETER-WAVE IMPATT AMPLIFIERS. USE OF COMPUTER-AIDED DESIGN AND LAYOUT SOFTWARE WILL REDUCE CIRCUIT DEVELOPMENT TIME, AND COMPUTER-AIDED MEASUREMENT TECHNIQUES WILL ALLOW THE ACCURATE CHARACTERIZATION OF THE UNIT-AMPLIFIER CIRCUITS SO THAT MULTI-DIODE

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POWER COMBINERS CAN BE DESIGNED ON THE BASIS OF SINGLE-DIODE AMPLIFIER MEASUREMENTS. A CAREFULLY-DESIGNED UNIT-AMPLIFIER CAN THUS SERVE AS THE FUNDAMENTAL BUILDING BLOCK FOR MILLIMETER-WAVE POWER AMPLIFIERS WHICH USE A NUMBER OF IMPATT DIODES TO YIELD VERY HIGH OUTPUT POWER LEVELS.

STONEHART ASSOCS INC
PO BOX 1220
MADISON, CT 06443
CONTRACT NUMBER: DAAL01-88-C-0814
DR JAMES E OXLEY
TITLE:
HYBRID RECHARGEABLE LITHIUM BATTERIES FOR HIGH RATE PULSED DISCHARGE APPLICATIONS
TOPIC# 95 OFFICE: ETDL/LABCOM IDENT#: 26562

THE OVERALL OBJECTIVE OF THIS EFFORT WILL BE TO DEMONSTRATE THE FEASIBILITY OF A RECHARGEABLE LITHIUM BATTERY/ELECTROCHEICAL CAPACITOR HYBRID. THIS WILL ALLOW PULSE DISCHARGE REQUIREMENTS TO BE MET FOR SELECTED ARMY COMMUNICATIONS MISSIONS AND FOR THOSE APPLICATIONS WHICH CANNOT BE FULLY SATISFIED BY A BATTERY ALONE, AND FOR WHICH THE ENERGY STORAGE AND CURRENT LEAKAGE CHARACTERISTICS OF CONVENTIONAL SYSTEMS ARE INADEQUATE. A SPECIFIC OBJECTIVE OF THE PROJECT IS TO OPTIMIZE THE CARBON ELECTRODES WHICH ARE USED IN ELECTROCHEMICAL CAPACITORS IN ORDER TO MAXIMIZE THEIR ENERGY DELIVERY CAPABILITY WHILE ACHIEVING LOW ELECTRICAL LEAKAGE AND LOW EQUIVALENT SERIES RESISTANCE. THE USE OF ALTERNATIVE HIGH CONDUCTIVITY SUPERACIDS WILL BE EXPLORED, WITH THE AIM OF IMPROVING THE OVERALL PERFORMANCE AND LEADING THE WAY TO MORE EFFICIENT ELECTRODE STRUCTURES. FINALLY, AN ELECTRICAL CIRCUIT ARRANGEMENT FOR MINIMIZING CHARGING EFFICIENCY LOSSES IN THE TRANSFER OF ENERGY BETWEEN THE LITHIUM BATTERY AND THE ELECTROCHEMICAL CAPACITOR WILL BE DEFINED.

SUNOL SCIENCES CORP
6400 VILLAGE PKWY
DUBLIN, CA 94568
CONTRACT NUMBER: DAAD05-88-C-0045
PETER C STUDT
TITLE:
LASER BATTLISTIC SHOCK ACCELEROMETER
TOPIC# 155 OFFICE: TECOM/CSTA IDENT#: 25302

SUBMITTED BY

A DESIGN FOR A SMALL, ONE INCH BY TWO INCH, RUGGEDIZED LASER ACCELEROMETER TO MEASURE SHOCK EXPERIENCED BY COMPONENTS MOUNTED IN ARMORED VEHICLES SUBJECTED TO PYROTECHNIC SHOCK AND PROJECTILE IMPACT IS DESCRIBED. A UNIQUE APPROACH USING ONLY DIFFUSELY REFLECTED LASER LIGHT FROM THE AREA OF INTEREST IS PROPOSED. IN THIS APPROACH, STANDOFF DISTANCES OF UP TO EIGHT INCHES ARE POSSIBLE, AND REPOSITIONING OF THE SENSOR IS A SIMPLE AND RAPID PROCEDURES REQUIRING NO SPECIAL SURFACE PREPARATION OR ATTACHMENT OF RETRO-REFLECTORS. BECAUSE OF THE UNIQUE DESIGN OF THE SENSOR, NO COMPLICATED VIBRATION ISOLATION TECHNIQUES ARE REQUIRED. THE SENSOR HEAD MAY BE MOUNTED IN ANY ARBITRARY MANNER WITHOUT REGARD TO SENSOR HEAD VIBRATION AS LONG AS THE AREA OF INTEREST REMAINS WITHIN THE VIEW OF THE SENSOR HEAD. MECHANICAL SHOCK ISOLATION MAY BE APPLIED TO THE SENSOR HEAD TO ALLOW SURVIVAL WITHOUT INTERFERING WITH THE MEASUREMENT. A COMPLETELY OPTICAL APPROACH TO THE SENSOR HEAD AND DATA CABLE DESIGN ELIMINATES ALL PROBLEMS ASSOCIATED WITH OPERATIONS IN OR GENERATION OF AN ELECTROMAGNETIC INTERFERENCE ENVIRONMENT.

SUSQUEHANNA RESOURCE & ENVIRONMENT INC
84 OAK ST
BINGHAMTON, NY 13905
CONTRACT NUMBER: DAAA21-88-C-0193
TIMOTHY D MASTERS
TITLE:
ADVANCED IMAGE PROCESSING METHODS FOR SMART MUNITIONS SEEKERS
TOPIC# 11 OFFICE: ARDEC IDENT#: 27025

THIS SBIR PROPOSAL, "INTELLIGENT ALGORITHMS FOR SMART MUNITION SEEKERS," HAS TWO MAJOR OBJECTIVES: (1) TO DETERMINE THE HIT-RATE AND FALSE-ALARM RATE OF THE SR&E SEGMENTOR AND TARGET EXTRACTOR USING A COMPREHENSIVE DATA BASE; AND (2) TO EVALUATE AND DETERMINE THE TECHNOLOGICAL REQUIREMENTS FOR DEVELOPING A REAL SEEKER. TO ACCOMPLISH THESE TWO GOALS, SEVERAL RESEARCH STAGES HAVE BEEN SET FOR EACH TASK: TASK 1. STAGE 1: IDENTIFICATION OF THE EXPERIMENTAL DATA SETS; STAGE 2: RESEARCH DESIGN FROM A DATA SET PERSPECTIVE; STAGE 3: RESEARCH DESIGN FROM A TARGET EXTRACTION PERSPECTIVE; AND STAGE 4: HIT-RATE AND FALSE-ALARM RATE ANALYSES. TASK 2. STAGE 1: BENCH MARK ANALYSIS OF THE PROCESSING TIME; STAGE 2: ESTABLISHING

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A BENCH MARK FOR SEGMENTATION QUALITY; STAGE 3: SPEED OPTIMIZATION FROM SOFTWARE CONSIDERATIONS; AND STAGE 4: SPEED OPTIMIZATION FROM THE HARDWARE VIEWPOINT. THE PRIMARY IMAGERY FOR DATA ANALYSIS IS FLIR SCENES. RECENT ADVANCEMENTS IN LASER RADAR TECHNOLOGY WARRANT INVESTIGATION INTO THE CAPABILITY OF RANGE IMAGERY FOR TARGET RECOGNITION.

