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MANUFACTURING METHODS AND TECHNOLOGY PROGRAM PLAN, CY 1979.(U)
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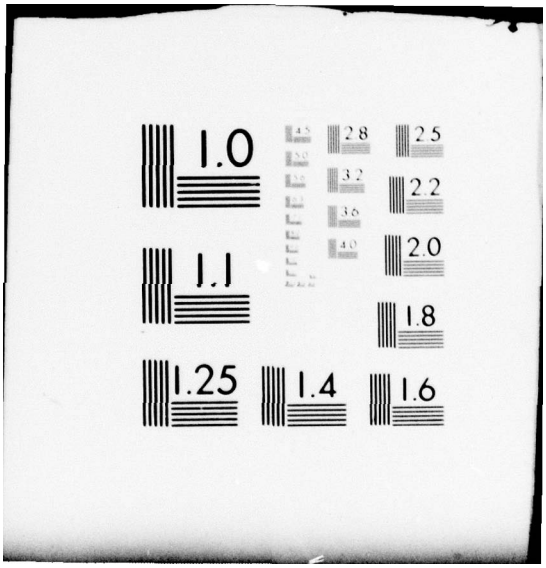
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U S ARMY

MATERIEL DEVELOPMENT AND READINESS COMMAND

LEVEL II

MANUFACTURING METHODS and TECHNOLOGY

PROGRAM PLAN, CY 1979.

(12) 224 p.

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PREPARED BY

(11) AUG 1979

MANUFACTURING TECHNOLOGY DIVISION
U S ARMY INDUSTRIAL BASE ENGINEERING ACTIVITY
ROCK ISLAND, ILLINOIS 61299

FORWARD

This document presents information for the DARCOM Manufacturing Methods and Technology (MMT) Program for Fiscal Years 1979-1983. The projects and funding levels for the out-years are for planning purposes only and will change based on technological developments and revisions in program requirements. Since total funding for these planned projects exceeds the projected funds for the Army's MMT Program, some projects will not be funded or may be slipped to later fiscal years. HQ, DARCOM and its major commands and centers have the authority to reprogram funds to projects with higher priority, thereby affording the flexibility to accommodate new opportunities as they arise. Users of this document are encouraged to offer suggestions for additional projects which would benefit the production of Army materiel.

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Budgets

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DARCOM's Manufacturing Methods and Technology (MMT) Program Plan is a near to mid-term planning document indicating technology and funding plans. Organization is by individual project within DARCOM's Subordinate Major Commands (SUBMACOMs). A technology problem and solution are presented for each project that is proposed for funding. Projects included in this document are tentative but do indicate the areas of the Army's technology development.

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DEPARTMENT OF THE ARMY
HEADQUARTERS US ARMY MATERIEL DEVELOPMENT AND READINESS COMMAND
5001 EISENHOWER AVE., ALEXANDRIA, VA 22333

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08 AUG 1979

DRCMT

SUBJECT: DARCOM MMT Program Plan (CY1979)

SEE DISTRIBUTION (Appendix E to Inclosure 1)

1. Inclosed document describes the DARCOM Manufacturing Methods and Technology (MMT) Program for the period FY79-83. This plan is derived from data submitted by the DARCOM subordinate major commands and centers, and was evaluated and prepared by the Manufacturing Technology Division of the US Army Industrial Base Engineering Activity.

2. This document was formerly entitled the DARCOM MMT Five Year Plan and covered the five Program Objective Memorandum (POM) out-years. Analysis revealed that only a small percentage of projects identified for the last two years of a five year plan were ever submitted for funding. This along with requests for more information on the current MMT program resulted in the change of fiscal years included in the plan.

3. Because of the dynamic nature of military materiel requirements and the constant changes in technology, the inclusion of a project in this plan is not a guarantee of funding. However, the plan does indicate the current technology needs and interests of the DARCOM community.

4. Additional copies of this document may be obtained by writing the Defense Documentation Center, ATTN: TSR-1, Cameron Station, Alexandria, VA 22314.

FOR THE COMMANDER:

Harold L. Griffin

1 Incl
CY1979 DARCOM
MMT Program Plan

DAROLD L. GRIFFIN
Chief,
Office of Manufacturing Technology

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INTRODUCTION

The MMT Program

The Manufacturing Methods and Technology (MMT) Program serves the US Army Materiel Development and Readiness Command (DARCOM) as a bridge between research and development and production. The program's primary aim is to reduce the cost of weapons system acquisition by improving the efficiency of manufacturing processes and by implementing new technology. Although cost reduction is a primary concern, emphasis is also directed towards efforts in reducing air and water pollution, increasing safety, conserving energy, and reducing dependence on critical materials.

The Army's production needs span the full range of modern technology from the high speed production of millions of small arms rounds to the forging of turrets for fifty-ton tanks to the production of integrated circuits. Product testing, material handling, and computer-aided design and manufacturing all fall within the scope of the MMT Program.

The MMT Program Plan

This document is an attempt to provide within a single source a summary of current and near-term efforts included in the DARCOM MMT Program. Since weapons systems requirements and the technology for these systems are constantly changing, inclusion in the Program Plan is not a guarantee that an individual project will be funded. However, the Plan does serve as an indicator of the areas towards which DARCOM's resources will be directed and the magnitude of the Army's commitment to this program.

Organization of the MMT Program Plan

The Plan provides a section for each DARCOM element which has projects in the FY79-83 period. Each section includes a summary of the activity, its responsibilities, and its major MMT thrust areas. Following this summary is a listing of each project proposed by that activity.

Individual project information is presented by the last four digits of the project number and includes the project title, funding, a brief description of the problem addressed by the project and the proposed solution. Projects are grouped according to broad categories and then further subdivided according to component. This arrangement points out major areas of emphasis and aids the identification of possible duplication of effort.

Industry Guide

An Industry Guide (Appendix A) has been included to aid in the use of the plan. The section will help clarify the interrelationships between the appropriations, commands, and personnel involved in the DARCOM MMT Program.

ANALYSIS

SUBMACOM SUBMISSION TO MMT PROGRAM
BY COMMAND (Thousands of Dollars)

Command	Fiscal Code	Appropriation	FY79	FY80	FY81	FY82	FY83
ARRADCOM/ARRCOM	4250	Ammunition	26744	26222	25705	25374	33131
	3297	Weapons	2360	4727	5994	7992	9549
AVRADCOM	1497	Aircraft	7259	9375	11696	11070	13285
CORADCOM	5297	Communications/Electronics	1510	1300	3045	2490	700
ERADCOM	5297	Communications/Electronics	5308	10935	15400	19685	8580
AMMRC	5397	Other Support	4500	4500	4500	5000	5000
MICOM	1497	Aircraft	0	0	290	0	0
	2597	Missiles	6262	8850	14341	15497	8550
	4250	Ammunition	525	1117	4220	900	0
	5297	Communications/Electronics	350	0	425	375	0
MERADCOM	5397	Other Support	2651	2628	4410	4052	6036
NARADCOM	O&MA	Other Support	510	765	754	0	0
TARADCOM	3197	Tracked Combat Vehicles	4085	4958	13055	13060	17150
	5197	Tactical & Support Vehicles	1020	1240	2880	3450	2425
TECOM	5397	Other Support	881	822	1000	1100	1300

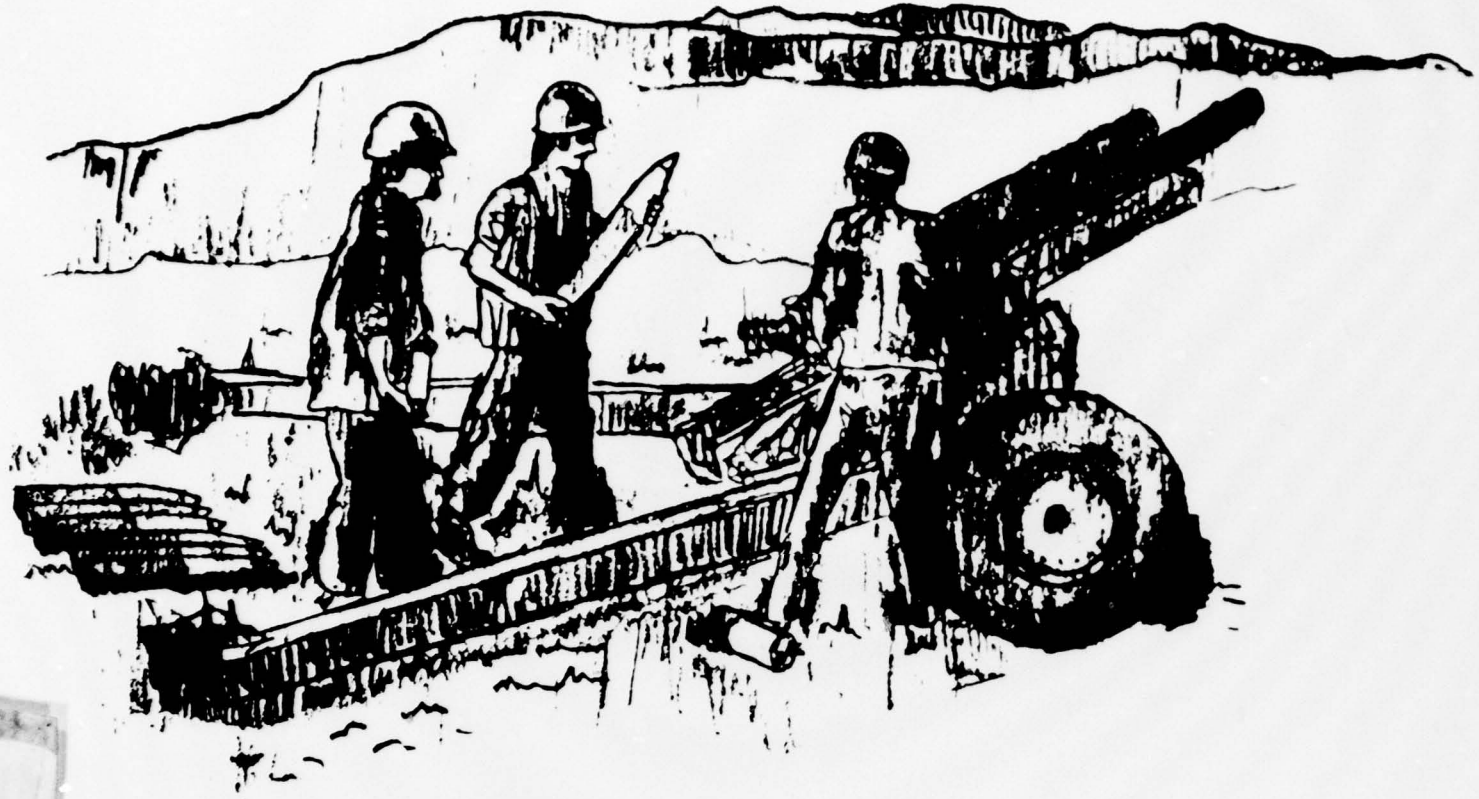
SUBMACOM SUBMISSION TO MMT PROGRAM
BY APPROPRIATION (Thousands of Dollars)

Appropriation	Fiscal Code	FY79	FY80	FY81	FY82	FY83
Aircraft	1497	7259	9375	11696	11070	13285
Missiles	2597	6262	8850	14341	15497	8550
Tracked Combat Vehicles	3197	4085	4958	13055	13060	17150
Weapons and Other Combat Vehicles	3297	2360	4727	5994	7992	9549
Ammunition	4250	27269	27339	29925	26274	33131
Tactical and Support Vehicles	5197	1020	1240	2880	3450	2425
Communications/Electronics	5297	7168	12235	18870	22550	9280
Other Support Equipment	5397	8032	7950	9910	10152	12336
	TOTALS	63455	76674	105671	110045	105706

ANALYSIS OF PREVIOUS PLANNING DATA

CY of Plan	Period Covered	Percent of Submission Previously Planned	
		FY80 Apportionment	FY81 Budget
1974	FY76 - FY80	8.7%	------
1975	FY77 - FY81	17.4%	12.9%
1976	FY78 - FY82	33.9%	22.0%
1977	FY79 - FY83	45.0%	32.1%
1978	FY80 - FY84	68.3%	43.8%

This chart shows the percentage of projects in the review cycle which were planned in previous years.



ARMAMENT R&D COMMAND

(ARRADCOM)

ARMAMENT MATERIEL READINESS COMMAND

(ARRCOM)

(MUNITIONS)

US ARMY ARMAMENT MATERIEL READINESS COMMAND (ARRCOM)

AND

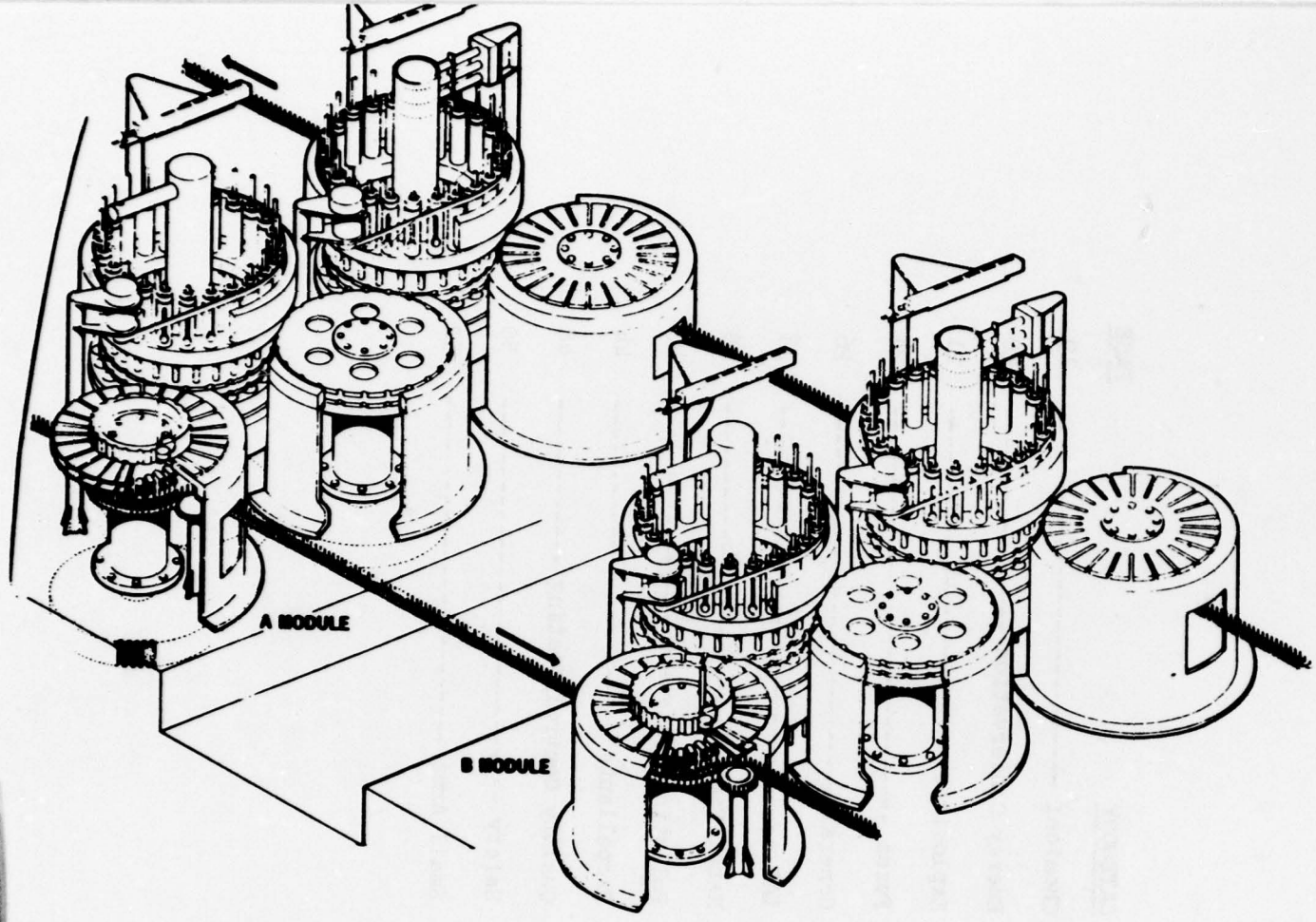
US ARMY ARMAMENT RESEARCH AND DEVELOPMENT COMMAND (ARRADCOM)

ARRCOM, with headquarters at Rock Island, IL, is responsible for integrated logistics (materiel readiness) management of nuclear and non-nuclear weapons and munitions. This includes follow-on procurement, production, engineering in support of production, industrial management, product assurance, material management, maintenance, value & logistics engineering, international logistics, and transportation and traffic management for assigned armament systems/materiel.