SUSQUEHANNA RESOURCES & ENVIRONMENT INC
84 OAK ST
BINGHAMTON, NY 13905
CONTRACT NUMBER: DAAA21-88-C-0198
TIMOTHY D MASTERS
TITLE:
ADVANCED WEAPON STATION AUTOMATION/INTEGRATION
TOPIC# 22 OFFICE: ARDEC IDENT#: 27032

UNDER THE ADVANCED WEAPON STATION AUTOMATION/INTEGRATION TOPIC, WE PROPOSE AN INNOVATIVE RESEARCH TO INTEGRATE TARGET EXTRACTION, AUTOMATION AND EXPERT SYSTEMS INTO ONE DEMONSTRATABLE WEAPON SYSTEM FOR TRAINING INTELLIGENT GUNNERS, AND DEVELOPING FIRE CONTROL DECISIONS. THREE PHASE I OBJECTIVES ARE: (1) TO DEMONSTRATE THAT THIS WEAPONN SYSTEM CAN BE DEVELOPED USING "OFF-THE-SHELF" HARDWARE TECHNOLOGIES AND THE EXISTING SR&E ATR ALGORITHMS; (2) TO DETERMINE DOMINANT FACTORS AFFECTING AN TOTALLY AUTOMATED SEGMENTATION PROCESS AND (3) TO CONDUCT A SERIES OF DEMONSTRATIONS AFTER THE FINAL SYSTEM IS DEVELOPED AND TESTED USING REAL WORLD IMAGE DATA AND TACTICAL INFORMATION EMBEDDED AS EXPERT SYSTEMS CONTROLLING THE SEGMENTATION AND TARGET EXTRACTION PROCESSES. THE UNIQUE PROPERTIES OF THE WEAPON SYSTEM ARE: (1) AUTOMATION AS THE BASIS OF ATR ACTION; (2) EMBEDDED EXPERT SYSTEMS AS THE DECISION MAKER TO CONTROL THE AUTOMATION PROCESSES; AND (3) THE WEAPON SYSTEM SERVING AS THE TRAINING ROUND FOR DEVELOPING THE EXPERT SYSTEM. IN THIS SYSTEM CONCEPT, THE HUMAN ANALYST IS TO CONTROL THE AUTOMATED ATR PROCESSES, BUT AT THE SAME TIME HE/SHE IS TO LEARN FROM THE WEAPON HOW TO DEVELOP RULES FOR AN AUTOMATION FILE.

SUTRON CORP
2190 FOX MILL RD
HERNDON, VA 22071
CONTRACT NUMBER: DAAD07-88-C-0061
GERALD J CALHOUN
TITLE:
LOW-POWER HOT-FILM ANEMOMETER FOR TACTICAL WIND SENSOR
TOPIC# 66 OFFICE: ASL IDENT#: 27079

SUBMITTED BY

SUTRON CORPORATION WILL MODIFY THE SENSOR HEAD OF AN AIR FORCE AN/FMQ-13(V) HOT FILM SENSOR TO OPERATE ON 12-VOLT POWER. THE SERIAL DIGITAL OUTPUT WILL BE MODIFIED TO PROVIDE WIND SPEED, WIND DIRECTION, BAROMETRIC PRESSURE, AND AIR TEMPERATURE TO AN IBM-PC OR COMPATIBLE. WIND TUNNEL EXPERIMENTS WILL BE CONDUCTED TO DETERMINE ACCURACY CRITERIA FOR OPERATION AT LOW (10 AND 20 DEGREE C) OVERHEAT TEMPERATURES. A 12-VOLT POWER SUPPLY WILL BE DEVELOPED WHICH MINIMIZES POWER CONSUMPTION AT LOW OVERHEATS. TESTS WILL BE CONDUCTED TO EVALUATE POWER SAVINGS FROM SOFTWARE-CONTROLLED VARIABLE OVERHEAT OPERATION AND SOFTWARE-CONTROLLED SAMPLING. A POWER BUDGET WILL BE DEVELOPED FOR AN ALL CMOS, LOW-OVERHEAT DESIGN. DELIVERABLES INCLUDING THE MODIFIED SENSOR HEAD, DOCUMENTATION FOR THE SERIAL INTERFACE, AND A TEST REPORT SUMMARIZING THE WORK AND RESULT.

SYSTEMS TECHNOLOGY INC
2672 BAYSHORE PKWY - STE 505
MOUNTAIN VIEW, CA 94043
CONTRACT NUMBER: NAS2-12917
WARREN F CLEMENT
TITLE:
ATMOSPHERIC TURBULENCE MODELING FOR REAL-TIME SIMULATION OF NAP-OF-THE-EARTH (NOE) FLIGHT
TOPIC# 31 OFFICE: AVSCOM IDENT#: 27047

SINCE ATMOSPHERIC DISTURBANCES CAN HAVE A LARGE IMPACT ON THE FLYING QUALITIES OF FIXED-WING AND ROTARY-WING AIRCRAFT, REAL-TIME AIRCRAFT TRAINING AND RESEARCH SIMULATORS MUST INCORPORATE MODELS OF THESE DISTURBANCES THAT ARE APPROPRIATE TO THE VEHICLES AND FLYING TASKS. IN SIMULATING NAP-OF-THE-EARTH (NOE) OPERATIONS IN PARTICULAR, THE DISTURBANCE MODELS SHOULD REPRESENT NONUNIFORM DISTRIBUTIONS IN THE DETERMINISTIC WIND VELOCITY (E.G., WIND SHEARS) AS WELL AS THE STOCHASTIC CHANGES IN THE WIND (E.G., TURBULENCE) OVER THE EXTENT OF THE VEHICLE. THE SPECIFIC PHASE I TECHNICAL OBJECTIVE OF THE WORK PROPOSED HEREIN WILL BE TO DEVELOP A COMPUTATIONAL PROCEDURE FOR SYNTHESIZING A REALISTIC LOW-ALTITUDE ATMOSPHERIC DISTURBANCE MODEL THAT CAN BE USED DURING REAL-TIME ROTORCRAFT SIMULATIONS OF SPECIFIC EXAMPLES OF NOE FLIGHT CONDITIONS. THE MODEL IS INTENDED TO BE USED WITH A COMPLETE ROTORCRAFT MODEL INCORPORATING DISTRIBUTED ROTOR

SUBMITTED BY

BLADE ELEMENTS AND HOVERING IN OR SLOWLY PASSING THROUGH THE ATMOSPHERIC DISTURBANCES. NONUNIFORM DISTRIBUTIONS OF DETERMINISTIC WIND VELOCITIES AND TURBULENCE CORRELATED WITH SPECIFIC FEATURES OF THE TERRAIN WILL BE REPRESENTED IN THE LOW ALTITUDE ATMOSPHERIC DISTURBANCE MODEL.

TACAN CORP
2111 PALOMAR AIRPORT RD
CARLSBAD, CA 92009
CONTRACT NUMBER: DAAL01-88-C-0891
MICHAEL M SALOUR
TITLE:
OPTICAL BISTABILITY IN GaAs/AlGaAs ASYMMETRIC STRUCTURE COUPLED WELLS
TOPIC# 90 OFFICE: ETDL/LABCOM IDENT#: 26467

WE PROPOSE TO INVESTIGATE AN ASYMMETRIC-COUPLED-WELL, MULTIPLE-QUANTUM-WELL STRUCTURE AND ITS APPLICATIONS TO BOTH BISTABLE AND NONBISTABLE OPTICAL SWITCHING. THE COUPLED-WELL FEATURE MAY PROVIDE FOR LOWER SWITCHING THRESHOLDS.

TAU CORP
485 ALBERTO WY - BLDG D
LOS GATOS, CA 95032
CONTRACT NUMBER: DAAD03-88-C-0014
DR FRED SMITH
TITLE:
AUTOMATIC VIDEO LOCATION AND RECOGNITION SYSTEM FOR RANDOMLY DISPERSED MUNITIONS
TOPIC# 152 OFFICE: TECOM/JPG IDENT#: 25284

THE PROBLEM ADDRESSED IS THE AUTOMATIC LOCATION AND CLASSIFICATION OF RANDOMLY DISPERSED OBJECTS TO AN ACCURACY OF 1 CM ON THE GROUND IN THE AREA OF 100 M TO 200 M. TO AVOID INTERFERENCE WITH THE DISPERSION OF THE OBJECTS ANY CAMERAS ARE TO BE LOCATED OUTSIDE THE AREA, AND ANY MAKERS PLACED IN THE AREA TO AID LOCATION ARE TO FLUSH WITH THE GROUND OR VERY SMALL. THESE REQUIREMENTS IMPLY THE USE OF

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TWO TOWER-MOUNTED PANNING CAMERAS OUTSIDE THE OBJECT-DISPERSAL AREA. THE PHASE I EFFORT WILL DEVELOP THE MISSING COMPONENTS OF THE VIDEO LOCATION AND RECOGNITION SYSTEM AND WILL DEMONSTRATE THEM USING TAU IMAGE PROCESSING HARDWARE OPERATING ON PHOTOGRAPHS OR VIDEO TAPES OF THE DISPERSED OBJECTS IN TERRAIN BACKGROUND. NO HARDWARE NEED BE PURCHASED BY THE GOVERNMENT FOR THESE DEMONSTRATIONS. PHASE II WILL COMPLETE THE DESIGN AND IMPLEMENT THE CAMERA SYSTEMS THE IMAGE PROCESSOR, THE OPERATOR INTERFACE, AND THE OVERALL SYSTEM CONTROLLER.

TECHNICAL SOLUTIONS INC
PO BOX 1148
MESILLA PARK, NM 88047
CONTRACT NUMBER: DAAA21-88-C-0148
DR ALTON L GILBERT
TITLE:
ADVANCED WEAPON STATION AUTOMATION/INTEGRATION
TOPIC# 22 OFFICE: ARDEC IDENT#: 27033

THE REQUIREMENT EXISTS FOR THE DEVELOPMENT OF A SYSTEM THAT WILL SUPPORT ON-GOING LABORATORY EFFORTS TO DEVELOP, IMPLEMENT, TEST, AND EVALUATE ADVANCED WEAPON STATION AUTOMATION TECHNOLOGY. THE SUPPORT SYSTEM TO BE DEVELOPED MUST PROVIDE A MEANS FOR MODELING AND DISPLAY OF THE WEAPON SYSTEM UNDER DEVELOPMENT, MUST ALLOW FOR A FULL RANGE OF TESTING TO BE CONDUCTED, AND MUST CONFORM TO ACCEPTED MODELING CRITERIA AS DEFINED BY THE U.S. GOVERNMENT.

TECHNOLOGY APPLICATIONS
218 KOCH AVE
PLACENTIA, CA 92670
CONTRACT NUMBER: DAAA21-88-C-0202
JAMES K WILLIAMS
TITLE:
COMMAND GUIDANCE TECHNIQUES FOR GUN LAUNCHED PROJECTILES
TOPIC# 18 OFFICE: ARDEC IDENT#: 27029

THE TECHNICAL PROBLEM IS TO DEVELOP A COST EFFECTIVE PROJECTILE TRACKING AND COMMAND GUIDANCE SYSTEM THAT WILL IMPROVE THE ACCURACY

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AND INCREASE THE LETHAL RANGE OF MILITARY 105/120mm GUN SYSTEMS FIRING AGAINST ADVANCED TECHNOLOGY ARMORED, HIGH MOBILITY TARGETS. THE OBJECTIVES OF THE PHASE I WORK ARE: 1) TO DEMONSTRATE THE POTENTIA FOR ACROSS RANGE ACCURACY OF 20 TO 40 CENTIMETERS AT 5,000 METERS OF A PROJECTILE BEACON TRACKING SENSOR, AND 2) DEMONSTRATE A FUNCTIONALLY COMPLETE BREADBOARD PROJECTILE COMMAND GUIDED ELECTRONICS SUBSYSTEM. THE MEETING OF THESE OBJECTIVES WILL PROVIDE THE FOUNDATION FOR A PHASE II FEASIBILITY DEMONSTRATION USING A TEST RANGE GUN FIRING EXPERIMENTAL COMMAND GUIDED PROJECTILE.

TECHNOLOGY INTEGRATION & DEV GP INC
ONE PROGRESS RD
BILLERICA, MA 01821
CONTRACT NUMBER: DAAJ02-88-C-0011
PHILIP HARVEY
TITLE:
ADVANCED INTEGRATED SOLID STATE FLIGHT LOAD SENSORS
TOPIC# 36 OFFICE: AVSCOM IDENT#: 27051

MODERN MICROELECTRONICS ARE MAKING POSSIBLE THE ACQUISITION AND PROCESSING OF EXTENSIVE FLIGHT DATA, BUT THE SENSORS FOR ACQUIRING SUCH DATA ARE UNSUITABLE FOR THE TASK, DUE TO THEIR ENVIRONMENTAL SUSCEPTIBILITY, FRAGILITY, AND INCOMPATIBILITY WITH FIELD REPLACE-MENT REQUIREMENTS. THUS, THE DEVELOPMENT OF NEW SENSORS AND ATTACH-MENT METHODS FOR FLIGHT LOAD MONITORING IS AN URGENT PRIORITY. THIS PROPOSAL DESCRIBES THE APPLICATION OF SOLID-STATE (MICRO-SENSOR) TECHNOLOGY TO THE PROBLEM OF LOAD (STRAIN) MEASUREMENT ON HELICOPTERS. THE POTENTIAL ADVANTAGES OF MICROSENSORS IN THE HELICOPTER ENVIRON-MENT INCLUDE: SMALL SIZE AND WEIGHT; INTEGRAL SIGNAL CONDITIONING AND PRE-PROCESSING; EASILY EMBEDDED IN OR MADE INTEGRAL WITH STRUCTURE, AND LOW COSTS ALLOW FOR GREATER COVERAGE AND REDUNDANCY. THESE ADVANTAGES CAN BE REALIZED IF A COMPREHENSIVE SYSTEM STRATEGY IS ADOPTED FOR STRUCTURAL LOAD MONITORING. SUCH AN INTEGRATED APPROACH IS PROPOSED.

TECHNOLOGY INTERNATIONAL INC
429 W AIRLINE HWY - STE S
LaPLACE, LA 70068
CONTRACT NUMBER: DAAED7-88-C-R077
MICHAEL BARNETT
TITLE:
DEVELOPMENT OF A CONSOLIDATED INTELLIGENT CONTROL UNIT (CICU) FOR CONTROL OF RCVS
TOPIC# 133 OFFICE: TACOM IDENT#: 26061

SUBMITTED BY

A CONSOLIDATED INTELLIGENT CONTROL UNIT (CICU) IS CONCEPTUALIZED FOR CONTROL OF MULTIPLE ROBOTIC COMBAT VEHICLES FROM A SINGLE RRC. WHILE A CONTROL STRATEGY WILL BE DESIGNED FOR CONTROL FUNCTIONS COMMON TO ALL MISSIONS, SPECIAL CONTROL TECHNIQUE WILL BE USED FOR MISSION-SPECIFIC CONTROL. THE DESIGN OF THE CICU IS BASED ON HIERARCHICAL AND MODULAR COMBINATION OF APPLICABLE CONTROL TECHNOLOGIES, REDUCTION OF COMMANDER'S WORKLOAD VIA AUTOMATION, USE OF CARD, WHEREVER FEASIBLE, PROVISION OF DECISION AIDS AND DISPLAY AIDS, HUMAN FACTORS INTERFACE AUGMENTATIONS. THE PHASE I EFFORT INVOLVES QUANTIFICATION OF THE SITUATION, DEVELOPMENT OF SYSTEM REQUIREMENTS VIA HUMAN FACTORS SIMULATION PROCEDURES, SPECIFICATION OF CICU AND ASSESSMENT OF ITS FEASIBILITY BASED ON THE STATE-OF-THE-ART TECHNOLOGIES.