ARRCOM's materiel assignments include artillery, infantry, air defense guns, surface vehicle and aircraft mounted weapons systems, rocket and missile warhead sections, demolition munitions, offensive and defensive chemical materiel and related training equipment, test equipment, and tools. ARRCOM directs operations of four assigned arsenals, three Government-owned, Government operated ammunition plants, twenty-eight Government-owned, contractor-operated (GOCO) ammunition plants, an Army ammunition activity, the DARCOM Ammunition Center, the Central Ammunition Management Office-Pacific (CAMOPAC), and the US Army Technical Escort Unit. ARRCOM is the DOD Single Manager for Conventional Ammunition. In this capacity, it has responsibility for procurement, production and wholesale management of common-user conventional ammunition for the Army, Navy, and Air Force.

ARRADCOM is responsible for all research, development, and life cycle engineering including manufacturing methods and technology engineering of assigned weapon systems. Its mission also includes initial low-rate production for conventional systems and life cycle procurement and production for nuclear munitions. ARRADCOM also executes assigned missions in support of other DOD elements having centralized management responsibility for specific weapons systems or items. In addition to large-caliber, small-caliber, mission support and headquarters staffs at Dover, NJ, command elements include the Chemical Systems Laboratory and the Ballistics Research Laboratory at Aberdeen Proving Ground, MD and Benet Weapons Laboratory at Watervliet, NY.

Integrated into DARCOM's structure is the Office of the Project Manager for Munitions Production Base Modernization and Expansion (PM/PBM). The PM is responsible for project management of the Munitions Production Base Modernization and Expansion (M&E) Program. The PM exercises centralized management authority over the planning, direction, control and execution of the M&E Program at all US Army Ammunition Plants and arsenals and for Government equipment located at non-Government owned facilities included in the M&E Program. A significant amount of interface between the PM, ARRCOM, ARRADCOM, Air Force and Navy is necessary to assure integration of the MMT Program into related M&E plans.



ARMAMENT R&D COMMAND
ARMAMENT MATERIEL READINESS COMMAND
(ARRADCOM, ARRCOM)
(AMMUNITION)

AMMUNITION PROGRAM

Bridging the technology gap, particularly in those areas that have no civilian counterpart, is a challenging task for the Ammunition MMT Program. Practically all current operations involve a great many hand operations, and methods must be found to efficiently mechanize these. Batch processes must be converted to continuous processes in order to take advantage of new materials handling techniques and to improve the safety of operations.

In many respects, the Ammunition program presents unique problems which require innovative solutions. For example, material handling, process tools and inspection systems must be computerized to achieve the desired operating economics and to decrease expensive direct labor; however, the new systems must also be capable of economic layaway for periods of ten years or more, a situation that is rare in private industry. Computer manufacturers make provisions for a few months of layaway but not several years. This is the type of situation which the Ammunition MMT program must address.

While the search for technology to modernize and expand facilities is worldwide, American industry is relied on to manufacture and operate these facilities; therefore, design is based on existing American know-how. Manufacturing technology is the foundation of the modern ammunition production facility, whether the technology is purchased from industry or developed through Defense supported projects.

The primary objective of the munitions manufacturing technology program is to improve existing manufacturing processes, techniques and equipment. The second objective is to bridge the gap between development and full-scale production. The third objective is to solve technological problems identified in the program. Specific functional areas of the munitions program are discussed in the following sections.

The Manufacturing Methods and Technology effort in the Load, Assemble and Pack area is guided by four major program goals; improved economy of operation, improved safety conditions for operating personnel, establishment of a rapid response production capability, and improvements in the quality of the end product produced. All of these goals must be accomplished within the standards and criteria established for pollution abatement and energy conservation.

Recent changes in policy and guidance have required Process Technology Projects to be cost effective within the framework and economics dictated by the Five Year Defense Plan (FYDP). This presents a unique fiscal management challenge in the design and fabrication of equipment and systems required for the loading and assembly of components and end

items. The challenge is being met by developing systems with the flexibility to produce many items, establishing an optimum balance between system simplicity and process operational requirements, and providing equipment designs capable of high efficiency operation to achieve cost effective system operations.

Due to the inherently hazardous nature of munitions production, an extensive program has been undertaken to upgrade the safety of explosive preparation equipment, loading equipment, and assembly systems. The MMT program relating to the upgrading of the operational safety of loading lines is a continuation of current efforts. This program will define and investigate specific operational safety hazards, and will develop equipment and systems to reduce operator exposures and risk.

Current planning requires that in the event of mobilization, production facilities be activated within a three month time frame and reach maximum production in four months. This objective requires that equipment design, layaway techniques, and control technology be oriented to achieve the desired quick reaction capability.

Through advances achieved in automated inspection techniques, automated loading systems, and automated assembly aystems, the uniformity and quality of the end product produced has been improved. The munitions MMT program includes several projects oriented towards improving quality control and test technology and others for the development of explosive loading and assembly techniques and equipment.

The Metal Parts MMT Program has as its major thrust investigations into optimum manufacturing processes for SAWS (Squad Automatic Weapon System), RAAM, GEMSS and GATOR, the 120mm Tank, and VIPER. Improvements of existing processes involves such investigations as link manufacturing for small caliber ammo, machining brass cartridge cases, 7.62mm bullet manufacturing by roll forming, and presses for mortar ammunition production. Projects are also included for improving maintainability and readiness posture through computer integrated manufacturing, computer-aided modeling of forming operations, and storage techniques for production machinery. Enhancing reliability and quality control efforts include analysis for predicting tool failure, improving projectile surface quality, and processing hi-frag steel.

Primary program emphasis in energetic materials is being placed on development of manufacturing technology for new munition items including: 120mm (XM-1 tank munition); binary round (8", 155mm and Navy Weteye); alternate ICM explosive fills; LOVA propellants; plastic bonded explosives; and insensitive high explosives and propellants. Recent enactment of the Clean Air Act Amendment and Toxic Substances Control Act has resulted in the requirement for continuous MMT effort to meet mandatory compliance dates. Conservation of production

base utilities, energy and resources, as well as identification and utilization of alternate energy sources are broad areas of major concern. The development and design of safe, cost-effective production processes are major goals of the munitions MMT program. Weak points in overall base readiness capability and maintainability will be determined and upgraded where feasible. In the supportive technology areas, the primary thrust areas continue to be pollution abatement engineering, energy technology development and explosives and occupationed safety.

ARRCOM

COMMAND FUNDING SUMMARY
(THOUSANDS)

CATEGORY	FY79	FY80	FY81	FY82	FY83
CHEMICAL	393	0	277	1695	1450
ENERGY CONSERVATION	1460	1234	1876	851	0
EXPLOSIVES	1090	1324	2189	2360	2884
FUZES	1908	1765	1485	330	300
GENERAL	1515	4096	3290	1686	1066
LAP	7891	5229	2598	3901	6450
METAL PARTS	4235	2893	2686	2671	5151
POLLUTION ABATEMENT	2441	2452	3149	2158	3179
PROPELLANTS	1967	2750	3962	6044	9464
QUALITY CONTROL/TESTING	1275	1854	2613	1257	710
SAFETY	1298	2136	1382	736	100
SMALL ARMS	1271	489	198	1685	2377
TOTAL	26744	26222	25705	25374	33131

CATEGORY: CHEMICAL

	PRIOR	FUNDING ($000) 79	80	81	82	83
COMPONENT -- PROCESSES						
(P017) TITLE - OPTIMUM USE OF WASTE FROM WP WASTE TREATMENT FACILITY					150	170
PROBLEM - WASTE CONTAINS METALLIC PHOSPHOROUS. WASTE IS CURRENTLY INCENIRATED. WASTE MUST BE SCRUBBED.						
SOLUTION - STUDY METHODS TO TREAT WASTE. PROVIDE PILOT RECOVERY SYSTEM. MAKE USABLE PRODUCT.						
(1703) TITLE - HEXACHLOROETHANE RECOVERY/REPROCESSING EVALUATIONS				277	300	
PROBLEM - 3 MILLION LB STOCKPILE OF UNSERVICEABLE MUNITIONS CONTAIN 1.41 MILLION LBS. OF HEX. STOCKPILE WILL GROW BY 565,000 POUNDS PER YEAR. DEMIL/DISPOSAL NECESSARY IF HEX IS NOT RECOVERED.						
SOLUTION - EXPLOIT EXISTING TECHNOLOGY TO RECOVER HEX FROM STOCKPILE. RECOVERED HEX WILL PROVIDE 46 PERCENT OF MC REQUIREMENT. PROCESS WILL BE USEFUL IN REPROCESSING SUBGRADE PURCHASES AS WELL.						
(4051) TITLE - IMPROVED INSTRUMENTATION + CONTROL FOR ACID PLANTS		157				
PROBLEM - GOCO ACID PLANTS EXPERIENCE MANY OPERATIONAL PROBLEMS DUE TO INABILITY OF PROCESS CONTROL INSTRUMENTATION TO PERFORM RELIABLY.						
SOLUTION - CONDUCT STUDY TO DETERMINE GOCO PLANTS CURRENT TECHNIQUES AND INSTRUMENTATION USED + SAME FOR THE PRIVATE SECTOR. MAKE A COMPILATION OF INSTRUMENTATION USED IN INDUSTRY WITH POTENTIAL APPLICATION TO ACID PLANT PROCESS CONTROL REQUIREMENTS.						
COMPONENT -- PYROTECHNICS						
(P011) TITLE - DEVELOP IMPROVED MFG PROCESSES IN PRODUCTION ENGR. LABORATOR					275	250
PROBLEM - PROD ENGR LABORATORY PROCESSES DO NOT USE LATEST STATE-OF-THE-ART.						
SOLUTION - UPGRADE PROCESSES BY DEVELOPING AND EXPANDING TECHNOLOGY.						
(P012) TITLE - ADAPTATION OF SLUGGING TECHNOLOGY TO HC SMOKE AND CS RIOT MU					120	110
PROBLEM - COLORED SMOKE GRENADE SLUGGING CONCEPT NOT ADAPTED TO HC AND RIOT MUNITIONS. CURRENT FILL AND PRESS OPNS ARE LABOR INTENSIVE. INDUSTRIAL HYGIENE IS POOR.						
SOLUTION - ADAPT SLUGGING TECHNOLOGY TO HC AND RIOT MIXTURES. IMPROVE INDUSTRIAL HYGIENE.						
(P013) TITLE - ADAPTATION OF SLUGGING CONCEPT TO 40MM SMOKE MARKER PRODUCTI					250	170
PROBLEM - SMOKE MARKER MUST BE FILLED TO CLOSE TOLERANCES. CURRENT FILL METHODS NEED IMPROVEMENTS. LABOR COSTS ARE HIGH. MATLS. HANDLING IS LABOR INTENSIVE.						
SOLUTION - ADAPT SLUGGING TECHNOLOGY FOR AUTOMATED PRODUCTION. REPLACE MANUAL MATL. HANDLING WITH MECHANICAL SYSTEMS.						

		FUNDING ($000)				
	PRIOR	79	80	81	82	83

COMPONENT -- PYROTECHNICS (CONTINUED)

(P016) TITLE - SIMULATION OF PBA PYROTECHNIC PRODUCTION LINES — 82: 100, 83: 100

PROBLEM - MULTI-PURPOSE LINES, SHORT DURATION PRODUCTION RUNS.

SOLUTION - PROVIDE SIMULATION SOFTWARE, MONITOR PRODUCTION PROCESSES, PROVIDE STATE OF READINESS.

(P019) TITLE - DEVELOP MANUFACTURING TECHNOLOGY FOR 40MM SMOKE CANOPIES — 83: 250

PROBLEM - MOBILIZATION REQUIREMENT, NO CURRENT PRODUCTION FACILITY, NEED PRODUCTION PROVE OUT.

SOLUTION - PROVIDE PILOT FACILITY TO PROVE OUT THE TDP, PROVIDE DESIGN CRITERIA AND PROCESS BASELINE.

(1297) TITLE - ADVANCED MT FOR HEXACHLORETHANE-HEX PRODUCTION — 82: 500, 83: 400

PROBLEM - AT THE PRESENT HEXACHLORETHANE IS PROCURED FROM EUROPE BECAUSE THERE IS NO FIRM IN NORTH AMERICA THAT PRODUCES THE MATERIAL.

SOLUTION - PROVIDE TECHNICAL DATA LEADING TO A MODERN EFFICIENT FACILITY CAPABLE OF PRODUCING MOB RATES OF HEX AND ABLE TO MEET EPA / OSHA STANDARDS.

(4460) TITLE - CONTIN MIXER-ILLUMINANT COMP ANAL + CONTROL SYSTEM — PRIOR: 236

PROBLEM - AN ON-LINE ANALYSIS AND PROPER CONTROL OF ILLUMINANT COMPOSITIONS PRIOR TO CONSOLIDATION TO INSURE PROCESS INTEGRITY IN ILLUMINATING CANDLE PRODUCTION IS NOT AVAILABLE.

SOLUTION - DEVELOP A PROTOTYPE AUTOMATIC PROCESS CONTROL FOR ILLUMINANT COMPOSITION CONSISTING OF SODIUM NITRATE MAGESIUM AND AN ORGANIC BINDER.

****
* CATEGORY *
****
*ENERGY CONSERVATION *
****

COMPONENT -- GENERAL

(4224) TITLE - ENERGY CONSERVATION IN SOLVENT RECOVERY OPERATIONS — 81: 641, 82: 851

PROBLEM - ACTIVATED CARBON SOLVENT RECOVERY AFFORDS HIGH POTENTIAL FOR ENERGY SAVINGS BY USE OF HEAT TRANSFER TECHNOLOGY.

SOLUTION - USE OF A FUME RECIRCULATION SYSTEM BASED UPON TRW CONCEPT IN PLACE OF STEAM DISTILLATION PROCESS.

		FUNDING ($000)					
		PRIOR	79	80	81	82	83
COMPONENT -- GENERAL (CONTINUED)							
(4281)	TITLE - CONSERVATION OF ENERGY AT AAPS	3124	1460	1234	1235		
	PROBLEM - PETROLEUM MAY NOT BE AVAILABLE IN FUTURE TO MEET PRODUCTION REQUIREMENTS.						
	SOLUTION - DEVELOP ENERGY SAVING TECHNOLOGY TO APPLY TO AAP MANUFACTURING FUNCTIONS TO REDUCE QUANTITY OF ENERGY USED AT ALL LEVELS OF PRODUCTION.						

****
* CATEGORY *
****
*EXPLOSIVES *
****

COMPONENT -- COMP B							
(4037)	TITLE - PROCESS IMPROVEMENT FOR PLASTIC-BOND EXPLOSIVES			236			
	PROBLEM - PRESENT METHODS OF PRODUCING PBX COMPOSITIONS ARE JOB-SHOP ORIENTED AND UNECONOMICAL FOR LARGE SCALE PRODUCTION PROJECTED IN THE FUTURE.						
	SOLUTION - DEVELOP NEW TECHNIQUES OF COATING, DRYING, AND PACKAGING PBX COMPOSITIONS. FIRST ATTEMPT WILL BE TO EVALUATE EQUIPMENT SELECTED FOR COMPOSITION C4 UNDER PROJ 4449.						
COMPONENT -- HMX/RDX							
(4310)	TITLE - DMSO RECRYSTALLIZATION OF HMX/RDX	1261	483	278			
	PROBLEM - THE CURRENT METHOD OF RECRYSTALLIZING HMX/RDX IS INEFFICIENT AND UNECONOMICAL. IT REQUIRES LARGE AMOUNTS OF RAW MATERIALS (ESP CYCLOHEXANONE OR ACETONE), PROCESS VESSELS, AND MANPOWER.						
	SOLUTION - A SOLVENT WITH MUCH GREATER SOLUATING POWER IS REQUIRED. DMSO IS SUCH A SOLVENT AND CAN BE USED FOR PROCESSING LARGE AMOUNTS OF HMX/RDX. THIS PROJECT IS DEVELOPING A PILOT SCALE PROCESS FOR RECRYSTAL LING HMX/RDX USING DMSO.						
(4404)	TITLE - RECOVERY OF ACETIC ACID IN RDX MANUFACTURING					224	200
	PROBLEM - FORMIC ACID IN THE 'A' AREA AZEO STILL AT MSAAP CAUSES PROBLEMS. FIRST THE STILL MUST BE MADE OF HASTALLOY VS STAINLESS AND SIDE REACTIONS CAUSE STEAM USAGE TO GO UP 140 PERCENT AND THE ENTRAINER TO BE REPLACED TWICE A YEAR.						
	SOLUTION - NEUTRALIZE THE FORMIC ACID PRIOR TO ITS INTRODUCTION TO THE AZEO STILL.						