TERRA TEK INC
360 WAKARA WY
SALT LAKE CITY, UT 84108
CONTRACT NUMBER: DACA39-88-C-0016
CHRISTOPHER F JOHNSON
TITLE:
ONE-MILLION POUND COMPRESSION REACTION LOADER AND COMPUTER CONTRO SYSTEM DESIGN
TOPIC# 171 OFFICE: WES IDENT#: 25459

A ONE-MILLION POUND COMPRESSION REACTION LOADER IS REQUIRED TO OPERATE IN CONJUNCTION WITH THE WATERWAYS EXPERIMENT STATION 6-KBAR TRIAXIAL TEST DEVICE. TERRA TEK HAS DESIGNED AND CONSTRUCTED SIMILAR TEST SYSTEMS FOR IN-HOUSE TESTING. TERRA TEK HAS ALSO DEVELOPED UNIQUE COMPUTER CONTROL CODES SPECIFICALLY FOR ROCK MECHANICS APPLICATIONS. THE PROPOSED PHASE I EFFORT IS TO DESIGN A COMPRESSION REACTION LOADER AND DEVELOP A COMPATIBLE COMPUTER CONTROL SYSTEM THAT BUILD ON THE EXISTING TERRA TEK SYSTEMS TO PROVIDE CAPABILITY IN AUTOMATED ROCK MECHANICS TESTING THAT GOES BEYOND THE CAPABILITY OF ANY EXISTING SYSTEM. THE RESULTING SYSTEM TO BE BUILT UNDER PHASE II WILL PROVIDE CAPABILITY TO PERFORM COMPLEX STRAIN-PATH TESTS, AS WELL AS ROUTINE TRIAXIAL ROCK MECHANICS TESTS.

TEXAS RESEARCH INSTITUTE INC
9063 BEE CAVES RD
AUSTIN, TX 78733
CONTRACT NUMBER: DAAL04-88-C-0047
J SCOTT THORNTON
TITLE:
BONDING TO UNPREPARED SURFACES
TOPIC# 75 OFFICE: MTL/LABCOM IDENT#: 26650

SUBMITTED BY

THIS PROPOSAL DESCRIBES AN SBIR PROJECT TO PREPARE NOVEL PRIMERS FOR BONDING TO UNPREPARED HYDROPHILIC SUBSTRATES SUCH AS STEEL, ALUMINUM, AND TITANIUM AND TO COMPOSITES. THE PRIMERS WILL BE PREPARED FROM ORGANOFUNCTIONAL SILANE AND ZIRCO-ALUMINATE COUPLING AGENTS AND FROM POLYMERIZABLE PHOSPHATE COMPOUNDS AND WILL BE DESIGNED TO REACT WITH MOISTURE AT THE SUBSTRATE SURFACE AND TO REPEL ADDITIONAL MOISTURE FROM THE INTERFACE. WEDGE TESTS CONDUCTED IN AGGRESSIVE ENVIRONMENTS WILL BE USED TO DETERMINE THE MECHANISMS BY WHICH THE PRIMERS INTERACT WITH THE SUBSTRATES AND TO DETERMINE THE FAILURE MECHANISMS OF THE WEDGE TEST SPECIMENS. THE RESULTS WILL BE USED TO SELECT SPECIFIC PRIMERS FOR ADDITIONAL DEVELOPMENT.

TOPICAL TESTING INC
1220 - E 3900RD S/STE 1E
SALT LAKE CITY, UT 84117
CONTRACT NUMBER: DAMD17-88-C-8189
JOHN H FISHER
TITLE:
NONINVASIVE MEASUREMENT OF CORE TEMPERATURE
TOPIC# 174 OFFICE: MEDICAL IDENT#: 25624

TOPICAL TESTING PROPOSES THE DEVELOPMENT OF A NON-INVASIVE DEVICE TO MONITOR CORE TEMPERATURE BY SAMPLING THE MAXIMUM TEMPERATURE OF THE RESPIRATORY AIR DURING EXPIRATION. PHASE I DEVELOPMENT WILL EXAMINE THE FEASIBILITY OF USING A FAST-RISE TIME THERMISTOR TO MONITOR THE TEMPERATURE OF THE EXPIRATORY AIR AND THEN USE OTHER MEASUREABLE PARAMETERS TO CALCULATE THE TEMPERATURE DROP AS THE EXPIRED AIR PASSES THROUGH THE BRONCHIAL TREE AND UPPER RESPIRATORY TRACT. THE STRATEGY FOR THIS DEVELOPMENT IS TO USE ANESTHETIZED ANIMAL MODELS IN A VARIETY OF HYPOTHERMIC ENVIRONMENTS TO DETERMINE THE MINIMUM NUMBER OF PARAMETERS THAT MUST BE MEASURED TO ACCURATELY ESTIMATE CORE TEMPERATURE. SUCH PARAMETERS MIGHT INCLUDE ORAL TEMPERATURE, TEMPERATURE AND HUMIDITY OF INSPIRED AIR AND THE RESPIRATORY RATE AND AIR FLOW. THE PHASE I GOAL IS TO TEST A WORKING PROTOTYPE. THE PHASE II GOAL WILL BE DEVELOPMENT OF A PORTABLE UNIT SUITABLE TO MEASURE CORE TEMPERATURE UNDER FIELD CONDITIONS. THE PROPOSED SYSTEM WILL ENHANCE THE ABILITY OF THE MILITARY TO OPERATE IN LOW TEMPERATURE ENVIRONMENTS BY BEING ABLE TO MONITOR WHETHER THEIR

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TROOPS ARE ENTERING INTO A STATE OF HYPOTHERMIA. IT WILL BE ABLE TO QUICKLY MONITOR TEMPERATURE IN A NON-INVASIVE MANNER WITHOUT THE REMOVAL OF CLOTHING.

TOYON RESEARCH CORP
75 AERO CAMINO - STE A
GOLETA, CA 93117
CONTRACT NUMBER:
GERARD P CARDILLO
TITLE:
REAL TIME FOLIAGE PENETRATION SYNTHETIC APERTURE RADAR
TOPIC# 44 OFFICE: HDL IDENT#: 27059

A RADAR OPERATING THROUGH FOLIAGE IS DEGRADED BY FOUR PRINCIPAL EFFECTS: ATTENUATION, REFRACTION, REFLECTION, AND RANDOM DISTRIBUTED RETURNS FROM RESONANT FOREST STRUCTURES. NUMEROUS RADAR DESIGNS HAVE BEEN ATTEMPTED, BUT NONE HAVE RESULTED IN A SATISFACTORY SOLUTION TO THE PROBLEM OF LOCATING TARGETS IN FOLIAGE. THE PROPOSED RADAR SYSTEM CONSISTS OF TWO AIRCRAFT FLYING ROUGHLY PARALLEL PATHS; AT LEAST ONE AIRCRAFT IS TRANSMITTING, BOTH ARE RECEIVING. THIS SYSTEM IS UNIQUE IN AT LEAST TWO MAJOR RESPECTS: (1) THE USE OF LOW ANGLE OF INCIDENCE RADIATION WHICH REDUCES LOSSES DUE TO FOLIAGE, ALLOWS HIGHER FREQUENCIES, AND ALLOWS RANGE RESOLUTION AS A HEIGHT DISCRIMINANT; AND (2) THE USE OF INTERFEROMETER RADAR PRINCIPLES ALLOWS RESOLUTION IN THE CROSS-TRACK COORDINATE. THE RESULTING HEIGHT AND CROSS-TRACK RESOLUTION, IN CONJUNCTION WITH ALONG-TRACK SAR PROCESSING, PRODUCE THREE-DIMENSIONAL RESOLUTION IN POSITION. OTHER FEATURES INCLUDE THE AVAILABILITY OF HEIGHT AND BISTATIC RCS AS TARGET DISCRIMINANTS. IN ADDITION, THE WIDEBAND FREQUENCY SWEEP OF THE PROPOSED WAVEFORM ALLOWS THE FREQUENCY DEPENDENCE OF TARGETS RCS TO BE A DISCRIMINANT.