	FUNDING ($000)					
	PRIOR	79	80	81	82	83
COMPONENT -- PROCESS CONTROL						
(0014) TITLE - EMERGING CHEM MFG TECHNOLOGY						
PROBLEM - CURRENT CHEMICAL PROCESSING OF ENERGETIC MATERIALS REQUIRES HEAVY DIVIDING WALLS AND BARRICADE PROTECTION WHICH ARE VERY EXPENSIVE AND EXPOSE PERSONNEL TO POTENTIAL INJURIES FROM EXPLOSIONS AND FIRES.					250	750
SOLUTION - REDESIGN EXPLOSIVE/PROPELLANT PROCESS LINES TO REDUCE POSSIBILITY OF A FIRE OR EXPLOSION TO NOT MORE THAN 50 LBS OF PROPELLANT OR EXPLOSIVE MATERIAL IN ANY ONE INCIDENT.						
(1905) TITLE - PBX CONT CAST FOR MUNITION LOADING						
PROBLEM - ADDED USE OF CASTABLE PLASTIC BONDED EXPLOSIVES WILL CREATE PRODUCTION SHORTFALLS. MOST PBX CAN NOT BE USED IN PRESENT MELT / CAST EQUIPMENT. PBX PRODUCTION IS NOW DONE AT 2 NAVY PLANTS WHICH COULD NOT HANDLE LOADING OF CASTABLE PBX IN BOMBS.	250			809	864	934
SOLUTION - ESTABLISH HIGH PRODUCTION RATE CONTINUOUS PROCESSES FOR MIX AND CAST OF VARIOUS PBX FORMULATIONS. IDENTIFY + EVALUATE EQUIPMENT + PROCESSES, SELECT + TEST EQUIPMENT + INTEGRATE ACCEPTABLE ITEMS INTO AN OPERATING PBX PROCESSING PILOT PLANT.						
(1906) TITLE - ADAPTIVE CONTROL OF EXPLOSIVES LINES						
PROBLEM - TAKE ADVANTAGE OF THE ADVANCED PROCESS CONTROL TECHNOLOGY FOR APPLICATION TO EXPLOSIVE PROCESSES TO REDUCE MANPOWER COSTS AND PERSONNEL EXPOSURE AND INCREASE PROCESS PRODUCTIVITY.						1000
SOLUTION - ADAPT MINI-PROCESS CONTROLS TO O---S O S O PROPELLANT PROCESSES WITH REDUCTION IN COSTS, ENHANCED REAL TIME CONTROL, REDUCED PERSONNEL EXPOSURE AND IMPROVED OVERALL EFFICIENCY.						
COMPONENT -- RDX/HMX						
(4449) TITLE - PROCESS IMPROVEMENT FOR COMPOSITION C-4						
PROBLEM - THE EXISTING FACILITIES WHICH ARE COMMON TO THE MANUFACTURE OF COMP A AND THE OTHER RDX COMPOSITION WOULD LIMIT THE AVAILABILITY OF THESE ITEMS BELOW THEIR MOB REQUIREMENTS.	120			561	480	
SOLUTION - ESTABLISH NEW PROCESSES AND METHODS FOR THE MANUFACTURE OF THESE ITEMS TO MINIMIZE THE IMPACT OF COMMON OPERATIONS ON CAPACITY.						

		FUNDING ($000)					
		PRIOR	79	80	81	82	83
COMPONENT -- RDX/HMX (CONTINUED)							
(4508)	TITLE - PROCESS IMPROVEMENTS FOR PRESSABLE RDX COMPOSITIONS	300	357	506	250		
	PROBLEM - MSAAP IS HINDERED WITH PROCESS BOTTLENECKS IN MANUFACTURING A COMPS. PROCESSING USES JOB SHOP TECHNIQUES AND IS LABOR INTENSIVE. OVERALL PRODUCTION FACILITIES ARE SEVERELY CONSTRAINED AND OPERATE UNDER SAFETY WAIVERS DUE TO OUTDATED TECHNOLOGY USED.						
	SOLUTION - PRIMARY BOTTLENECKS ARE IN THE COATING AND DRYING AREAS. THIS PROJECT INVESTIGATES VARIOUS WAYS TO ELIMINATE THESE BOTTLENECKS, EVALUATE THEM AND GENERATE SUFFICIENT PILOT SCALE DATA TO ALLOW DESIGN OF THE IMPROVED PROCESS.						
COMPONENT -- TNT							
(L292)	TITLE - AUTOMATED FLAKER MOLTEN TNT DETECTOR					150	
	PROBLEM - WHEN TNT DOES NOT SOLIDIY ON FLAKER DRUM IT FALLS INTO HOPPER WHERE IT SOLIDIFIES AND STOPS THE FLOW OF TNT FLAKES. OPERATIONS MUST BE STOPPED UNTIL THE HAZARDOUS REMOVAL OF TNT FROM HOPPER BY REAMING OR RAPPING IS COMPLETED.						
	SOLUTION - A MOLTEN TNT DETECTOR WILL BE DEVELOPED TO DETECT PRESENCE OF MOLTEN TNT ON FLAKER DRUM AND STOP THE FLAKING OPERATION. THIS WILL PREVENT MOLTEN TNT FROM ENTERING THE HOPPER.						
(4200)	TITLE - TNT CRYSTALLIZER FOR LG CAL			304	419		
	PROBLEM - TNT MELT LOADING REQUIRES AN OPTIMUM RATIO OF MOLTEN AND SOLID TNT IN THE EXPLOSIVE MIX AT THE TIME OF POUR. THE RATIO IS OBTAINED BY THE ADDITION OF FLAKE TNT TO A QUANTITY OF MOLTEN TNT BASED ON OPERATOR JUDGEMENT.						
	SOLUTION - DEV A DEVICE WHICH UTILIZES MOLTEN TNT TO GEN A SLURRY CONSISTENCY THROUGH PARTIAL CONTROLLED, STEADY-STATE CRYSTALLIZATION. BY CLOSE CONTROL OF TNT FLOW RATE AND THERMAL PARAMETERS, A CONTINUOUS FINE GRAINED SLURRY MIX OF PROPER RATIO WOULD RESULT.						
(4363)	TITLE - TNT INSPECTION					392	
	PROBLEM - DIFFERENCES IN TNT CHARACTERISTICS HAVE BEEN OBSERVED DURING LOADING OF TNT INTO ROUNDS AND IN ENVIRONMENTAL TESTS OF ROUNDS LOADED WITH TNT.						
	SOLUTION - EXTRACT SAMPLES FROM STOCKPILE OF TNT PRODUCED AT DIFF. AAPS. SAMPLES WILL BE SUBJECTED TO TESTS NOT IN CURRENT SPEC. ATTEMPTS WILL BE MADE TO SEE IF THERE IS CORRELATION BETWEEN TEST RESULTS AND PROBLEM AREAS. IF SO A RECOMMENDATION WILL FOLLOW.						

	FUNDING ($000)					
	PRIOR	79	80	81	82	83

COMPONENT -- TNT (CONTINUED)

(4399) TITLE - INSTRU IN-PROCESS MEASUREMENTS OF SOLID LIQUID TNT 150

PROBLEM - NO ACCURATE REAL TIME CAPABILITY EXISTS TO MEASURE THE SOLID/LIQUID RATIO OF TNT SLURRIES CRITICAL FOR TNT LOADING OF MEDIUM AND LARGE CALIBER PROJECTILES. THIS RESULTS IN MARGINAL PROCESS CONTROL WITH A POTENTIAL FOR DEFECTIVE CASTS AND REWORK.

SOLUTION - DEVELOP REMOTELY OPERATED HIGHLY SENSITIVE INSTRUMENTATION TO MEASURE SLURRY SOLID/LIQUID PROPORTION DURING TNT LOADING OPERATIONS. THIS WILL PERMIT CLOSE CONTROL OF THE TNT PHYSICAL CHARACTERISTICS AND RESULT IN THE HIGHEST UNIFORM QUALITY POSSIBLE

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* CATEGORY *
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*FUZES *
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COMPONENT -- ELECTRONICS

(1005) TITLE - CERAMIC-METAL SUBSTRATES FOR HYBRID ELECTRONICS 319

PROBLEM - ALL THICK FILM HYBRIDS ARE FABRICATED ON A CERAMIC SUBSTRATE WHICH IS FRAGILE AT HIGH G SHOCK LEVELS AND MUST BE ADEQUATELY SUPPORTED IN ORDER TO SURVIVE. THIS IS A COSTLY PROCEDURE.

SOLUTION - DEVELOP MFG METHODS + TECHNIQUES FOR PRODUCTION OF THICK FILM HYBRID CIRCUITRY ON METAL-BASED SUBSTRATES. THIS INCLUDES PROCESSES FOR AN INSULATING LAYER ON A METAL SUBSTRATE AND PROCESSING OF THICK FILM MATERIALS TO FORM ELECTRONIC COMPONENTS.

(3913) TITLE - MECH JOINING OF MINIATURIZED ELEC COMPONENTS 89

PROBLEM - LEAD JOINING REQUIRES HIGH HEAT WHICH CAUSES DETERIORATION OR FAILURE OF DELICATE COMPONENTS OR FORMATION OF OXIDE COATINGS.

SOLUTION - THE APPLICATION OF LASERS FOR WELDING OVERCOMES THESE PROBLEMS. THE PRECISE CONTROL AND SHORT DURATION OF THE HIGH HEAT OF LASER PREVENTS DAMAGE TO COMPONENTS AND PREVENTS OXIDE FORMATION.

COMPONENT -- LAP

(L297) TITLE - TECHNIQUE FOR APPLYING SEALANT MATERIAL 175

PROBLEM - IN CURRENT METHODS OF ASSEMBLY OF FUZES, SEALING MATERIEL IS APPLIED TO MATING PARTS AS THEY ARE SECURED TOGETHER, OFTEN LEAVING SEALANT BEAD AND HOLES IN SEALANT WHEN IT DRIES. HOLES CAN CAUSE WATERPROOF FAILURES.

SOLUTION - AN ENGINEERING STUDY PROPOSAL FOR IMPROVING SEALING.

		FUNDING ($000)				
	PRIOR	79	80	81	82	83
COMPONENT -- LAP (CONTINUED)						
(1003) TITLE = LOW COST MOLDED PACKAGING FOR HYBRID ELECTRONICS			243			
PROBLEM = FOAM OR EPOXY POTTED HYBRID CIRCUITS USED IN SMALL CALIBER ARE NOT SURVIVING HI G LEVELS. HERMETIC PACKAGES ARE NOT USED DUE TO COST CONSIDERATIONS.						
SOLUTION = APPLY MOLDING TECHNIQUES THAT ARE USED IN DUAL-IN-LINE PLASTIC PACKAGES. THIS PROCESS IS BASED UPON BULK FILM PROTECTION OF THE SUBSTRATE FOLLOWED BY MOLDING OF THE ELECTRONICS AND METAL PLATING TO PROVIDE SHIELDING IF REQUIRED.						
(4024) TITLE = DSN DEV BLDG PROTOTYPE AUTO ASSY MACH M223 FUZE		1132				
PROBLEM = HIGH DENSITY ITEM PRODUCED ON HANDLINES WITH SLOW SPEED AUTO EQUIP. NEED HIGHER PRODUCTIVITY WITH MINIMUM CAPITAL EQUIPMENT COSTS.						
SOLUTION = DEVELOP HIGH SPEED AUTOMATED ASSEMBLY EQUIPMENT (90 PCS PER MIN) TO REDUCE CAPITAL EQUIP COSTS FOR LARGE QUANTITY PRODUCTION.						
COMPONENT -- METAL PARTS						
(L280) TITLE = P/M ALUMINUM ALLOY FUZE COMPONENTS					230	125
PROBLEM = MANY FUZE COMPONENTS ARE MACHINED FROM STEEL, BRASS, AND ALUMINUM BAR STOCK. MACHINING FROM BAR STOCK HAS DISADVANTAGES THERE IS A NEED TO DEVELOP ALTERNATE PROCESS TO PRODUCE QUANTITY REQUIRED. PRESENT MACHINES CANNOT MEET REQUIREMENTS.						
SOLUTION = POWDER METALLURGY PROCESS CAN FABRICATE PIECE PARTS TO CLOSE DIMENSIONAL TOLERANCES TO ACHIEVE BETTER TOLERANCES IMPROVE SURFACE FINISH HIGHER MATERIAL DENSITY SECONDARY COINING OPERATION CAN BE USED.						
(4401) TITLE = HOT FORMING + COLD HEADING LARGE FUZE COMPONENTS				275		
PROBLEM = MULTISPINDLE BAR MACHINES DATE FROM 1950'S. THEY HAVE LOW PRODUCTIVITY, DO NOT MEET OSHA, CAN'T USE CARBIDE TOOLS, NO SPARE PARTS.						
SOLUTION = APPLY MOD TECH SUCH AS HOT FORGE AND COLD HEADING TO OBTAIN SHAPE + REDUCE MACHINING AND SCRAP. THIS ALLOWS HIGH SPEED CHUCKERS FOR FINISH MACHINING.						
(4402) TITLE = HSS PRECISION GEAR HOBS				200	100	
PROBLEM = THE FUZE PRODUCTION BASE UTILIZES SOLID CARBIDE HOBS FOR MFG PINIONS. THERE IS NO DOMESTIC MFR OF THESE HOB. THEY ARE IMPORTED FROM FOREIGN SOURCES. LEAD TIME IS 10 TO 18 WEEKS. A SURVEY SHOWED A LACK OF TECH, SKILLS + INTEREST IN MFG.						
SOLUTION = DEVELOP IMPROVED HIGH SPEED STEEL HOBS USING HIGH STR STEEL TO IMPROVE WEAR LIFE + PROVIDE A BACKUP HOB FOR HOB + LEADTIME REDUCTION USING U.S. AVAILABLE TECHNOLOGY.						

		FUNDING ($000)					
	PRIOR	79	80	81	82	83
COMPONENT -- POWER SUPPLIES						
(1001) TITLE = PILOT LINE FOR FUZE FLUIDIC POWER SUPPLIES			255	300		
PROBLEM = FLUIDIC GENERATORS ARE COMPLEX AND COSTLY TO PRODUCE. IN PRODUCTION, CLOSE TOLERANCES AND SMALL PART ASSEMBLY ARE REFLECTED IN HIGH COST AND LOW YIELD.						
SOLUTION = IDENTIFY AND ADOPT THE MOST ECONOMICAL MFG PROCESSES AND TECHNIQUES TO ESTABLISH A MECHANIZED PILOT LINE FOR ASSEMBLY OF FLUIDIC POWER SUPPLIES.						
(3960) TITLE = PROTOTYPE PRODUCING EQUIP = PRINTED CIRCUIT BOARDS		405				
PROBLEM = R+D DESIGNS EXPERIENCE IN-PROCESS PROBLEMS WHEN TRANSFERRED TO LARGE-SHEET, MULTI-ARRAY COMMERCIAL PRODUCTION. PROBLEMS ARE FLOW SOLDERABILITY, LINE WIDTH AND IN-PROCESS HANDLING.						
SOLUTION = FABRICATE PROTOTYPE PRODUCING EQUIPMENT FOR PRINTED CIRCUIT BOARDS USING PRODUCTION TECHNIQUES NORMALLY USED IN THE INDUSTRIAL SECTOR TO ASSURE COMPATABILITY OF THE TOP WITH MASS PRODUCABILITY.						
(4266) TITLE = MANUFACTURING, INSPECTION AND TEST EQUIP FOR MAG PWR SUPPLY			345	710		
PROBLEM = PIEZOELECTRIC POWER SUPPLIES USED IN HEAT AMMO HAVE BEEN OBSERVED TO HAVE UNDESIRABLE VOLTAGE GENERATION IMPRESSED ON THE ELECTRICAL CIRCUITING OF THE ROUND DUE TO SHOCK VIBRATIONS RESULTING DURING FLIGHT WHICH MAY CAUSE PREMATURES.						
SOLUTION = MOVE THE POWER SUPPLY FROM THE NOSE OF THE ROUND TO INSIDE THE PIBD FUZE HOUSING AND CHANGE IT TO A MAGNETIC PULSE GENERATING TYPE POWER SUPPLY WHICH IS UNAFFECTED BY THE PROBLEM OF SHOCK VIBRATIONS.						
COMPONENT -- QA/TESTING						
(3961) TITLE = IMPROVE (3-D) VIBRATION ACCEPT TEST P/M732 M724		282	605			
PROBLEM = CURRENT METHODS ARE COSTLY AND TIME CONSUMING, RARELY EXPOSE THE TEST ITEM TO TRUE SERVICE ENVIRONMENTS, AND REQUIRE THREE TESTS TO ACCOUNT FOR ALL TEST AXES.						
SOLUTION = USE OF COMPUTERIZED 3-D VIBRATION / SHOCK TESTING AS AN ACCEPTANCE TOOL SOLVES TECHNICAL + ECONOMIC TEST DEFICIENCIES. TEST TIME IS REDUCED						

CATEGORY
GENERAL

		FUNDING ($000)				
	PRIOR	79	80	81	82	83
COMPONENT -- MISCELLANEOUS						
(L203) TITLE - INSP + TEST EQUIP FOR CONDUCTIVE MIX DETONATOR					606	
PROBLEM - CONDUCTIVE MIX TYPE DETONATORS HAVE NOT BEEN FABRICATED IN PRODUCTION QUANTITIES.						
SOLUTION - A US VERSION OF THE GERMAN CONDUCTIVE MIX DETONATOR WILL BE FABRICATED USING THE LATEST TECHNIQUES. THE PROJECT WILL PROVIDE THE MECHANIZATION NEEDED FOR INCREASED SAFETY AS WELL AS INCREASED PRODUCTION AT A LOWER COST.						
(L223) TITLE - FOAM IN PLACE MUNITION BODY F/XM84					100	100
PROBLEM - DEVELOP PROCESS TO ENCAPSULATE MAJOR MUNITION COMPONENTS WHERE INTERNAL STRESSES WOULD BE MINIMIZED. PREALIGNMENTS OF ELEMENTS WOULD NOT BE DISTURBED AND EXOTHERM WOULD BE COMPATIBLE WITH EXPLOSIVES AND OTHER TEMPERATURE SENSITIVE COMPONENTS.						
SOLUTION - DETERMINE OPTIMUM COMBINATION OF FOAM IN-PLACE MATERIALS AND COMPONENT ALIGNMENT PROCESS TO ALLOW FOR ENCAPSULATION OF INTERNAL COMPONENTS FOR XM84.						
(P015) TITLE - DEVELOP TECHNOLOGY FOR MFG OF DELAY AND TRAINS					250	200
PROBLEM - DELAY TRAIN PRODUCTION CONTRACTED OUT. DISRUPTION OF PRODUCTION. D EFECTIVE COMPONENTS.						
SOLUTION - PROVIDE DELAY TRAIN MFG IN-HOUSE. PROVIDE INLINE CONCEPT FOR ITEMS. PROVIDE INTEGRATED FACILITY.						
(P020) TITLE - INCENDIARY MIX STUDY						350
PROBLEM - TECHNOLOGY OUTDATED. FACILITIES OLD AND LABOR INTENSIVE. HEAVY POLLUTANT.						
SOLUTION - PERFORM STUDY TO PROVIDE UPDATED EQUIPMENT. PROVIDE STATE OF ART TECHNOLOGY. LIMIT POLLUTION FROM PLANT.						
(P021) TITLE - OPTIMIZATION OF REACTIVATION OF LAYAWAY WP PLANT						150
PROBLEM - COMPLEX PROCESSES AND EQUIPMENT. HAZARDOUS MATERIALS IN PRODUCTION. SHORT TIME TO REACTIVATE.						
SOLUTION - OPTIMUM PLAN GIVES DETAILS OF PROCEDURES SEQUENCE AND METHODS. MINIMUM TIME TO REACTIVATE. ENHANCED SAFETY FOR REACTIVATION. MINIMIZE PROBLEMS DURING STARTUP OF PRODUCTION.						

		FUNDING ($000)				
	PRIOR	79	80	81	82	83
COMPONENT -- MISCELLANEOUS (CONTINUED)						
(4309) TITLE = PROCESS DEVEL F/120MM AMMO		848	3806	3290	478	
PROBLEM = MASS PRODUCTION IN THE US OF =, GERMAN 120MM TANK AMMUNITION POSES PROBLEMS IN FOUR FUNCTIONAL AREAS = METAL PARTS, PROPELLANT, FUZE, AND LAP.						
SOLUTION = THIS IS A MULTI-YEAR EFFORT IN FOUR FUNCTIONAL AREAS, A SEPARATE TASK ADDRESSES EACH UNIQUE PROBLEM. THIS MMT SUPPORTS FACILITY PROJECTS IN FY83-84 AND IS ESSENTIAL TO FIELDING THE 120MM GUN SYSTEM ON THE XM1 TANK IN FY85.						
(4335) TITLE = ALTERNATIVE PROCESS FOR TITANIUM GYROSCOPES		411				
PROBLEM = CONTEMPLATED PRODUCTION METHODS ARE COSTLY AND REMAIN ESSENTIALLY UNCHANGED FROM THOSE USED TO PRODUCE COMPONENTS FOR THE ENGINEERING DEVELOPMENT VERSION.						
SOLUTION = APPLY AND PROVE OUT A MORE COST EFFECTIVE PRODUCTION TECHNIQUE SPECIFIED FOR THE MANUFACTURE OF EACH GYRO COMPONENT.						
(6736) TITLE = TECH READINESS ACCEL THRU COMPUTE INTEGRATED MFG (TRACIM)	140	256	290		252	766
PROBLEM = THE LEAD TIME REQUIRED TO BRING PRODUCTION LINES TO MOBILIZATION MAXIMUM IS INTOLERABLY EXCESSIVE. A CRITICAL DETERRENT IS THE EXTREME SHORTAGE OF TOOLMAKERS AND MACHINISTS.						
SOLUTION = THE DEVELOPMENT AND IMPLEMENTATION OF A COMPUTER INTEGRATED MANUFACTURING SYSTEM WILL SIGNIFICANTLY REDUCE THE REQUIREMENT FOR HIGHLY SKILLED CRAFTSMEN.						

CATEGORY
LAP

COMPONENT -- ASSEMBLY

(L263) TITLE = VIPER MECH ASSY OF COMPLETE ROUND TO LAUNCHER					170	535
PROBLEM = THE ASSEMBLY OF ROUND TO LAUNCHER IS A COSTLY OPERATION DUE TO HIGH LABOR COSTS.						
SOLUTION = A STUDY WILL BE CONDUCTED TO DETERMINE THE AREAS WHERE MECHANIZATION CAN BE APPLIED. APPLICABLE AREAS WILL BE MECHANIZED INTO AN ASSEMBLY SYSTEM.						

		FUNDING ($000)					
		PRIOR	79	80	81	82	83
COMPONENT -- ASSEMBLY (CONTINUED)							
(L273)	TITLE - VIPER TOOLING PROCESS FOR MAGNAFORMING						135
	PROBLEM - ALIGNMENT OF WARHEAD, ROCKET MOTOR, AND CRUSH SWITCH IS CRITICAL TO COMPLETE ROUND ASSEMBLY AND NECESSITATES TIME CONSUMING OPERATIONS TO SET UP MAGNAFORM STATION.						
	SOLUTION - DESIGN AND BUILD ALIGNMENT FIXTURES THAT WILL AUTOMATICALLY SET UP THE PRODUCT WHILE MAINTAINING POSITION AND ALIGNMENT.						
(4000)	TITLE - AUTO M55 DETONATOR PRODUCTION EQUIPMENT	5030	1600	475	575		
	PROBLEM - LAP OF DETONATORS IS LABOR INTENSIVE, PERSONNEL EXPOSURE IS EXTENSIVE. MOB RATES ARE EXTREMELY HIGH.						
	SOLUTION - DEVELOP AN AUTOMATED SYSTEM FOR PRODUCTION OF NON-ELECTRIC DETONATORS TO PRODUCE HIGH QUALITY DETONATORS WITH REDUCED COST AND IMPROVED SAFETY.						
(4062)	TITLE - AUTO MFG SUP FOR MORTAR INCREMENT CONTAINERS		507	895	514		
	PROBLEM - THE MANUFACTURE AND ASSEMBLY OF THE 60/81MM PROP CHARGE INCREMENT CONTAINER IS LABOR INTENSIVE AND DOES NOT MEET PRODUCTION REQUIREMENTS.						
	SOLUTION - DEVELOP PROCESS AND EQUIPMENT TO REDUCE COSTS, INCREASE PRODUCTION RATES, AND IMPROVE QUALITY.						
(4064)	TITLE - AUTO LAP OPERATIONS FOR 105MM TANK CARTRIDGES		1262				
	PROBLEM - PRESENT MANUAL TECHNIQUES USED FOR THESE ITEMS ARE VERY LABOR INTENSIVE AND LACK REPRODUCABILITY WHILE BEING EXTREMELY COSTLY.						
	SOLUTION - THIS PROJECT WILL DESIGN AN ASSEMBLY SYSTEM WHICH WILL BE CAPABLE OF REPETITIVELY ASSEMBLING THE 105MM TANK CARTRIDGES MORE CONSISTANTLY AND AT A COST SAVINGS.						
(4133)	TITLE - AUTO INSP OF CRITICAL DEFECTS IN M55 DETONATORS		283				
	PROBLEM - 100% INSPECTION OF THREE CRITICAL VISUAL DEFECTS ARE CURRENTLY PERFORMED MANUALLY, TWO OF THESE INSPECTIONS REQUIRE HANDLING EXTRA SENSITIVE DETONATORE AND HAS RESULTED IN NUMEROUS INJURIES.						
	SOLUTION - INVESTIGATE A CONCEPT WHICH WILL MEASURE POWDER INCREMENT DENSITY + HEIGHT + COULD REPLACE THE DESTRUCTIVE TESTS. THE TECHNIQUE COULD ALSO PROVE TO PROVIDE A MEASURE OF PROCESS CONTROL WHICH HAS NOT BEEN OBTAINED PREVIOUSLY.						

		FUNDING ($000)					
		PRIOR	79	80	81	82	83
COMPONENT -- ASSEMBLY	(CONTINUED)						
(4162)	TITLE = PROCESS IMPROVEMENTS AND AUTO TEST FOR M70/73 XM75 BLU91B			200			
	PROBLEM = NO EQUIPMENT EXISTS TO TEST MAGNETOMETER CORES, AUTOMATE MAGNETIC COUPLING DEVICE, PC BOARD WARPING OCCURS DURING WAVE SOLDERING, NO DIAGNOSTIC TESTER EXIST FOR FAMILY OF SCATTERABLE MINE ELECTRONIC LENS.						
	SOLUTION = DEVELOP MAGNETOMETER CORE AND ELECTRONIC LENS DIAGNOSTIC TESTERS, IMPROVE PROCESS TO REDUCE PC BOARD WARPING DURING WAVE SOLDERING, DEVELOP EQUIPMENT FOR AUTOMATING ASSEMBLY OF MAGNETIC COUPLING DEVICE.						
(4385)	TITLE = MECH OF ASSY OPERATION OF CENTER CORE IGNITERS				460		
	PROBLEM = CURRENT TECHNIQUES TO ASSEMBLE THE CLOTH IGNITER ASSEMBLY TO THE IGNITER TUBE REQUIRES LARGE NUMBERS OF OPERATORS HANDLING HIGHLY HAZARDOUS BLACK POWDER.						
	SOLUTION = THIS PROJECT WILL DEVELOP EQUIPMENT TO MECHANICALLY ASSEMBLE THIS IGNITER ASSEMBLY. THIS WILL ENABLE THE REDUCTION OF PERSONNEL IN HAZARDOUS OPERATIONS.						
(4469)	TITLE = AUTOMATED INSERTION OF GRENADE LAYERS	502	1150	350			
	PROBLEM = THE MANUAL INSERTION GRENADE LAYERS INTO PROJECTILES IS A HIGHLY MANUAL, COSTLY AND HAZARDOUS OPERATION.						
	SOLUTION = DEVELOP AUTOMATED EQUIPMENT TO PERFORM THE INSERTION OF GRENADE LAYERS INTO THE M483-155MM PROJECTILE.						
(4498)	TITLE = MT FOR CONSOLIDATN + AUTO ASSEMBLY OF SMALL MINES	325	572	592			
	PROBLEM = OFF-LINE OPERATIONS AND MULTIPLE HANDLING IS REQUIRED FOR THE PREDOMINATELY MANUAL LAP OPERATIONS.						
	SOLUTION = THIS PROJECT WILL PROVIDE THE PROCESS PROCEDURES FOR CONSOLIDATING HE WITHINTHE MINE HOUSING, CONCEPTS FOR AUTOMATION OF THE ASSEMBLY OPERATIONS AND A FINALREPORT.						
COMPONENT -- GENERAL							
(0003)	TITLE = APPLICATION TO LAP OF EMERGING MFG TECH					600	2500
	PROBLEM = THERE ARE NUMEROUS REQUIREMENTS IN THE LAP AREA THAT COULD TAKE ADVANTAGE OF THE LATEST TECHNOLOGY DEVELOPMENT IN INDUSTRY, WE MUST PROVIDE FOR THE APPLICATION OF THIS TECHNOLOGY TO OUR LINES THROUGH ENGINEERING PROJECTS.						
	SOLUTION = THIS TECHNOLOGY THRUST COVERS THE APPLICATION OF NEW TECHNOLOGY DEVELOPMENTS IN INDUSTRY TO LAP PROCESSES, THESE MAY INVOLVE WEIGHING, MATERIAL HANDLING, MATERIAL DEVELOPMENT, AND EQUIPMENT APPLICATION.						
(4364)	TITLE = DESIGN STUDY FOR ULTRASONICALLY ACTIVATED AMMO PROCESSING				250	275	

		FUNDING ($000)				
	PRIOR	79	80	81	82	83
COMPONENT -- LOAD						
(D001) TITLE - 60MM SMOKE PDN TECH F/IMPROVED SMOKE MUNITION						410
PROBLEM - A FAMILY OF NEW IMPROVED WP SMOKE ROUNDS INCLUDING 60MM MORTAR IS BEING DEVELOPED. FUTURE PRODUCTION IS DEPENDENT ON THE AVAILABILITY OF NEW TECHNOLOGY AND PRODUCTION EQUIPMENT.						
SOLUTION - DEVELOP TECHNOLOGY REQUIRED TO DESIGN PILOT EQUIPMENT FOR FILLING IMPROVED SMOKE 60MM MUNITION INCORPORATING WICK MATERIAL WITH WP.						
(D004) TITLE - ADAPTIVE CONTROL OF LAP OPERATIONS					200	300
PROBLEM - IN THE CONTINUOUS PROCESSES INVOLVING HE OPERATIONS IT HAS BEEN DETERMINED THAT CONTINUOUS FEEDBACK AND CONTINUOUS CORRECTION OF PROCESS PARAMETERS ARE NECESSARY TO INSURE PROPER OPERATION AND SAFETY OF THE PROCESS.						
SOLUTION - DEVELOP A SYSTEM FOR CONTINUOUS MONITORING AND CORRECTION OF PROCESS PARAMETERS IN CONTINUOUS PROCESSES FOR PROPER OPERATION AND SAFETY.						
(L215) TITLE - BLENDING EQUIP FOR PA130					550	250
PROBLEM - NOL 130 HAS POOR FLOW CHARACTERISTICS. PRESENT BLEND EQUIP FOR NOL 130 NOT SUITED TO PA130.						
SOLUTION - PA130 IS BEING DEVELOPED. MODIFY EXISTING EQUIP TO LOAD PA130.						
(L266) TITLE - FORCE REBALANCE NETWEIGH/CHECKWEIGH DISPENSING SYS					400	
PROBLEM - FASTER RATES OF DISPENSING PROPELLANT POWDER ARE NEEDED WHICH INCLUDES NETWEIGH CHECKWEIGH AND FEEDBACK CORRECTIONS TO DISPENSING CONTROL SYSTEM.						
SOLUTION - DEVELOP THE TECHNOLOGY TO MAKEUP PROPELLANT CHARGES AND NETWEIGH AND CHECKWEIGH AT PRODUCTION RATES OF 35 CHARGES PER MINUTE.						
(P018) TITLE - DEVELOP IMPROVED FILLING METHOD FOR M74 ROCKET						250
PROBLEM - TPA FILLING METHOD IS SLOW AND CAUSES INEFFICIENT OPERATION.						
SOLUTION - EVALUATE AND SELECT OPTIMUM FILL EQUIPMENT TO REDUCE FILLING TIME.						
(1367) TITLE - DEVELOP MFG TECHNOLOGY FOR XM96 CS ROCKET						350
PROBLEM - NEVER PRODUCED AT PBA. MOBILIZATION REQUIREMENT.						
SOLUTION - PROVIDE MFG TECHNOLOGY. PROVIDE DESIGN CRITERIA FOR IPF.						