TPL INC
1549 GLORIETTA NE
ALBUQUERQUE, NM 87112
CONTRACT NUMBER: DAAA21-88-C-0246
MARK L PERRY
TITLE:
AN ADVANCED RAPID INITIATION PROPAGATION IGNITOR SYSTEM FOR LOVA PROPELLANTS
TOPIC# 8 OFFICE: ARDEC IDENT#: 27021

SUBMITTED BY

RAPID INITIATED PROPAGATION (RIP) IGNITORS PROVIDE MORE UNIFORM FLAME SPREADING THROUGH PROPELLANT BEDS THROUGH CYLINDRICAL WAVE EXPANSION ACCOMPANIED BY REDUCED EXPANSION EFFECTS ON THE PRESSURE PULSE. IMPROVEMENTS IN RIP IGNITOR PERFORMANCE ARE POSSIBLE THROUGH: INCREASES IN PRIMER CHARGE DENSITY, REDUCTION IN IGNITOR FREE VOLUME, BLENDS OF IGNITOR MATERIALS, AND USE OF HIGH EMISSIVITY SOLIDS. THE PROGRAM WILL CONDUCT AN ANALYTICAL AND EXPERIMENTAL PARAMETRIC INVESTIGATION OF ADVANCED RAPID INITIATION PROPAGATION (ARIP) IGNITOR DESIGNS BASED ON THESE IMPROVEMENTS. AN EXISTING ARIP IGNITOR PERFORMNCE CODE WILL BE MODIFIED AND UPGRADED FOR THIS APPLICATION. BASED ON IGNITION HEAT FLUX REQUIREMENTS FOR LOVA PROPELLANTS, CANDIDATE ARIP IGNITORS WILL BE DESIGNED. RADIANT HEAT FLUX OUTPUTS WILL BE MEASURED THROUGH USE OF A THERMAL GRADIENT TECHNIQUE. EXPERIMENTAL EVIDENCE INDICATING LOVA PROPELLANT IGNITION REQUIREMENTS ARE MET WILL CONSTITUTE DEMONSTRATION OF TECHNICAL FEASIBILITY OF THE ARIP CONCEPT.

TRACTELL INC
4490 NEEDMORE RD
DAYTON, OH 45424
CONTRACT NUMBER: DAAB07-88-C-B801
DR EUGENE E JONES
TITLE:
AN ELECTRONIC LOGISTICS KNOWLEDGE BASE EMBEDDED ON INDIVIDUAL REPARABLE COMPONENTS
TOPIC# 207 OFFICE: LACBOM/LTO IDENT#: 26284

THIS RESEARCH SEEKS TO DETERMINE THE FEASIBILITY OF A METHOD TO ELECTRONICALLY EMBED LOGISTICS-RELATED DATA WITHIN/ON HARDWARE COMPONENTS. THE SPECIFIC RESEARCH INNOVATION IS CALLED THE "LOGISTICS KNOWLEDGE BASE MODULE/TEMPLATE" (LKBMT). THE LKBMT IS A STAND-ALONE INFORMATION LOGGING DEVICE TO BE PACKAGED AS A MICROCHIP IN A MANNER VASTLY SUPERIOR TO CURRENT SMART CARD TECHNOLOGIES. THE LKBMT SERVES AS AN "ON-COMPONENT" KNOWLEDGE BASE FOR MAINTENANCE AND LOGISTICS USE. THIS DEVICE WOULD BE EMBEDDED INTO A HOST COMPONENT AS A MODULE DURING MANUFACTURE OR BE BONDED ONTO THE COMPONENT AS A TEMPLATE DURING RETROFIT. IN EITHER FORM, THE LKBMT IS EXTERMELLY POWERED AND INTERROGATED THROUGH A RADI-FREQUENCY PROBE. IT HAS A

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NON-VOLATILE, CRASH-PROOF MEMORY WHICH IS CAPABLE OF LOGISTICS DATA RETENTION FOR TEN YEARS. ELECTRONIC LINKS TO THE HOST COMPONENT MAY CONTINUOUSLY RECORD RELIABILITY-RELATED PARAMETERS, SUCH AS TEMPERATURE, VIBRATION, HUMIDITY, ETC., AND SERVE AS AN ELAPSED TIME METER.

TRANSITIONS RESEARCH CORP
15 GREAT PASTURE RD
DANBURY, CT 06810
CONTRACT NUMBER: DAAED7-88-C-R068
DR CARL F R WEIMAN
TITLE:
ROBOTIC VEHICLE VIDEO IMAGE TRANSMISSION
TOPIC# 123 OFFICE: TACOM IDENT#: 25912

UNMANNED VEHICLES ARE DESIRABLE IN HOSTILE ENVIRONMENTS. GUIDANCE IS A DIFFICULT PROBLEM, PARTICULARLY IN ROUGH TERRAIN. VISION IS ESSENTIAL. AUTONOMOUS GUIDANCE IS NOT PRESENTLY VIABLE. REMOTE VIDEO GUIDANCE BY AN OPERATOR IS A PRACTICAL SOLUTION. VIDEO DATA RATES IMPLY VERY HIGH CARRIER FREQUENCIES (GIGAHERZ) WHICH IN TURN REQUIRE LINE OF SIGHT TRANSMISSION. MANEUVERING OPTIONS ARE SERIOUSLY HAMPERED. A THREE-FOLD APPROACH IS PROPOSED TO REDUCE VIDEO DATA RATES, AND HENCE TRANSMISSION FREQUENCIES, BY MORE THAN TWO ORDERS OF MAGNITUDE. THE FIRST STEP IS TO RESAMPLE IMAGE DATA USING LOG-POLAR COORDINATES. WE HAVE SHOWN THAT THIS YIELDS BETTER THAN AN ORDER OF MAGNITUDE REDUCTION IN PIXEL COUNT, FOR A GIVEN RESOLUTION IN THE CENTER OF THE FIELD OF VIEW. THE SECOND STEP IS TO EXTRACT ONLY SALIENT IMAGE FEATURES FOR TRANSMISSION. THE THIRD IS SIGNAL COMPRESSION BY PROVEN TECHNIQUES SUCH AS BLOCK TRUNCATION CODING. THIS STUDY WILL IMPLEMENT SOFTWARE ALGORITHMS FOR IMAGE REMAPPING, FEATURE EXTRACTION AND SIGNAL COMPRESSION. THESE WILL BE TESTED ON REAL IMAGERY IN NON-REAL TIME. THE BEST CANDIDATES WILL BE SELECTED FOR PRELIMINARY DESIGN OF REAL TIME HARDWARE TO BE CONSTRUCTED IN PHASE II.