		FUNDING ($000)					
		PRIOR	79	80	81	82	83
COMPONENT -- LOAD	(CONTINUED)						
(1701)	TITLE - BULK TRANSFER OF CHEMICAL MATERIALS					160	220
	PROBLEM - CURRENT TECHNIQUE FOR RETRIEVAL WEIGHING AND TRANSPORTING PYROTECHNIC CHEMICAL CONSTITUENTS ARE ACCOMPLISHED BY LABOR INTENSIVE OPERATION AND ARE UNSAFE.						
	SOLUTION - AN EFFICIENT MATERIALS HANDLING SYSTEM WILL BE SURVEYED AND DEVELOPED SO THAT EPA/OSHA STANDARDS WILL BE MET.						
(4086)	TITLE - REPROCESSING EXPLOSIVE FINES AND DRILL SCRAP			357	200		
	PROBLEM - FINELY DIVIDED EXPLOSIVE SCRAP GENERATED IN CAVITY DRILLING AND RISER CRUSHING OPERATIONS IS CURRENTLY BURNED AS WASTE. IT CANNOT BE REPROCESSED IN ITS GENERATED STATE DUE TO HANDLING PROBLEMS AND AGGLOMERATION WHEN INTRODUCED INTO MELT SYSTEMS.						
	SOLUTION - DEVELOP A SYSTEM TO SCREEN, INSPECT AND REPROCESS THE FINE EXPLOSIVE INTO FLAKE EXPLOSIVE THAT CAN BE EASILY TRANSPORTED AND DIRECTLY INTRODUCED INTO MELT POUR SYSTEMS.						
(4137)	TITLE - AUTO LOADING OF CENTER CORE IGNITERS		205	967			
	PROBLEM - LOADING OF THE LONG SLENDER CLOTH BAG IS AN AREA WHICH REQUIRES HIGH LABOR COSTS AND SUBJECTS A LARGE NUMBER OF PERSONNEL TO HAZARDOUS OPERATIONS.						
	SOLUTION - DEVELOP EQUIP TO AUTOMATICALLY LOAD THESE IGNITERS.						
(4163)	TITLE - CONTROLLED PRODUCTION LOADING SYSTEM F/105 MM HEAT-T	199	669				
	PROBLEM - PRESENT LOADING PROCESS FOR 105MM, HEAT AMMUNITION RESULTS IN A REJECT RATE OF FROM 50 TO 60 PERCENT.						
	SOLUTION - A NEW PROCESS IS BEING DEVELOPED WHICH WILL REDUCE THE REJECT RATE TO 5 PERCENT AND PROVIDE A MORE CONSISTANT PRODUCT.						
(4194)	TITLE - IMPROVED PROCESS FOR PRESSING LX-14 EXPL CHGS.		327				
	PROBLEM - PRESENT PROCESS FOR PRESSING LX-14 IS SLOW AND REQUIRES NUMEROUS OPERATIONS WHICH ARE COSTLY.						
	SOLUTION - DEVELOP A NEW SIMPLIFIED PROCESS FOR PRESS LOADING LX-14 WHICH STANDARDIZES THE TECHNIQUES ON ALL ITEMS.						
(4236)	TITLE - AUTO LACE JACKETS FOR CENTER CORE CHARGES			612			
	PROBLEM - THE MANUAL THREADING AND TIGHTENING OF THE LACING IS EXTREMELY TIME CONSUMING AND REQUIRES LABORIOUS HIGH COST OPERATIONS WHILE PROVIDING POOR QUALITY PRODUCT.						
	SOLUTION - DEVELOP AN AUTOMATED/MECHANIZED SYSTEM FOR THE LACING OPERATION.						

		FUNDING ($000)					
		PRIOR	79	80	81	82	83
COMPONENT -- LOAD	(CONTINUED)						
(4244)	TITLE = DEV AUTO LDG EQUIP F/ELECTRIC PRIMER IGNITERS					247	
	PROBLEM = ELECTRIC PRIMER IGNITERS ARE PRESENTLY PRODUCED ON HAND LINES.						
	SOLUTION = AUTOMATE LOAD SYSTEM.						
(4263)	TITLE = AUTO PILOT LINE FOR CONTROLLED COOL/PROCESSING ME LOAD PROJ	4316	329				
	PROBLEM = THE OPERATIONAL/TESTING PHASE OF THE CONTROLLED COOLING PILOT PLANT MUST BE CONDUCTED TO VERIFY EQUIPMENT CRITERIA AND DESIGNS PREVIOUSLY FURNISHED AND CURRENTLY BEING UTILIZED IN THE DESIGN OF FULL-SCALE PRODUCTION FACILITIES.						
	SOLUTION = SUPPLEMENT PRIOR YEAR EFFORTS TO COMPLETE TESTING OF EQUIPMENT FOR MPTS PREHEAT, EXPLOSIVE LOADING, CONTROLLED COOLING, FUNNEL/THREAD PROTECTOR EXTRACTION AND INSTRUMENTATION/CONTROL.						
(4292)	TITLE = AUTOMATED EQPT FOR LOAD AND ASSEMBLY OF LOW VELOCITY 40 MM				300		
	PROBLEM = AN EXPANDIBLE PRODUCTION LINE IS NEEDED FOR PROJECTED INCREASED REQUIREMENTS. IT WILL USE THE MOST MODERN TECHNIQUES OF MANUFACTURE AND ASSEMBLY OF 40MM CARTRIDGES.						
	SOLUTION = AN AUTOMATED EQUIPMENT SYSTEM WILL BE DESIGNED AND PROVEN TO CONSOLIDATE ALL OPERATIONS FOR MANUFACTURING 40MM CARTRIDGES.						
(4312)	TITLE = INJECTION MOLDING FOR PRODUCTION EXPLOSIVE LOADING		261	279			
	PROBLEM = MELT LOADING OF SMALL EXPLOSIVE ITEMS NORMALLY REQUIRES LARGE SURPLUSES OF MOLTEN EXPLOSIVE TO OBTAIN GOOD FILLING CHAR. SURPLUS RISER MATERIAL CAN BE TWICE THE AMOUNT LOADED INTO END ITEMS. VERY SMALL ITEMS CANNOT BE EFFECTIVELY MELT LOADED AT ALL.						
	SOLUTION = DEVELOP AN INJECTION MOLDING SYSTEM FOR FILLING SMALL ITEMS WITH MOLTEN EXPLOSIVE UNDER PRESSURE. DESIGN LOADING FIXTURES TO FORM EXPLOSIVE CHARGES TO FINISHED DIMENSIONS AND REDUCE SURPLUS EXPLOSIVE REQUIREMENTS TO VERY LOW LEVELS.						
(4466)	TITLE = EVAL TNT, CYCLOTOL, AMATEX, OCTOL WITH PA MELT-POUR FACIL	200	461				
	PROBLEM = THE MELT/POUR EXPLOSIVE FILL EQUIPMENT WAS DESIGNED FOR THE ARMY'S PREFERRED FILL, COMP B WITH LITTLE REGARD FOR THE APPLICATION OF THIS EQUIPMENT TO THE ALTERNATE EXPLOSIVE FILLS						
	SOLUTION = DEVELOP MELT/POUR UTILIZATION PLANS FOR THE PROCESSING OF TNT, CYCLOTOL AND OCTOL.						

FUNDING (8000)

	PRIOR	79	80	81	82	83
COMPONENT -- PACK			502			
(A253) TITLE - AUTO HIGH RATE UNPACK EQUIP FOR MORTAR PROP CHGS						
PROBLEM - HANDPACKING ON THE MORTAR PROP CHGS M204 AND 205 LAP LINE RESULTS IN UNSAFECONDITIONS AND DAMAGE TO PARTS.						
SOLUTION - DEVELOP AUTOMATED EQUIPMENT TO REPLACE HANDPACKING.				499	389	
(A367) TITLE - AUTO PACKOUT EQUIP FOR PROP CHARGE						
PROBLEM - A CHANGE IN THE DESIGN OF THE PROPELLANT CHARGE SHIPPING CONTAINER WILL MAKE THE PACKOUT SYSTEMS DEVELOPED FOR THE PREVIOUS CONTAINER UNUSABLE.						
SOLUTION - THE EFFORT WILL DESIGN AND BUILD STATIONS WHICH CAN BE USED ON THE EXISTING EQUIPMENT. THIS WILL ASURE UTILITY OF EQUIPMENT WITH NEW CONTAINER.						
COMPONENT -- SUPPORT					400	1500
(D002) TITLE - IMPROVED AUTOMATED LAP MATERIAL HANDLING TECH						
PROBLEM - MATERIAL HANDLING EQUIPMENT USED IN LINES AT LAP PLANTS IS GENERALLY OLD AND COSTLY TO OPERATE, MAINTAIN, AND SUPPORT.						
SOLUTION - THIS PROJECT WILL EXPLORE STATE OF THE ART EQUIPMENT WITH EMPHASIS ON ADAPTATIONS REQUIRED FOR OPERATION IN AN EXPLOSIVE ENVIRONMENT.					210	
(1368) TITLE - DEVELOP MANUF TECH FOR CARTRIDGE 40MM CS M651						
PROBLEM - THE M651 CARTRIDGE HAS BEEN ADDED TO PBA MOBILIZATION REQUIREMENTS. THERE IS CURRENTLY NO PRODUCTION FACILITY TO PRODUCE THE ITEM.						
SOLUTION - THIS PROJECT PROVIDES ALL THE TECHNOLOGY NEEDED TO CONVERT THE EXISTING 40MM COLORED SMOKE FACILITY FOR PRODUCTION OF THE M651 CARTRIDGE.					300	
(1702) TITLE - ADV TECH FOR PRODUCTION OF IGNITION SLEEVE						
PROBLEM - MANUFACTURING CLOTH IMPREGNATED IGNITION SLEEVES FOR THE 105MM & 155MM HC SMOKE CANISTERS IS INEFFICIENT WITH POOR QUALITY CONTROL. REJECT RATES ARE HIGH AND PROCESS DOES NOT MEET OSHA STANDARDS.						
SOLUTION - DEVELOP A NEW MACHINE TO FORM WELL IMPREGNATED, WELL FORMED IGNITION SLEEVES. IT WILL INCREASE MANPOWER EFFICIENCY, IMPROVE QUALITY, REDUCE WASTE, AND REDUCE OPERATOR EXPOSURE TO HAZARDOUS MATERIALS.			265			
(A305) TITLE - PROD TECH F/IMPR WP 155MM SMOKE MUN						
PROBLEM - PRODUCTION REQUIREMENT FOR 155MM WP XM825 HAS BEEN ESTABLISHED IN FY84 AND FY85 AND NO PRODUCTION FACILITY IS CURRENTLY AVAILABLE.						
SOLUTION - PERFORM MANUFACTURING PROCESS STUDIES TO PROVE OUT THE FEASIBILITY OF PRODUCTION FILLING AND CLOSING OF THE XM825.						

CATEGORY	FUNDING ($000)					
METAL PARTS	PRIOR	79	80	81	82	83

COMPONENT -- CARTRIDGE CASE

(8400) TITLE - MACHINING OF BRASS CARTRIDGE CASES — 150

PROBLEM - TOOL MORTALITY TO MACHINE EXTRACTOR GROOVE IS EXCESSIVE AND PRODUCES GREAT DEAL OF SCRAP. ALSO HOLDING COMPONENTS IS A PROBLEM.

SOLUTION - FIND ALTERNATE DESIGNS FOR CUTTING TOOLS. INVESTIGATE NEW WAYS TO HOLD COMPONENTS FIRMLY IN PLACE.

COMPONENT -- FORMING/MACHINING

(0005) TITLE - ALTERNATE ASSY FOR SOLDERED AND BRAZED JOINTS — 500

PROBLEM - BRAZING AND SOLDERING OPERATIONS REQUIRE PRECISE CONTROL OF CLEARANCES, TEMPERATURES AND FLUXES IN ORDER TO OBTAIN ACCEPTABLE JOINTS.

SOLUTION - ALTERNATE METHODS OF JOINING COMPONENTS WILL BE INVESTIGATED TO REDUCE COST AND ENHANCE RELIABILITY.

(0007) TITLE - ADAPTIVE CONTROL OF DIMENSIONS OF METAL COMPONENTS — 550

PROBLEM - WEAR OF CUTTING TOOLS AND GRINDING WHEELS EVENTUALLY PRODUCES OUT OF TOLERANCE DIMENSIONS.

SOLUTION - UTILIZE SENSING DEVICES AND ADAPTIVE CONTROLS TO AUTOMATICALLY COMPENSATE FOR TOOL AND WHEEL WEAR.

(0008) TITLE - SOFT TECH DATA PACKAGES — 300

PROBLEM - TDPS FOR MUNITIONS METAL PARTS CONTAIN PROVISIONS THAT NEEDLESSLY ADD TO THEIR MANUFACTURING COSTS.

SOLUTION - MANUFACTURING TECHNOLOGY ANALYSIS WILL BE APPLIED TO ALL TDPS TO DETERMINE CHANGES TO FACILITATE MANUFACTURING OPERATIONS WITHOUT SACRIFICING QUALITY OR PERFORMANCE.

(0009) TITLE - IMPROVE FORGE TOOL PERFORMANCE — 450

PROBLEM - FORGING TOOLS ARE A MAJOR COST ITEM IN SHELL MFG. AND LIFE OF TOOLS HAS A SIGNIFICANT AFFECT ON QUALITY OF FORGINGS AND END PRODUCTS.

SOLUTION - INVESTIGATE USE OF NEW TOOL STEELS AND HARD FACING MATERIALS TO IMPROVE TOOL LIFE AND REDUCE COSTS.

(L221) TITLE - ANTI-ARMOR WHD LINES F/XM84 — 400

PROBLEM - COSTLY AND TIME CONSUMING MANUFACTURING PROCESS FOR MASS PRODUCING SELF-FORGING FRAGMENT LINERS WITH VARYING WALL THICKNESS.

SOLUTION - DETERMINE OPTIMUM PROCESS SUCH AS HYDROFORMING, ELECTROPLATING AND/OR MACHINING. PROVE OUT PROCESS.

		FUNDING ($000)					
		PRIOR	79	80	81	82	83
COMPONENT -- FORMING/MACHINING (CONTINUED)							
(L245)	TITLE = FORGING OF ALUMINUM COMPONENTS					100	120
	PROBLEM = FORGINGS FOR OGIVES, BASES, AND FINS ARE IMPACT EXTRUDED WITH LARGE AMOUNT OF MATERIAL LEFT THAT HAS TO BE MACHINED OFF.						
	SOLUTION = INVESTIGATE USING NET SHAPE FORGING TO ELIMINATE MACHINING OPERATIONS AND MATERIAL WASTE.						
(3403)	TITLE = MOD OF GOCO BRASS MILL						80
	PROBLEM = CLOSE TOLERANCED BRASS STRIP NOT AVAILABLE COMMERCIALLY.						
	SOLUTION = FEASIBILITY STUDY SHOWS POSSIBLE TOLERANCING ON BRASS STRIP UP TO 0.002 INCHES. THIS HOWEVER NEEDS TO BE PROVEN ON PRODUCTION LEVEL.						
(1903)	TITLE = DIE CAST TAILCONE + ONE PIECE SKIN FOR BLU-96/B		450	1176			
	PROBLEM = CURRENT ROLL FORMING EQUIPMENT IS LIMITED TO SIX FEET. BLU-96/B SKIN IS TEN FEET AND IS GROOVED. LIMITED EXPERIENCE EXISTS IN BUILDING A DIE FOR THE BLU-96/B TAILCONE WHICH IS 26 INCHES IN DIAMETER AND WEIGHS IN EXCESS OF 70 LBS.						
	SOLUTION = DEVELOP A MACHINE THAT WILL ROLL FORM BLU-96/B SKIN, MANUFACTURE ARTICULATE DIE FOR 2000 TON DIE CAST PRESS AND QUALIFY PROTOTYPE FOR IPF.						
(4124)	TITLE = FABRICATION OF CONTROL ACTUATION SYSTEM HOUSINGS		930				
	PROBLEM = THE HOUSINGS USED IN TACTICAL CONTROL SYSTEMS ARE THE HIGHEST COST ITEMS IN THE SYSTEMS.						
	SOLUTION = DETERMINE A GENERAL METHOD OF FABRICATING ALUMINUM HOUSINGS AT MID-VOLUME RATE AND LOW CYCLE COST AND THEN SELECTING A MACHINING CENTER METHOD FOR MULTI-MODEL HOUSINGS.						
(4369)	TITLE = IMPROVED PROJECTILE CAVITY SURFACE				500		
	PROBLEM = THE FORGING PROCESSES + TECHNIQUES CURRENTLY USED CAN CAUSE DEFECTS + IMPERFECTIONS ON THE CAVITY SURFACE. THIS CONDITION NEEDS CORRECTION TO PREVENT SENSITIVITY PROBLEM THAT CAN OCCUR WITH THE COMP EXPLOSIVE TO BE USED IN HE ROUNDS.						
	SOLUTION = INVESTIGATE THE VARIOUS OPERATIONS SUCH AS NICK AND BREAK BILLET SEPARATION, SCALE, TOOL WEAR OF FORGE, AND FOREIGN MATTER BUILD-UP. DETERMINE BEST PROCESS CHANGES.						
(4373)	TITLE = MOPMS PROCESSING						371
	PROBLEM = TIME CONSUMING POTTING AND SUBSTRUCTURE OPERATIONS.						
	SOLUTION = UTILIZE ALTERNATE MATERIALS AND INJECTION MOLD BASE.						