TRIANGLE RESEARCH & DEVELOPMENT CORP
PO BOX 12696
RSCH TRIANGLE PK, NC 27709
CONTRACT NUMBER: DAAED7-88-C-R082
JOHN L DUNCAN
TITLE:
FIBEROPTIC WIDE-ANGLE UNITY-POWER PERISCOPE
TOPIC# 137 OFFICE: TACOM IDENT#: 26097

SUBMITTED BY

AN NOVEL INVESTIGATION IS PROPOSED FOR THE POTENTIAL IMPROVEMENT OF THE ARMY'S COMBAT VEHICLE UNITY PERISCOPE. THE NEW DESIGN COULD BE BETTER DESCRIBED AS "ALL ANGLE" INSTEAD OF A WIDE ANGLE; HOWEVER, THIS PROPOSAL USES WIDE ANGLE IN THE SENSE OF EVENTUALLY BEING ABLE TO SEE 180, 270, OR 360 DEGREES WITHOUT POTENTIAL "BLIND SPOTS" OR ABERRATIONS. THE NEW DESIGN WOULD UTILIZE COHERENT FIBEROPTICS WITH COUPLED OBJECTIVE LENSES TO PRODUCE A FOCAL PLANE THAT WOULD GIVE THE VIEWER A REALISM SIMILAR TO AN ACTUAL VIEW OUTSIDE THE COMBAT VEHICLE WHILE KEEPING UNITY VISION. THE PROPOSED FIBEROPTIC PERISCOPE INITIALLY COULD BE DESIGNED TO HAVE THE DIMENIONAL MOUNTING CHARACTERISTICS OF ONE OF THE CURRENTLY USED MIRROR/PRISM PERISCOPES. DUE TO THE CONSTRAINTS OF THE PHASE I PROGRAM, THE INITIAL FIBEROPTIC PERISCOPE WOULD BE LIMITED TO THE DESIGN OF TWO OR THREE SECTIONS. THESE SECTIONS COULD BE TESTED AND COMPARED WITH THE MIRROR/PRISM PERISCOPES NOW USED BY THE DRIVER OF THE M-1 TANK. THE PROPOSED PERISCOPE POTENTIALLY COULD INCREASE THE DRIVER'S VIEW FROM 110 TO 180 DEGREES. THE FIVE-DEGREE "BLIND SPOTS" BETWEEN THE CURRENT THREE PERISCOPES MAY THUS BE ELIMINATED AND ABERRATIONS HELD TO A MINIMUM.

TSI INC
PO BOX 64394 - 500 CARDIGAN RD
ST PAUL, MN 55164
CONTRACT NUMBER: DAAED7-88-C-R071
VICTOR E KIMBALL
TITLE:
RUGGED LASER VIBRATION SENSOR FOR ON-BOARD VEHICLE TESTING
TOPIC# 127 OFFICE: TACOM IDENT#: 25951

PRESENT VEHICLE DRIVE TRAIN DIAGNOSTICS USUALLY REQUIRE TEST STANDS AND OFTEN COMPONENT REMOVAL, MAKING THEM VERY INEFFICIENT. ON-BOARD VEHICLE TESTING CAN DRAMATICALLY INCREASE THE EFFICIENCY OF DIAG-NOSITC DATA COLLECTION AND PROVIDE MORE REALISTIC, ON-LINE INFORMA-TION. THIS PROPOSAL DESCRIBES THE DEVELOPMENT OF A PORTABLE, NON-CONTACT, RUGGED LASER DIODE VIBRATION SENSOR FOR ON-BOARD VEHICLE TESTING OF VEHICLE TRANSMISSIONS AND TRANSFER CASES. THE INSTRUMENT MEASURES VIBRATIONS FROM 1 Hz TO 100,000 Hz AND OUTPUTS ANALOG SIGNALS PROPORTIONAL TO THE VIBRATION VELOCITY AND ACCELERATION.

SUBMITTED BY

THE WIDE FREQUENCY RANGE IS PARTICULARLY IMPORTANT IN IDENTIFYING BEARING FAULTS, WHICH SOMETIMES PRODUCE VIBRATION SPECTRA IN THE 50 KHz TO 100 KHz RANGE. ADAPTING SUCH AN INSTRUMENT FOR VEHICLE MOUNTING WILL ENABLE THE VIBROMETER TO MAKE "IN SITU" VIBRATION MEASUREMENTS TO DETERMINE THE GEARBOX CONDITION WITHOUT REMOVAL AND ALSO TO STUDY THE EFFECTS OF ROUGH ROADS ON THE GEARBOX.

UNIVERSAL TECHNICAL SYSTEMS INC
1220 ROCK ST
ROCKFORD, IL 61101
CONTRACT NUMBER: DAAED7-88-C-R073
KENNETH R GITCHEL
TITLE:
EXPERT DESIGN SYSTEM TO ASSESS DRIVE TRAIN RELIABILITY/DURABILITY IN MILITARY TRACKED VEHICLES
TOPIC# 130 OFFICE: TACOM IDENT#: 26012

EXPERT SYSTEMS SOFTWARE USED IN DESIGN AND MANUFACTURING OF COMMERCIAL TRANSMISSION SYSTEMS WILL BE APPLIED TO THE ANALYSIS OF MILITARY TRACKED VEHICLES. RESULTS OF THE ANALYSIS WILL BE COMPARED WITH DATA AVAILABLE FROM FIELD EXPERIENCE AND WHERE NECESSARY THE EXPERT SYSTEMS WILL BE MODIFIED TO SUIT THE UNIQUE REQUIREMENTS OF THE MILITARY VEHICLES. THE PROPOSED INVESTIGATION WILL ALSO DEVELOP PRELIMINARY CONCEPTS OF AN OPTIMUM DESIGN SO AS TO BE ABLE TO MINIMIZE VOLUME/WEIGHT OF DRIVE TRAINS. LASTLY THE ANALYSIS WILL REFLECT ON HOW THE PERFORMANCE OF DRIVE TRAINS WILL BE IMPACTED BY CHANGES IN THE GEOMETRY OF THE CUTTING EDGE OF THE GEAR CUTTING TOOLS. THIS CAN BE SIGNIFICANT CONTRIBUTOR TO THE FAILURE OF AN OTHERWISE ACCEPTABLE DESIGN.

UNIVERSAL VOLTRONICS CORP
27 RADIO CIR DR
MT KISCO, NY 10549
CONTRACT NUMBER: DAAK70-88-C-0007
WALTER F J CREWSON
TITLE:
EXPLORATORY DEVELOPMENT OF ADVANCED TECHNIQUES FOR LIGHTWEIGHT POWER CONDITIONING EQUIPMENT
TOPIC# 111 OFFICE: BRDEC IDENT#: 26165

SUBMITTED BY

UNIVERSAL VOLTRONICS CORPORATION (UVC) IS PROPOSING TO ATTACK THE FUNDAMENTAL CHOKE POINT (HEAT TRANSFER) THAT PRESENTLY PRECLUDES FURTHER MINIATURIZATION OF POWER CONDITIONING EQUIPMENT IN THE ONE TO 20kW RANGE. RATHER THAN FOLLOW THE TRADITIONAL ROUTE OF IMMERSING COMPONENTS IN A COOLANT, UVC PROPOSES TO INTEGRATE THE COOLANT INTO THE COMPONENTS (E.G. IMPREGNATE CAPACITORS WITH FLUORINERT FLUID, STRIP THE COVERS OFF SEMICONDUCTOR JUNCTIONS SO FLUID CAN CONTACT THE JUNCTION SURFACE, ETC.). THIS IS EXPECTED TO PRODUCE GAINS OF TWO TO FIVE IN POWER DENSITY (WATTS PER LB.).

UNIVERSITY RESEARCH ENGRS & ASSOCS INC
PO BOX 5398 - 1554 SWALLOW WAY
HERCULES, CA 94547
CONTRACT NUMBER: DAAA21-88-C-0165
THOMAS F CALLAHAN
TITLE:
155mm SELF-PROPELLED ARTILLERY AUTOLOADER
TOPIC# 24 OFFICE: ARDEC IDENT#: 27036