		FUNDING ($000)					
		PRIOR	79	80	81	82	83
COMPONENT -- FORMING/MACHINING (CONTINUED)							
(4397)	TITLE - FABRICATION OF ADVANCED WARHEADS					700	300
	PROBLEM - MANUFACTURING PROCEDURES FOR ADVANCED WARHEADS NEED TO BE ESTABLISHED.						
	SOLUTION - STUDIES TO ESTABLISH AND OPTIMIZE THE MANUFACTURING PROCESS FOR ADVANCED WARHEADS.						
(4444)	TITLE - BODY FOR M42/M46 GRENADE	1162	563				
	PROBLEM - THE PRESENT METHOD OF PRODUCING THE BODY FOR THE M46 AND M42 GRENADE IS COSTLY.						
	SOLUTION - DETERMINE A MORE ECONOMICAL METHOD TO PRODUCE THE BODY FOR THE M42 AND M46 GRENADES.						
(6716)	TITLE - DEV COMP-AID MODEL OF FORMING OPERATIONS FOR ARTILLERY MPTS	545	306		150		
	PROBLEM - TRIAL AND ERROR METHODS AND THE ABSENCE OF PROVEN AUTOMATED DESIGN TECHNIQUES FOR TOOLING CAUSE UNEXPECTED FAILURES IN FORMING OPERATIONS AND DELAYS IN STARTUP OF AMMUNITION PRODUCTION LINES.						
	SOLUTION - DEVELOP ANALYTICAL MODELS AND AUTOMATED TOOL DESIGN METHODS OF CRITICAL METAL FORMING OPERATIONS. TOOL DESIGNS THUS GENERATED WILL BE TESTED IN A PRODUCTION SETTING TO VERIFY THE COMPUTER MODELS. PROVEN MODELS ARE APPLICABLE TO CURRENT AND FUTURE ITE						
COMPONENT -- MORTAR							
(6759)	TITLE - AUTOMATIC TRANSFER-HOT FORMING PRESSES F/MORTAR AMMO	132			275		
	PROBLEM - MORTAR METAL PARTS PRODUCTION USES CONVENTIONAL EQUIPMENT AND LABOR INTENSIVE PROCESSES.						
	SOLUTION - NEW GENERATION HOT FORMERS ARE ANTICIPATED TO BE CONSTRUCTED WITH DESIGN CHARACTERISTICS WHICH WOULD ENABLE AUTOMATIC PROCESSING OF MORTAR METAL PARTS THROUGH THE DRAW WITH NO ADDITIONAL LABOR.						
COMPONENT -- PROJECTILE							
(1907)	TITLE - AUTO GAGING FOR 5 INCH PROJECTILE				50A		
	PROBLEM - CURRENT INSPECTION IS INADEQUATE TO MEET 5 INCH PROJECTILE BODIES REQUIREMENT AND REQUIRES DESIGN CHANGES.						
	SOLUTION - DEVELOP AUTOMATED ACCEPTANCE INSPECTION SYSTEM FOR5 INCH 38 AND 5 INCH 54 CALIBER PROJECTILE BODIES.						

		FUNDING ($000)				
	PRIOR	79	80	81	82	83
COMPONENT -- PROJECTILES						
(D010) TITLE - BILLET NICKING IMPROVEMENT					100	200
PROBLEM - PRESENT PRACTICE OF TORCH NICKING OF STEEL BILLETS FOR PROJECTILE FORGING PRODUCES A PERCENTAGE OF UNUNIFORM BREAKS THAT RESULT IN FORGING REWORK OR SCRAP.						
SOLUTION - INVESTIGATE OTHER FORMS OF NICKING SUCH AS PLASMA ARC, ELECTRON BEAM AND LASER TO IMPROVE QUALITY OF BREAKS.						
(D011) TITLE - IMPROVED SWAGING OF ROTATING BANDS					100	200
PROBLEM - WEST TIRE SETTER BANDING MACHINES ARE COMMONLY USED FOR SWAGING ROTATING BANDS TO PROJECTILE BODIES. THE COMPANY IS NO LONGER IN BUSINESS AND PARTS ARE NOT AVAILABLE FOR IPE IN BASE. NEW LAWTOMATICS AT SCRANTON AND LOUISIANA ARE NOT OPERABLE.						
SOLUTION - INVESTIGATE NEW EQUIPMENT DESIGNS TO REPLACE WEST TIRE SETTERS.						
(S021) TITLE - HOT FORMING OF P/M PROJ BODIES						350
PROBLEM - CURRENT METHODS OF FABRICATING CANNON CALIBER ROUNDS REQUIRES EXTENSIVE MACHINING TO REMOVE 60-70 PERCENT OF THE STARTING MATERIAL.						
SOLUTION - FABRICATE PROJECTILE BODIES BY UTILIZING POWDER METALLURGY (P/M) HOT FORMING INTO THE DESIRED SHAPE.						
(4189) TITLE - HIGH FRAGMENTATION STEEL PRODUCTION PROCESS		400	848	1153	241	
PROBLEM - THE CURRENT PRODUCTION PROCESS FOR MANUFACTURING HF1 PROJECTILES IS EXTREMELY EXPENSIVE. PROPRIETARY PRODUCTION PROCESSES DEVELOPED BY PRIVATE INDUSTRY ARE NOT AVAILABLE.						
SOLUTION - EXAMINE NEW AND IMPROVED PRODUCTION PROCESSES FOR REDUCTION OF STARTING MULTI-WEIGHT, MACHINING TECHNIQUES, ANNEALING FORGINGS, ONE-HIT HOT NOSING, HEAT TREATING AND FRACTURE TOUGHNESS. WILL COMPLETE A TDP FOR COMPETITIVE PROCUREMENT.						
(6634) TITLE - MFG PROCESS FOR DU CALIBER ARMOR DEFEATING PROJS	1107	542				
PROBLEM - DESIGN PRODUCTION LINES OPERATING IN A REAL ENVIRONE CHIPS.						
SOLUTION - INVESTIGATE ROLL FORMING OF MACHINED SURFACES AND CHIP RECYLING TO REDUCE SCRAP RATE.						
(6682) TITLE - SIMULATION OF AMMUNITION PRODUCTION LINES		170				
PROBLEM - MMENT + SUBJECT TO THE UNCERTAINTIES ASSOCIATED WITH MACHINE BREAKDOWNS + SCHEDULE MAINTENANCE IS VERY DIFFICULT TO PREDICT.						
SOLUTION - USE COMPUTER PROGRAM TO DEVELOP SIMULATIONS OF THE OPERATION OF MODEL LINE MODULES FOR PRODUCTION BASE MODERNIZATION + EXPANSION.						

		FUNDING ($000)				
	PRIOR	79	80	81	82	83
COMPONENT -- PROJECTILES (CONTINUED)						
(6738) TITLE - ULTRA-HIGH SPEED METAL REMOVAL, ARTILLERY SHELL		181	354			
PROBLEM - DUE TO THE LOW METAL REMOVAL RATES OF THE CURRENT CONVENTIONAL MACHINING OPERATIONS, A GREATER NUMBER OF MACHINES ARE REQUIRED TO PRODUCE ARTILLERY PROJECTILES.						
SOLUTION - TO ACHIEVE INCREASED METAL REMOVAL RATES ALSO TO REDUCE THE NUMBER OF MACHINES CURRENTLY USED TO PRODUCE PROJECTILES.						
COMPONENT -- TOOLING						
(D006) TITLE - AUTOMATED MATERIAL HANDLING						1000
PROBLEM - MATERIAL HANDLING IN MUNITIONS METAL PARTS PROCESSING IS A SIGNIFICANT ELEMENT OF COST.						
SOLUTION - NEW AUTOMATIC HANDLING DEVICES SUCH AS PROGRAMMABLE ROBOTS WILL BE INVESTIGATED FOR APPLICABILITY TO MUNITIONS COST REDUCTION.						
(L222) TITLE - BORESIGHTING OF SFF WHD W/IR SENSOR					200	100
PROBLEM - NO PRODUCTION PROCESS EXISTS TO BORE SIGHT STORM WARHEAD TO IR SENSOR. PRESENT HAND PROCESS REQUIRES SEVERAL HOURS AND IS UNRELIABLE.						
SOLUTION - DEVELOP EQUIPMENT TO AUTOMATE PROCESS.						
(L262) TITLE - VIPER ROCKET MOTOR FIN AND SABOT ASSY					535	130
PROBLEM - FIN AND SABOT ARE MULTI-PART COMPONENTS REQUIRING DIFFICULT HAND ASSEMBLY.						
SOLUTION - DESIGN EQUIPMENT TO PROVIDE EITHER MECHANICAL ASSIST FOR PLACEMENT OF PARTS AND RIVETING OR MECHANIZED UNITS FOR COMPLETE ASSEMBLY.						
(8013) TITLE - WELDED OVERLAY ROTATING BAND MACH F/LC MUN					300	
PROBLEM - HIGH SPEED WELDING MACHINES FOR ROTATING BANDS DO NOT EXIST FOR 20MM - 40MM PROJECTILES.						
SOLUTION - DEVELOP WELDING MACHINE.						
(9405) TITLE - P/M TOOLING F/SMALL CALIBER CASES					120	100
PROBLEM - CURRENT PUNCHES AND DIES USED FOR DRAWING CASES ARE MACHINED FROM WROUGHT BAR STOCK. THIS IS EXPENSIVE AND TIME CONSUMING.						
SOLUTION - INVESTIGATE USE OF POWDER METALLURGY TO NEAR NET DIMENSIONAL SHAPE FOR TOOLING.						

		FUNDING ($000)					
		PRIOR	79	80	81	82	83
COMPONENT -- TOOLING (CONTINUED)							
(0166)	TITLE = ANALYSIS FOR PREDICTING FAILURE OF MFG TOOLING				100	125	
	PROBLEM = THE ABILITY TO PREDICT FAILURE OF MACHINE OR COMPONENTS IS NON-EXISTANT. FAILURES ARE COSTLY AND REDUCE PRODUTION OUTPUT.						
	SOLUTION = FREQUENCY ANALYSIS WILL IDENTIFY MACHINE PARTS WHICH ARE DEFECTIVE, OVERLOADED, OR NOT OPERATING PROPERLY.						
(4322)	TITLE = DES CRIT/SYS CHAR OF ELEC CONTROL PROD FAC	185	610	515			
	PROBLEM = UNCERTAINTY OF THE EFFECT OF LONG TERM STORAGE DURING PLANT LAYAWAY ON ELECTRONIC CONTROL SYSTEMS AND THE ASSOCIATED IMPACT ON PRODUCTION BASE LEAD TIME.						
	SOLUTION = ANALIZE DATA CONCERNING DEGRADATION OF ELECTRONIC SYSTEMS DURING PERIODS OF DORMANCY AND DEVELOP CRITERIA FOR LAYAWAY PLANNING AND FUTURE SYSTEM DESIGN.						
(4332)	TITLE = IMPROVEMENTS FOR POTTING ELECTRONIC ASSEMBLY FOR GATOR			83			
	PROBLEM = CURRENT METHODS INVOLVE MANY INDIVIDUAL HAND OPERATIONS WITH LOW YIELD. FACILITY WILL BE EXPENSIVE TO PROCURE AND TO PROVE OUT CONTINUOUS PROCESS TO SATISFY PRODUCTION REQUIREMENTS.						
	SOLUTION = REDUCE PROCESSING AND HANDLING TIME BY ALTERNATE PROCESSING TECHNIQUES.						

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* CATEGORY *
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*POLLUTION ABATEMENT *
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COMPONENT -- CHEMICAL							
(1318)	TITLE = EST CHEM PROD + FILL CLOSE + LAP TECH F/8VX2 XM736			398	484		
	PROBLEM = THE QL PROCESS FOR VX BINARY MFG RESULTS IN LARGE QUANTITIES OF WASTE, AND ORGANIC PHOSPHOROUS COMPOUNDS. PRIOR PROCEDURES FOR DISPOSAL (DEEP WELL) ARE NO LONGER ACCEPTABLE. NEW TECHNIQUES ARE REQUIRED.						
	SOLUTION = ESTABLISH PROCESSES TO REDUCE WASTE BY-PRODUCTS AND PROVIDE METHODS FOR DISPOSAL OF UNAVOIDABLE WASTE MATERIAL FROM PROCESS MFG.						

		FUNDING ($000)				
	PRIOR	79	80	81	82	83

COMPONENT -- CHEMICAL (CONTINUED)

(4298) TITLE - EVALUATION OF HEXAMINE RECYCLE ON MSAAP B-LINE — 81: 455; 82: 367

PROBLEM - MAAP'S AMMONIA COLUMN (B-LINE) EFFLUENT CONTAINS HEXAMINE WHICH IS NOT READILY BIODEGRADABLE NOR CHEMICAL DECOMPOSABLE, HEXAMINE IS ALSO CARCINOGENIC USE OF WET OXIDATION IN MAAP'S NEW LWTF WOULD BE QUITE EXPENSIVE TO BUILD AND OPERATE.

SOLUTION - RECYCLE OF THE AMMONIA COLUMN EFFLUENT WOULD CONCENTRATE THE DILUTE HEXAMINE UP TO 30 PERCENT AT WHICH POINT IT CAN BE EITHER REVISED OR INCINERATED.

COMPONENT -- GENERAL

(0015) TITLE - POLLUTION ABATEMENT — 83: 2800

PROBLEM - MAJOR THRUSTS WILL CENTER IN AREAS OF SOLID WASTE DISPOSAL, MONITORING AND CONTROL INSTRUMENTATION, COMPLETING RED WATER DISPOSAL TECHNOLOGY AND WATER MANAGEMENT PROGRAMS.

SOLUTION - EACH ABOVE CITED THRUST WILL BE COVERED BY SEPARATE MMT PROJECTS UNDER DIFFERENT YEAR FUNDING.

(1354) TITLE - SLUDGE VOLUME REDUCTION AND DISPOSAL PROCESS STUDY — 79: 122; 80: 256

PROBLEM - MCA POLLUTION ABATEMENT FACILITIES UNDER CONSTRUCTION AT PINE BLUFF ARSENAL DISCHARGE INTO A SETTLING LAGOON HAVING A FIVE YEAR CAPACITY BUT NO CLEAN OUT OR SLUDGE DISPOSAL EQUIPMENT. TO EXTEND LAGOON LIFE-SPAN, SLUDGE VOLUME MUST BE MINIMIZED.

SOLUTION - PROVIDE A PROCESS FOR LAGOON SLUDGE CLEAN-OUT + DEWATERING FOR LANDFILL DISPOSAL. VOLUME WILL BE REDUCED BY PRECLARIFICATION + EQUALIZATION TO MINIMIZE CHEMICAL TREATMENT REQUIREMENTS. EVALUATE OTHER TREATMENT CHEMICALS TO REDUCE SLUDGE VOLUME.

(1355) TITLE - MANUFACTURING PLANTS TOXIC EFFLUENT/EMISSION PRETREATMENT — 79: 104; 80: 222

PROBLEM - THE POLLUTANT DISCHARGE PERMIT PROGRAM REQUIRES THE USE OF BEST AVAILABLE TECHNOLOGY FOR THE TREATMENT OF DESIGNATED TOXIC WASTES BY 1984. PINE BLUFF ARSENAL WASTE TREATMENT FACILITY DOES NOT EMPLOY BEST AVAIL. TECH. FOR THESE POLLUTANTS.

SOLUTION - IDENTIFY MANUFACTURING PLANT PROBLEM EFFLUENTS / EMISSIONS AND HAZARDOUS WASTES AND DEVELOP TREATMENT CRITERIA. UTILIZE BEST AVAILABLE TECHNOLOGY FOR TREATMENT DESIGN CRITERIA. ALSO EVALUATE NEED FOR ADDED EQUIPMENT AND OPERATION CRITERIA.