IN VIEW OF RECENT ARMS NEGOTIATIONS, THE NEED TO IMPROVE OUR CONVENTIONAL FORCE CAPABILITY HAS GREATER STRATEGIC SIGNIFICANCE AND AN ELEVATED SENSE OF URGENCY. IT IS PARTICULARLY IMPORTANT TO NOTE THAT THE SOVIETS HAVE MORE THAN A 10 TO 1 ADVANTAGE IN DEPLOYED ARTILLERY UNITS. THEREFORE, THERE IS A NEED TO IMPROVE THE EFFECTIVENESS OF THE ADVANCED FIELD ARTILLERY SYSTEM'S 155mm SELF-PROPELLED ARTILLERY UNIT BY "LEAPFROGGING" FORWARD WITH AUTOMATIC LOADING CAPABILITY. UREA DEVELOPED AN AUTOLOADER CONCEPT THAT INCORPORATES A 4 CHAMBER MAGAZINE AND HAS VERY HIGH POTENTIAL TO: (1) SATISFY THE CRITICAL BURST RATE FIRING REQUIREMENT, I.S., FIRE FOUR ROUNDS IN FIFTEEN SECONDS, (2) HELP PROMOTE THE "SHOOT & SCOOT" BARRAGE CONCEPT, (3) DECREASE THE TOTAL CYCLE TIME FOR SUSTAINED FIRING, (4) REDUCE THE ARTILLERY UNIT'S MANPOWER REQUIREMENTS, (5) REDUCE THE AMMUNITION RESUPPLY MANPOWER REQUIREMENTS, (6) INCREASE THE SURVIVABILITY OF BOTH THE SELF-PROPELLED ARTILLERY UNIT AND THE RESUPPLY VEHICLE. AGGRESSIVE MANAGEMENT OF THE SMALLEST TIME INCREMENTS IS A CRITICAL DESIGN GOAL BECAUSE THE SUCCESS OF THE AFAS BURST FIRE REQUIREMENT TURNS ON MINIMIZING CYCLE TIME. THE PROPOSED INNOVATIVE CONCEPT SUPPORTS THE GOAL OF EFFICIENT CYCLE TIME MANAGMENT. A

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SIMILAR APPROACH COULD BE DEVELOPED TO REDUCE THE FIELD AMMUNITION RESUPPLY TIME AND THUS INCREASE SURVIVABILITY.

VECTOR-VISION
4930 - W 77TH ST
MINNEAPOLIS, MN 55435
CONTRACT NUMBER:
DR BAHRAM MOZAYENY
TITLE:
DIGITIZING CONTOUR MAPS INTO CAD TERRAIN MODELS
TOPIC# 167 OFFICE: CERL IDENT#: 25188

THERE IS A NATIONAL NEED TO CONVERT TOPOGRAPHIC INFORMATION FROM CONTOUR MAPS TO 3D DIGITAL TO CAD OR TERRAIN MODELING DATA. MUCH LABOR IS BEING EXPENDED EACH DAY ACROSS THE NATION TO PERFORM THIS TASK USING MANUAL OR SCANNING TECHNIQUES. OUR SOLUTION, THE VECTORIZER, COMBINES SCANNING WITH ARTIFICIAL INTELLIGENCE TO TRACE SELECTIVELY LINES FROM A DRAWING DIRECTLY INTO CAD FORMAT. WE PROPOSE TO DEVELOP ADDITIONAL INTELLIGENCE AND METHODOLOGY TO MAKE THIS DEVICE UNIVERSALLY USABLE. OUR RESEARCH WILL ENHANCE CAPABILITIES OF THE VECTORIZER TO ENABLE IT TO RACE DASHED LINES AND TO RECOGNIZE AND IGNORE UNWANTED INFORMATION. AS A RESULT OF THIS RESEARCH, A DEVICE CAN BE DEVELOPED WHICH ESSENTIALLY REVERSES THE PLOTTING PROCESS. IT WILL READ DRAWINGS BACK INTO DRAWING INSTRUCTIONS. DR BAHRAM MOZAYENY RECEIVED HIS DOCTORAL DEGREE IN CIVIL ENGINEERING FROM THE UNIVERSITY OF MINNESOTA AND HAS 19 YEARS EXPERIENCE IN APPLIED COMPUTER TECHNIQUES IN ENGINEERING.

VERITAY TECHNOLOGY INC
PO BOX 305 - 4845 MILLERSPORT HWY
EAST AMHERST, NY 14051
CONTRACT NUMBER: DAAA21-88-C-0247
GERALD A STERBUTZEL
TITLE:
IGNITION CONCEPTS FOR INSENSITIVE GUN PROPELLANTS
TOPIC# 8 OFFICE: ARDEC IDENT#: 27022

THE SIGNIFICIANT ADVANTAGES OFFERED BY LOVA PROPELLANTS MAY NEVER BE

SUBMITTED BY

REALIZED IF SATISFACTORY SOLUTIONS TO THEIR INHERENT IGNITION PROBLEMS (E.G., POOR FLAMESPREAD, POOR IGNITABILITY AT LOW TEMPERATURES, ETC.) ARE NOT QUICKLY FOUND. RECENT IGNITION/COMBUSTION STUDIES CONDUCTED AT VERITAY SUGGEST THAT SUFFICIENT CHAMBER PRESSURES AND TEMPERATURES CAN BE GENERATED BY EXISTING PRIMERS TO ACHIEVE FLAMESPREAD EQUIVALENT TO THAT OF CONVENTIONAL PROPELLANTS. TO DEMONSTRATE THE FEASIBILITY OF APPLYING PRINCIPLES OF PRIMER MIX OPTIMIZATION TO ACCENTUATE THE GENERATION OF HOT PARTICLES, EXISTING 25mm IGNITERS/PRIMERS WILL BE MODIFIED AND A MATRIX OF TESTS WILL BE PERFORMED UNDER REALISTIC 25mm SINGLE-SHOT CONDITIONS DURING THE PHASE I EFFORT. SHOULD THESE TESTS REVEAL A NEED, A SECONDARY IGNITION PULSE MAY BE APPLIED TO GIVE THE IGNITER A "ONE-TWO PUNCH." AT THIS TIME, HOWEVER, WE DO NOT BELIEVE THIS SECONDARY IGNITION PULSE WILL BE REQUIRED. FOLLOWING DEMONSTRATION OF THE FEASIBILITY OF MODIFYING EXISTING 25mm IGNITERS/PRIMERS IN SUCH A WAY AS TO MAKE THEIR ENERGY OUTPUT CONSISTENT WITH THE IGNITION REQUIREMENTS OF THE NEW LOVA PROPELLANTS, SAFETY CHARACTERIZATIONS WILL BE COMPLETED AND WORK WILL PROCEED TOWARD LARGER CALIBER DESIGNS.

VHG LABS INC
180 ZACHARY RD - #5
MANCHESTER, NH 03103
CONTRACT NUMBER: DAAB07-88-C-F418
JAMES R VALENTINE
TITLE:
NEW METHOD FOR MEASURING TRACE ELEMENTS IN II-VI SEMICONDUCTING MATERIALS
TOPIC# 210 OFFICE: CECOM/NV IDENT#: 25778

MEASUREMENT OF CRITICAL TRACE LEVEL ELEMENTS IN SEMICONDUCTING MATERIALS MAY BE POSSIBLE USING A SPECIAL ATOMIC ABSORPTION SPECTROPHOTOMETRY TECHNIQUE. DIRECT VAPORIZATION OF SOLID SAMPLES COMBINED WITH A HIGHLY EFFICIENT SYSTEM TO CORRECT FOR NON-ANALYTE ABSORPTION WILL BE INVESTIGATED ON CdTe MATERIALS.

VISTA CONTROLS CORP
27825 FREMONT CT
VALENCIA, CA 91355
CONTRACT NUMBER: DAAA21-88-C-0124
RON RAMBIN
TITLE:
155mm ARTILLERY AUTOLOADERS
TOPIC# 24 OFFICE: ARDEC IDENT#: 27037

SUBMITTED BY

THE 155 AUTOLOADER IS A VERY IMPORTANT PART OF THE HIP AND HIP BLOCK IMPROVEMENT PROGRAMS. THIS PROJECT PROPOSES TO INVESTIGATE PREVIOUS, CURRENT AND PROPOSED AUTOLOADERS AND PERFORM A DESIGN TRADE STUDY TO DETERMINE WHAT THE BEST ATTRIBUTES OF EACH. THE TRADE STUDY IS EXPECTED TO PRODUCE TWO RESULTS, A RECOMMENDATION OF WHICH OF THE STUDIED AUTOLOADERS BEST MEETS THE CRITERION SET UP FOR THE STUDY AND A PRELIMINARY DESIGN AND DESIGN SPECIFICATION THAT USES THE BEST ATTRIBUTES OF THE STUDIED SYSTEMS. CONCEPTS SUCH AS ROBOTICS AND VISION TECHNOLOGY WILL BE INCORPORATED IF SUFFICIENT PERFORMANCE GAINS CAN BE DEMONSTRATED.