(4084) TITLE - OPACITY/MASS EMISSION CORRELATION — 79: 121; 80: 111

PROBLEM - FORGING OPERATIONS FOR LARGE CALIBER AMMUNITION PRODUCE SMOKE THAT IS REGULATED FOR BOTH OPACITY AND MASS OF THE EMISSIONS.

SOLUTION - AN INEXPENSIVE OPACITY MONITOR MAY BE USED TO ALSO MEASURE THE MASS OF THE EMISSIONS FROM A SMOKE STACK IF PROPERLY CORRELATED.

		FUNDING ($000)				
	PRIOR	79	80	81	82	83
(CONTINUED)	1180	1269				
COMPONENT ** GENERAL						
(4214) TITLE = POLLUTION ENGINEERING FOR 1983-85 REQUIREMENTS						
PROBLEM = THE FEDERAL REGULATIONS FOR ENVIRONMENTAL CONTROL ARE CHANGING AND BECOMING MORE STRINGENT FOR 1983 AND 1985.						
SOLUTION = ADOPT NEW TECHNOLOGY, ESPECIALLY IN THE AREAS OF RECYCLING AND REUSE OF WASTE MATERIAL, TO PROVIDE CONFORMANCE WITH 1983 AND 1985 REGULATIONS.				405	355	
(4226) TITLE = ON-LINE MONITORS FOR WATER POLLUTANTS						
PROBLEM = AAP'S DISCHARGE MANY MILITARY UNIQUE POLLUTANTS THAT THE SURGEON GENERAL HAS FOUND TO BE MORE TOXIC THAN EXPECTED. AMENDMENTS TO 1977 WATER POLLUTION CONTROL ACT STIPULATE THAT ALL POLLUTANTS BE MONITORED.						
SOLUTION = PROGRAM WILL RANK VARIOUS AVAILABLE INSTRUMENTS CAPABLE OF MONITORING TOXIC AND HAZARDOUS POLLUTANTS AT AAP'S, AND CONSIDER COST-BENEFIT RATIOS TO DEVELOP SIMPLE, ECONOMIC INSTRUMENTS TO MONITOR SPECIFIC POLLUTANTS.				366	385	
(4227) TITLE = DISPOSAL OF WASTE WATER TREATMENT SLUDGE						
PROBLEM = WASTEWATER TREATMENT FACILITIES OF AAP'S GENERATE LARGE VOLUMES OF SLUDGE FOR WHICH LAND FILL DISPOSAL WILL BE PROHIBITED AND WHICH WILL REQUIRE COSTLY ALTERNATE DISPOSAL METHODS.						
SOLUTION = ALTERNATE DISPOSAL TECHNIQUES WILL BE INVESTIGATED THAT WILL ELIMINATE PROPELLANT CONTAMINANTS BY PHYSICAL CHEMICAL THERMAL DESTRUCTION AND RECLAIM HEAVY METALS AND COMPOUNDS FOR REUSE IN THE MANUFACTURING PROCESS.				508	361	
(4229) TITLE = ADVANCED PINK WATER TREATMENT						
PROBLEM = CURRENT PINK WATER DISPOSAL TECHNOLOGY THROUGH CARBON ADSORPTION IS HIGH IN COST EVEN WHEN REGENERATION TECHNIQUE IS UTILIZED.						
SOLUTION = ALTERNATIVE TECHNOLOGIES ARE AVAILABLE WHICH CAN REDUCE THIS TREATMENT BY 50 PERCENT. IT IS LIKELY THAT A HYBRID SYSTEM WILL BE DEVELOPED THAT CAN BE RETOFITTED TO THE CURRENT SYSTEMS.				558	435	
(4231) TITLE = IN-PLANT REUSE OF POLLUTION ABATED WATERS						
PROBLEM = MORE STRINGENT STANDARDS FOR MILITARY UNIQUE POLLUTANTS, 1985 GOAL OF ZERO DISCHARGE, EXPENSE OF TREATING POLLUTION. CONTINUE THIS REUSE OF TREATED WATER IN OTHER PROCESSES.						
SOLUTION = THIS PROJECT CONCENTRATES EFFORT IN RECYCLING OF TREATED WASTE WATER WITH THE ULTIMATE GOAL OF COMPLYING WITH THE ZERO DISCHARGE GUIDELINE.						

		FUNDING ($000)					
		PRIOR	79	80	81	82	83
COMPONENT -- GENERAL (CONTINUED)							
(6748)	TITLE = SCAMP POLLUTION ABATEMENT	310	77				
	PROBLEM = THE POLLUTANTS PRODUCED BY SCAMP LINES HAVE BEEN INVESTIGATED UNDER PROJECT 57X4114, SUBPROJECT #2. WHEN COMPLETE, IN FY77, A RECOMMENDED ABATEMENT SYSTEM WILL RESULT. THIS SYSTEM MUST BE TESTED.						
	SOLUTION = CONSTRUCT A PROTOTYPE POLLUTION CONTROL SYSTEM ON A SINGLE SCAMP LINE.						
COMPONENT -- PROPELLANTS/EXPLOSIVES							
(L259)	TITLE = DECONTAMINATION OF EXPLOSIVES IN SOIL AND WATER					300	
	PROBLEM = CURRENT WASTE DISPOSAL TECHNIQUES CAUSED CONTAMINATED SOIL PROBLEM AT THE PLANTS, FOR EXAMPLE LAGOONS, PONDS AND GROUND CONTAMINATION.						
	SOLUTION = SEVERAL TECHNIQUES SUCH AS SURFACTANT TREATMENT HAVE BEEN PROVEN EFFECTIVE IN BINDING TOGETHER NITROBODIES IN A COMPLETELY INSOLUABLE MASS. THIS PROJECT WILL CONTINUE WORK BEGUN UNDER R+D PROGRAM.						
(4225)	TITLE = RED WATER POLLUTION ABATEMENT SYSTEM		350	155	150		
	PROBLEM = RED WATER PRODUCED IN VOLUME FROM THE PURIFICATION OF TNT IS A POLLUTANT FOR WHICH A SATISFACTORY DISPOSAL METHOD DOES NOT EXIST.						
	SOLUTION = THE FEASIBILITY OF THE SONOCO SULFITE RECOVERY PROCESS FOR THE DISPOSAL OF RED WATER HAS BEEN DEMONSTRATED. THIS PROJECT OPTIMIZES OPERATING PARAMETERS OF CRITICAL COMPONENTS TO SUPPORT AN MCA PROJECT FOR RADFORD AAP.						
(4295)	TITLE = TERTIARY TREATMENT OF HOLSTON WASTE WATER				103	63	
	PROBLEM = FACILITY PROJECT AT HOLSTON REQUIRES TERTIARY TREATMENT TO MEET DISCHARGE STANDARDS FOR NITROBODIES. CARBON ADSORPTION OR A HYBRID TREATMENT SYSTEM IS NEEDED.						
	SOLUTION = THIS PROJECT WILL COMPLETE PILOT WORK TO ESTABLISH DESIGN CRITERIA AND OBTAIN DATA FOR THE TERTIARY TREATMENT SYSTEM.						
COMPONENT -- RECYCLE							
(4011)	TITLE = POLLUTION ABATE FOR RECYCLE OF MET=ILLUMINANTS					135	201
	PROBLEM = SCRAP PYROTECHNIC COMPOSITION IS DISPOSED BY BURNING CAUSING AIR POLLUTION, ALSO POWDERED MANESIUM IS LOST AND IT IS A CRITICAL MATERIAL IN SHORT SUPPLY.						
	SOLUTION = NAVY AT CRANE INDIANA HAS COMPLETED R+D WORK ON RECOVERING AND RECYCLING OF POWDERED MAGNESIUM. SIGNIFICANT COST SAVINGS ARE PROJECTED. THIS PROJECT WILL CONDUCT THE REQUIRED PILOT WORK TO SUPPORT FACILITY DESIGN.						

		FUNDING ($000)				
	PRIOR	79	80	81	82	83
COMPONENT -- RECYCLE (CONTINUED)						
(4033) TITLE = CAUSTIC RECOVERY FROM SODIUM NITRATE SLUDGE			153	263	126	
PROBLEM = HOLSTON IS CURRENTLY LOSING $80 FOR EACH TON OF SODIUM NITRATE BY-PRODUCT SOLD. SODIUM NITRATE IS EXTREMELY DIFFICULT TO DISPOSE OF BECAUSE OF COMPETITION FROM OTHER FERTILIERS ON THE MARKET.						
SOLUTION = CONVERT SODIUM NITRATE INTO SODIUM HYDROXIDE FOR RUSE IN SPENT ACID RECOVERY OPERATIONS AT HOLSTON. A SUBSTANTIAL COST BENEFIT RESULTS BY REDUCING AMOUNT OF NEW SODIUM HYDROXIDE SOLUTION TO BE PURCHASED.						
(4235) TITLE = SNR UNIT WATER POLLUTION ABATEMENT					401	178
PROBLEM = LARGE QUANTITY OF SODIUM NITRITE IS DISCHARGED FROM B-LINE AT HOLSTON AAP CAUSING POLLUTION PROBLEM AS WELL AS LOSING A USEFUL PRODUCT.						
SOLUTION = RECYCLE OF EFFLUENT WASTE WATER STREAMS WILL BE PROTOTYPED BY ADDING A POLISHING MIST DEMISTER, SEPARATION OF WASTE STEAMS, USE OF COOLING TOWER, AND ELIMINATION OF DISSOLVED SOLIDS BUILDUP IN RECYCLE SOLUTION.						
(4344) TITLE = EST WASTE DISPOSAL TECH FOR M687 BINARY PROJ FAC			108	424		
PROBLEM = LARGE QUANTITIES OF SOLID WASTES ARE GENERATED DURING OF MFG. THERE IS NO ACCEPTABLE DISPOSAL METHOD. DRUM STORAGE IS NOT FEASIBLE AND LANDFILL MAY REQUIRE SPECIAL PREPARATION.						
SOLUTION = DEVELOP PROCEDURES FOR DECREASING THE AMOUNT OF SOLID WASTE GENERATED, RECOVER WASTES IN THE FORM OF LIQUID HCL WHICH CAN BE USED IN THE CENTRAL LWT FACILITY AND RECYCLE STILL BOTTOMS WHICH WILL REDUCE SOLID WASTES BY 80 PERCENT.						

CATEGORY

PROPELLANTS

COMPONENT -- BALL						
(6693) TITLE = BALL PROPELLANT DETERRANT COATING-CAM RELATED	168	171				
PROBLEM = THE DETERRENT COATING STEP IN BALL PROPELLANT MANFACTURE PRODUCES A PRODUCT THAT DEMONSTRATES SIGNIFICANT BALLISTIC VARIABILTY FROM BATCH TO BATCH						
SOLUTION = ESTABLISH AND OPTIMIZE A WORKABLE QUANTITIVE MODEL FOR THE DETERRENT COATING PROCESS AND INSTALL COMPUTER AIDED PROCESS CONTROL INSTRUMENTATION WHICH WILL ELIMINATE OPERATOR INDUCED VARIABILITY.						

		FUNDING ($000)					
		PRIOR	79	80	81	82	83
COMPONENT -- BALL (CONTINUED)							
(6760)	TITLE - DRYING LOW DENSITY BALL PROPELLANT	118	101				
	PROBLEM - LOW DENSITY BALL PROPELLANT IS LOW IN WEIGHT, HIGH IN MOISTURE CONTENT AND MORE HAZARDOUS THAN CONVENTIONAL BALL PROPELLANT THUS CREATING A NUMBER OF PROBLEMS IN DRYING PROCESS.						
	SOLUTION - EVALUATE OTHER TECHNIQUES FOR DRYING LOW DENSITY BALL PROPELLANT SUCH AS RADIO FREQUENCY ENERGY AND SUPERHEATED STEAM DRYING						
COMPONENT -- BENITE							
(4210)	TITLE - DRY CUTTING OF ENERGETIC MATERIALS			497			
	PROBLEM - BENITE STRANDS ARE CUT TO REQUIRED LENGTHS USING A MILLING MACHINE WITH TWO CIRCULAR SAWS. THIS IS UNDULY COSTLY BECAUSE OF EXCESSIVE HANDLING, AND ADDITIONAL DRYING AND INSPECTION OPERATIONS.						
	SOLUTION - INITIATE HIGH PRESSURE WATER IN FORM OF A FINE JET STREAM TO CUT BENITE STRANDS. THIS WILL REDUCE THE NUMBER OF OPERATIONS, ELIMINATE BUNDLING, TYING/UNTYING OPERATIONS, AND REDRYING WILL BE MINIMIZED.						
COMPONENT -- GENERAL							
(D012)	TITLE - ADAPTIVE CONTROL OF PROP LINES					800	2000
	PROBLEM - INTERFACE PROBLEMS BETWEEN PROCESS EQUIPMENT AND CONTROL SYSTEMS IN PROP PLANTS EXIST BECAUSE THE PROCESS EQUIPMENT WAS DESIGNED WITHOUT CONSIDERATION OF CONTROL SYSTEM. THIS PROCEDURE LEAD TO MISMATCHES BETWEEN THE EQUIPMENT AND CONTROLS.						
	SOLUTION - DESIGN AND/OR SELECT PROCESS EQUIPMENT AND PROCESS CONTROLS ON A CONCURRENT AND INTEGRATED BASIS.						
(D013)	TITLE - EMERGING PROP MFG TECHNOLOGY					1145	4000
	PROBLEM - MANY PROCESSES FOR MANUFACTURE OF PROPELLANTS USE TECHNIQUES DEVELOPED DURING WORLD WAR II. SUCH PROCESSES INVOLVE COSTLY BATCH-TYPE, LABOR INTENSIVE OPERATIONS. THESE METHODS ARE EXCESSIVE ENERGY USERS AND POLLUTION CONTRIBUTORS.						
	SOLUTION - DEVELOP MORE EFFICIENT, COST EFFECTIVE PROPELLANT PRODUCTION PROCESSES UTILIZING CONTINUOUS AND AUTOMATED ADVANCED TECHNOLOGY. BENEFITS INCLUDE REDUCED LABOR, POLLUTION, AND ENERGY CONSUMPTION.						
(D016)	TITLE - APPLICATION OF NEW TECH FOR PROP MANUF					1100	2600
	PROBLEM - OFTEN AN OPERATION OR A STEP IN A PROCESS COULD BE GREATLY IMPROVED BY THE APPLICATION OF NEW TECHNOLOGY. AT PRESENT THERE IS NO WAY TO EXPLOIT THESE ON A QUICK REACTION BASIS.						
	SOLUTION - ESTABLISH A SPECIAL PROJECT JUST FOR LOW VALUE QUICK REACTION MMT'S. THIS WILL ALLOW EVALUATION OF POTENTIAL APPLICATIONS OF NEW TECHNOLOGY IN AN EXPEDITIOUS MANNER.						

		FUNDING ($000)					
		PRIOR	79	80	81	82	83
COMPONENT -- GENERAL (CONTINUED)							
(4145)	TITLE - CONTROL DRYING IN AUTO SB AND BALL PROP MFG				525	241	
	PROBLEM - OFF-LINE ANALYSIS FOR MOISTURE AND VOLATILES MAKES IT DIFFICULT TO CONTROL A CONTINUOUS DRYING OPERATION SINCE THE TIME REQUIRED FOR ANALYSIS IS LONG COMPARED TO THE RESIDENCE TIME FOR THE PROPELLANT IN A CONTINUOUS DRYER.						
	SOLUTION - USE PRODUCT TEMPERATURE AND/OR ON-LINE ANALYZERS AND FLOW METERS AS A BASIS FOR IMPROVED CONTROL OF A CONTINUOUS DRYING OPERATION AND REDUCE THE AMOUNT OF OFF-LINE ANALYSIS REQUIRED.						
(4273)	TITLE - AUTO PRODUCTION OF STICK PROPELLANT				651		
	PROBLEM - PRESENT BATCH TECHNIQUES FOR STICK PROPELLANT MFG INVOLVE MUCH HAND LABOR THEREBY RESULTING IN LIMITED PRODUCTION CAPACITY, HIGH COST, AND HAZARD EXPOSURE.						
	SOLUTION - INSTALL AND EVALUATE PROTOTYPE EQUIPMENT TO AUTOMATICALLY PRODUCE RACKED SOLVENT-TYPE STICK PROPELLANT, WHICH WILL BE CUT BY FLUID JET CUTTER. THIS PROCESS WILL OPERATE WITH EXISTING 12 INCH PRESS AND PRESS BAY.						
(4274)	TITLE - RECOV + REGEN OF PROP MFG SOLVENTS BY AUTO CONTROL			253			
	PROBLEM - ACTIVATED CHARCOAL SOLVENT RECOVERY SYSTEMS OPERATE ON TIMED CYCLE OPEN LOOP CONTROLLED BASIS. CYCLES ESTABLISHED BY CALCULATIONS. SOLVENT CONTENT OF AIR PASSED THRU BEDS VARIES WIDELY. RESULTS IN INEFFICIENT SOLVENT RECOVERY UNNECESSARY ENERGY USAGE						
	SOLUTION - USE SOLVENT DETECTION INSTRUMENTATION TO DETERMINE IF CHARCOAL IS SATURATED IN ADSORPTION CYCLE OR IS SOLVENT FREE DURING REGENERATION CYCLE. THIS WOULD RESULT IN MOST EFFICIENT SOLVENT RECOVERY SYSTEM.						
COMPONENT -- MULTI BASE							
(4462)	TITLE - MODERNIZED FAD FOR MULTI-BASE PROPELLANTS	755	528	850			
	PROBLEM - FORCED AIR DRYING PROCESS AND FACILITIES MUST BE MODIFIED TO REDUCE THE POLLUTION EMISSIONS AND AT THE SAME TIME RECOVER VALUABLE PROPELLANT MATERIAL.						
	SOLUTION - DEVELOP RECOVERY EQUIPMENT TO REDUCE POLLUTION EMISSIONS AND PROVIDE MORE EFFICIENT HEATING PLATE COILS COUPLED WITH LOWER AIR VELOCITIES.						