VOLTAIX INC
PO BOX 5357 - 197 MEISTER AVE
NORTH BRANCH, NJ 08876
CONTRACT NUMBER: DAAL01-88-C-080
JOHN P de NEUFVILLE
TITLE:
EXPERIMENTAL EVALUATION OF THE SYNTHETIC SOLID ELECTROLYTE INTERFACE CONCEPT FOR THE PRIMARY Ca-SOCl2 BATTERY SYSTEM
TOPIC# 103 OFFICE: ETDL/LABCOM IDENT#: 26621

THE Ca-SOCl(2) BATTERY CHEMISTRY IS AN EXCELLANT CANDIDATE TO PROVIDE SAFE OPERATION IN BATTERIES SIGNIFICIANTLY LARGER THAN 1 kg OPERATE AT STEADY RATES GREATER THAN THE "C" RATE IN ARMY APPLICATIONS REQUIRING HIGH ENERGY DENSITY BATTERIES. PROGRESS HAS BEEN MADE ON OPTIMIZING THE ELECTROLYTE COMPOSITION AND THE CATHODE STRUCTURE TO MINIMIZE IR LOSSES AND MAXIMIZE CATHODE CAPACITY AT RELATIVELY HIGH SPECIFIC RATES (I.E. 20 mA/cm[2]). HOWEVER, THE TWIN PROBLEMS OF ANODE PASSIVATION AND ANODE CORROSION ARE ANTICIPATED IN THIS SYSTEM, PARTICULARLY FOR BATTERIES STORED AT ELEVATED TEMPERATURES AND/OR DISCHARGED AT LOW TEMPERATURES. WE PROPOSE TO DETERMINE AND DEMONSTRATE THE EFFICACY OF RD SPUTTERED SYNTHHETIC SOLID ELECTROLYTE INTERPHASE (SEI) COATINGS BASED ON THE TERNARY SYSTEM Ca-Ge-S AND RELATED CHEMISTRIES TO ALLEVIATE THESE PROBLEMS: REDUCING Ca ANODE POLARIZATION AT HIGH DRAIN RATES AND REDUCING Ca ANODE CORROSION AT ELEVATED TEMPERATURES.

WINDROCK ASSOCS
44 OUTER DR
OAK RIDGE, TN 37830
CONTRACT NUMBER: DAAK70-88-C-0010
JAMES F KIRKPATRICK
TITLE:
DETECTION OF INCIPIENT FAILURE IN ROTATING MACHINERY
TOPIC# 115 OFFICE: BRDEC IDENT#: 26216

SUBMITTED BY

WORK IS PROPOSED TO DEVELOP, TEST, AND DEMONSTRATE A MICROPROCESSOR BASED INCIPIENT FAILURE DETECTION SYSTEM FOR ROTATING MACHINERY. RESEARCH WILL BE CONDUCTED WITH RESPECT TO DEVELOPING PROGNOSTIC CAPABILITIES. THE PHASE II EFFORT WILL EXPAND THE SYSTEM TO OTHER MACHINERY TYPES AND WILL INCLUDE DEVELOPMENT OF PROGNOSTIC CAPABILITIES.

WYKO CORP
1955 - E SIXTH ST
TUCSON, AZ 85719
CONTRACT NUMBER: DAAA21-88-C-0162
KATHERINE CREATH
TITLE:
QUANTITATIVE REAL-TIME HOLOGRAPHIC INTERFEROMETRY FOR DETERMINATI OF VECTOR DISPLACEMENTS AND STRAINS
TOPIC# 2 OFFICE: ARDEC IDENT#: 27016

REAL-TIME HOLOGRAPHIC INTERFEROMETRY CAN BE USED TO DETERMINE THE DISPLACEMENT AND DEFORMATION OF AN OBJECT WHICH HAS BEEN STRESSED. PHASE-MEASURING TECHNIQUES CAN AND HAVE BEEN ADDED TO PROVIDE QUANTITATIVE INFORMATION ABOUT THE DEFORMATION OF THE OBJECT IN ONE PARTICULAR DIRECTION. IN ORDER TO DETERMINE THE STRAIN IN THE TEST OBJECT, THREE OR FOUR SEPARATE MEASUREMENTS ARE NECESSARY SO THAT THE THREE-DIMENSIONAL VECTOR DISPLACEMENT OF THE OBJECT CAN BE DETERMINED. THIS WORK WILL DETERMINE WHAT MEASUREMENTS AND CALCULATIONS ARE NECESSARY TO QUANTITATIVELY DETERMINE VECTOR DISPLACEMENT AND STRAIN OF THE OBJECT UNDER TEST, AS WELL AS WHAT SOFTWARE IS NECESSARY TO DEVELOP FOR USE BY MECHANICAL ENGINEERS STUDYING OBJECT DEFECTS. THE ULTIMATE OBJECTIVE OF THIS WORK IS TO PRODUCE A COMPLETE TESTING SYSTEM CONTROLLED BY A DESKTOP COMPUTER TO ACQUIRE AND ANALYZE HOLOGRAPHIC INTERFEROMETRY DATA.

XMCO INC
11150 SUNRISE VALLEY DR
RESTON, VA 22091
CONTRACT NUMBER: DAAL01-88-C-0809
CHARLES J GARVEY
TITLE:
ARTIFICIAL INTELLIGENCE IN ARMY TACTICAL SYSTEMS
TOPIC# 223 OFFICE: ETDL/LABCOM IDENT#: 27082

SUBMITTED BY

XMCO BELIEVES THAT AI HAS THE POTENTIAL TO SIGNIFICANTLY INCREASE THE EFFICIENCY AND CAPABILITY OF FRONT-LINE UNITS AND SOLDIERS. THE POTENTIAL BENEFITS INCLUDE: (1) SURVIVABILITY - SAVE HUMAN LIFE BY PROVIDING RAPID ADVICE IN FAST-MOVING, STRESSFUL SITUATIONS; (2) DECISION ACCURACY - REDUCING THE PROBABILITY OF A CRITICAL MISTAKE BECAUSE THE SYSTEM IS NOT SUBJECT TO HUMAN FRAILTIES SUCH AS FATIGUE AND STRESS; (3) SIMULATION/TRAINING - PROVIDING AN EXCELLENT SIMULATOR FOR TRAINING FRONT-LINE PERSONNEL. THE SPECIFIC OBJECTIVES OF THE PHASE I RESEARCH EFFORT ARE TO INVESTIGATE THE FEASIBILITY FOR AI APPLICATIONS TO INFLUENCE AND ENHANCE THE DECISIONS AND CONTROLS REQUIRED FOR FRONT LINE SOLDIERS TO ACCOMPLISH THEIR MISSIONS AND TO SELECT HIGH-PAYOFF AI APPLICATIONS TO AID FRONT LINE SOLDIERS IN THEIR DECISION MAKING AND CONTROL FUNCTIONS. TO ACCOMPLISH THESE OBJECTIVES, XMCO WILL CONDUCT RESEARCH ON COMPANY LEVEL DECISION MAKING AND REQUIRED CONTROLS, DETERMINE THE PRESENT CRITICAL ISSUES AND PROBLEMS, ANALYZE, DEVELOP, AND PRIORITIZE C2 AND SUPPORT DECISIONS AND REQUIREMENTS AND SELECT HIGH-PAYOFF AI TECHNIQUES WITH POTENTIAL TO AID IN OVERCOMING ISSUES/PROBLEMS AND MEETING THE REQUIREMENTS.

ARMY

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