		FUNDING ($000)					
		PRIOR	79	80	81	82	83
COMPONENT -- NITROCELLULOSE							
(4341)	TITLE - IMPROVED NITROCELLULOSE PURIFICATION	694	742	583	720		
	PROBLEM - EXISTING NITROCELLULOSE PURIFICATION FACILITIES WERE BUILT IN EARLY 1940'S AND ARE IN DETERIORATED CONDITION. THE PROCESS USED DATES BACK TO WW1 AND CONSUMES LARGE QUANTITIES OF ENERGY AND WATER.						
	SOLUTION - SELECT AND DEVELOP A NITROCELLULOSE PURIFICATION PROCESS TO BE USED IN THE MODERNIZATION PROGRAM WHICH IS MORE ENERGY AND WATER EFFICIENT. THE METHOD SELECTED IS BASED ON THE SWISS CONICELL PROCESS AS A RESULT OF THE FY77 EFFORT.						
COMPONENT -- NITROGUANIDINE							
(4059)	TITLE - NQ CRYSTALLIZATION FOR CONTINUOUS PROP LINES		250		838	584	
	PROBLEM - NITROGUANIDINE PRODUCED ON THE NEW LINE AT SUNFLOWER AAP IS EXPECTED TO HAVE A DIFFERENT PARTICLE SIZE DISTRIBUTION THAN THAT OF PREVIOUS SUPPLIER. THIS MAY CREATE PROCESSING PROBLEMS IN THE NEW CONTINUOUS AUTOMATED MULTI-BASE LINE (CAMBL) PROCESS.						
	SOLUTION - THIS PROJECT IS TO QUALIFY THE NITROGUANIDINE PRODUCED AT SUNFLOWER AAP ON THE CAMBL PROCESS AT RADFORD AAP AND DETERMINE IF THERE WILL BE ANY SERIOUS PROCESSING PROBLEMS.						
(4061)	TITLE - NITROGUANIDINE PROCESS OPTIMIZATION			260	890	1370	868
	PROBLEM - A NITROGUANIDINE FACILITY IS UNDER CONSTRUCTION AT SAAP AND IS TO BE OPERATIONAL IN FY80. IT UTILIZES PROCESSES NOT PREVIOUSLY USED COMMERCIALLY AND IT CONTAINS MANY RECIRCULATION AND SUPPORT LOOPS, THE OPERATION OF WHICH ARE STRONGLY INTERDEPENDENT.						
	SOLUTION - CONDUCT PROCESS IMPROVEMENT PROCEDURES USING NITROGUANIDINE SUPPORT EQUIPMENT (NSE) INSTALLED UNDER PROJECT 5752632, AND APPLY EVOLUTIONARY OPERATION (EVOP) TO THE NITROGUANIDINE FACILITY BEING CONSTRUCTED AT SUNFLOWER APP.						
COMPONENT -- SINGLE BASE							
(L289)	TITLE - MOISTURE + ALCOHOL CONTROL IN AUTO SB PROP MANUF					185	
	PROBLEM - THERE IS NO ACCURATE METHOD OF QUICKLY AND ACCURATELY DETERMINING THE ALCOHOL AND WATER CONTENT IN THE NITROCELLULOSE BEING FED INTO THE COMPOUNDER FROM THE THERMAL DEHY TO INSURE PROPER COMPOUNDING IN AUTOMATED SINGLE BASE PROP LINES.						
	SOLUTION - EVALUATE TECHNIQUES SUCH AS AUTO SPECTROSCOPY AND GAS CHROMATOGRAPHY TO DEVELOP A QUICK AND ACCURATE MEANS TO DETERMINE THE ALCOHOL AND WATER CONTENT OF NITROCELLULOSE PRIOR TO BEING FED INTO THE COMPOUNDER.						

		FUNDING ($000)					
		PRIOR	79	80	81	82	83
COMPONENT -- SINGLE BASE (CONTINUED)							
(4027)	TITLE - SOLVENT RECOVERY/DRYING OF SINGLE BASE PROPELLANTS			307	358		
	PROBLEM - PRESENTLY SOLVENT RECOVERY, WATER DRY, AND AIR DRY OPERATIONS ARE ACCOMPLISHED IN 3 SEPARATE TANKS, ONE TANK IS USED FOR EACH OPERATION. THESE OPERATIONS ARE BOTH LABOR AND ENERGY INTENSIVE AND GENERALLY INEFFICIENT.						
	SOLUTION - COMBINE THE 3 SEPARATE OPERATIONS INTO ONE COMBINED OPERATION TO TAKE PLACE IN ONE MODIFIED SOLVENT RECOVERY TANK. THIS APPROACH WILL RESULT IN A SIGNIFICANT SAVINGS IN BOTH LABOR AND ENERGY.						
(4474)	TITLE - DEHUMIDIFIED AIR FOR DRYING SINGLE BASE PROPELLANT		175				
	PROBLEM - HUMID AIR REQUIRES MORE ENERGY TO DRY SINGLE BASE PROPELLANT.						
	SOLUTION - USE DEHUMIDIFIED AIR-SAVE ENERGY.						
COMPONENT -- SOLVENTLESS							
(4044)	TITLE - FINAL ROLL MILL FOR SOLVENTLESS PROPELLANT					639	
	PROBLEM - CURRENT METHOD FOR MANUFACTURE OF SOLVENTLESS DOUBLE BASE PROPELLANT CARPETROLLS IS LABOR INTENSIVE, SLOW AND EXPOSES OPERATING PERSONNEL TO POTENTIALLY HAZARDOUS MANUAL OPERATIONS.						
	SOLUTION - MODIFY ROLL MILL (DEVELOPED FOR MORTAR PROPELLANT) TO PRODUCE SOLVENTLESS, DOUBLE BASE PROPELLANT CARPET ROLLS. DIRECT BENEFITS INCLUDE REDUCED COST AND IMPROVED SAFETY.						

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* CATEGORY *
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*QUALITY CONTROL/TESTING *
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COMPONENT -- BALLISTIC TESTING							
(4139)	TITLE - APPL OF RADAR TO BALL ACC TEST OF AMMO (ARBAT)	4917	245				
	PROBLEM - PRESENT RADARS IN USE AT THE PROVING GROUNDS HAVE LIMITED CAPABILITY, ARE ADAPTATIONS OF TACTICAL SYSTEM AND LACK REAL TIME DATA PROCESSING CAPABILITY.						
	SOLUTION - DEVELOP A RADAR BASED INSTRUMENTATION SYSTEM FOR USE AT THE PROVING GROUNDS FOR THE IMPROVED BALLISTIC ACCEPTANCE TESTING OF AMMO, REDUCING PERSONNEL AND PROVIDING LONG RANGE PROJ TRACKING CAPABILITY AND IMPROVED DATA REDUCTION.						

		FUNDING ($000)					
		PRIOR	79	80	81	82	83
COMPONENT -- INSPECTION							
(P509)	TITLE - CONICAL SURFACE INSPECTION					235	130
	PROBLEM - NO SATISFACTORY AUTOMATED INSPECTION EQUIPMENT IS KNOWN TO ACCOMPLISH THE VARIOUS CONICAL SURFACE INSPECTIONS FOR CONVENTIONAL AND ADVANCED SHAPED CHARGE LINERS.						
	SOLUTION - PROVIDE AN AUTOMATED INSPECTION SYSTEM COMPATIBLE WITH PROPOSED CONVENTIONAL AND SHAPED CHARGE TECHNOLOGY PROGRAMS, SPECIFICALLY FOR CONICAL SURFACE MEASUREMENTS.						
(4360)	TITLE - HIGH SPEED DIMENSIONAL INSP OF FUZE COMP				285	200	
	PROBLEM - FUZE PRECISION PLATES ARE INSPECTED BY SAMPLING AND MANUAL METHODS.						
	SOLUTION - PROVIDE 100 PERCENT HIGH SPEED AUTOMATED INSP. PRODUCTION TRENDS CAN BE RECORDED FOR PROCESS CONTROL.						
(6553)	TITLE - ACOUSTICAL INSPECTION SYSTEM		95				
	PROBLEM - PREVIOUS PRODUCTION LINE TESTS WERE OF DEFICIENCIES AND THE SYSTEM COULD NOT BE APPROVED FOR FINAL ACCEPTANCE.						
	SOLUTION - REDO THE PRODUCTION LINE TEST BY CORRECTING THE PREVIOUS DEFICIENCIES AND DEVELOP USEFUL DATA WITH WHICH TO MAKE A FINAL EVALUATION OF THE ACOUSTIC INSP SYSTEM.						
COMPONENT -- NON-DESTRUCTIVE TESTING							
(L251)	TITLE - OFF-LINE MOISTURE TEST FOR DETONATORS					175	350
	PROBLEM - PRESENT METHOD IS LABOR INTENSIVE, TOO MANY BAD DETONATORS ARE PRODUCED PRIOR TO DISCOVERING PROBLEMS. TEST REQUIRES STORAGE OF LARGE QUANTITIES OF DETONATORS.						
	SOLUTION - DEVELOP PROTOTYPE HELIUM LEAK DETECTOR SYSTEM WHICH WILL REDUCE TIME FOR TEST. QUICKER TURNOVER WILL REDUCE STORAGE REQUIREMENTS.						
(P506)	TITLE - NON-DESTRUCT LEAK TEST FOR FUZE					200	230
	PROBLEM - LEAK TESTING OF FUZES HAS BEEN LIMITED TO DESTRUCTIVE, TIME CONSUMING WATERPROOFNESS TESTS NECESSITATING SMALL SAMPLE SIZES. NON-STANDARD GAS OR AIR LEAK TESTS ALSO USED PROVIDE NON-UNIFORM AND NEBULOUS RESULTS.						
	SOLUTION - A STANDARDIZED NON-DESTRUCTIVE AIR LEAK TEST IS REQUIRED ON METAL CONTAINERS FOR ARTILLERY AND ROCKET FUZES. SELECTION OF A STANDARD TEST FOR FUZES WILL REQUIRE ANALYSIS DUE TO VARIED FUZES.						
(4046)	TITLE - AUTO METH TO PERFORM QUAN ANA OF BLENDED EXPL SAMP		307				
	PROBLEM - PRESENT ANALYSIS TAKES TOO LONG. TOO MUCH POWDER IS STORED DURING TESTING.						
	SOLUTION - DEVELOP FASTER ANALYSIS. REDUCE STORAGE BY REDUCING TESTING TIME.						

		FUNDING ($000)					
		PRIOR	79	80	81	82	83
COMPONENT -- NON-DESTRUCTIVE TESTING (CONTINUED)							
(4131)	TITLE - SHELL HOLOGRAPHIC INSPECTION AND EXAMINATION LINE DEVICE			556	544	163	
	PROBLEM - THERE IS NO COMPLETE AUTOMATIC NONDISTRUCTIVE INSPECTION SYSTEM FOR TESTING SHELLS AT 100 PERCENT PRODUCTION RATE.						
	SOLUTION - DEVELOP A PRODUCTION PROTOTYPE HOLOGRAPHIC SYSTEM TO AUTOMATICALLY INSPECT ENTIRE 155MM M483A1 HPT PROJECTILES.						
COMPONENT -- X-RAY							
(4454)	TITLE - AUTOMATIC INSPECTION DEVICE EXPLOSIVE CAST IN SHELL	1348	628	1298	1784	284	
	PROBLEM - THE PRESENT METHOD OF INSPECTION LOADED PROJECTILE UTILIZES A STANDARD RADIOGRAPHIC FLM METHOD. LABOR AND MATERIAL (FILM) ARE COSTLY. DETERMINATION OF CRITICAL DEFECT IS SUBJECT TO HUMAN JUDGEMENT, FATIGUE, AND ERROR.						
	SOLUTION - DEVELOP PROTOTYPE SYSTEM USING A MINI-COMPUTER TO ANALYZE X-RAY IMAGES TO AUTOMATICALLY ACCEPT OR REJECT GROUPS OF HE FILLED PROJECTILES. DEVELOP A PROTOTYPE FILMLESS REAL-TIME AUTOMATED INSPECTION SYSTEM.						

CATEGORY

SAFETY

COMPONENT -- GENERAL							
(4071)	TITLE - EXPLOS PREVENTION IN DRY DUST COLLECTION SYSTEMS			252	275		
	PROBLEM - POTENTIALLY HAZARDOUS CONDITIONS EXIST IN DRY DUST COLLECTION SYSTEMS THROUGHOUT THE MUNITIONS PRODUCTION BASE. PRESENT DATA ON DETONATION CHARACTERISTICS OF EXPLOSIVE, PROPELLANT OR PYROTECHNIC DUST ARE INCOMPLETE/INADEQUATE TO IMPROVE SAFETY.						
	SOLUTION - DEVELOP DATA TO ESTABLISH SAFE OPERATING PARAMETERS FOR DUST COLLECTION SYSTEMS. UTILIZE THESE DATA TO DEVELOP FAIL-SAFE COLLECTION SYSTEM DESIGNS WHICH PREVENT DUST EXPLOSIONS BY EMPLOYMENT OF PROPER VENTING, LIMITING IGNITION ENERGY, ETC.						
(4291)	TITLE - BLAST EFFECTS IN THE MUNITIONS PLANT ENVIRONMENT	1050	235	404			
	PROBLEM - MOST OF THE DESIGN EFFORT IS IN THE AREA OF LACE REINFORCED STRUCTURES FOR CLOSED IN AREAS TO AN EXPLOSION. WE MUST ATTEMPT TO UTILIZE COM CONSTRUCTION MATERIAL.						
	SOLUTION - TO STUDY CHARACTERISTICS OF THE BLAST ENVIRONMENT AND DETERMINE THE RESPONSE OF THE VARIOUS STRUCTURAL MATERIALS AND ELEMENTS SUBJECTED TO THESE LOADING.						

		FUNDING ($000)					
		PRIOR	79	80	81	82	83
COMPONENT -- LAP							
(T600)	TITLE - IMPROVED SAFETY OF SCALE WEIGHING EQUIPMENT						100
	PROBLEM - ELECTRONIC CONTROLS FOR WEIGHING SYSTEMS DO NOT MEET THE NATIONAL ELECTRICAL CODE STANDARDS AND OPERATE PRESENTLY UNDER EXCEPTIONS TO THE CODE.						
	SOLUTION - SCALE TRANSDUCERS WILL BE STUDIED AND SPECIFICATIONS OF THE VARIOUS COMPONENTS WILL BE REVIEWED. COMMERICALLY AVAILABLE COMPONENTS WILL BE CONFIGURED TO ACHIEVE AN INTRINSICALLY SAFE TRANSDUCER.						
(1902)	TITLE - MFG METHODS OF GEL FUEL FOR FAE BOMBS BLU-95/B AND BLU-96/B			305			
	PROBLEM - A PROCESS TO PRODUCE LARGE QUANTITIES OF THIXOTROPIC FUEL CONTAINING PROPYLENE OXIDE DOES NOT EXIST. THE FUEL, DUE TO ITS FLAMMABLE AND THIXOTROPIC PROPERTIES, PRESENTS MAJOR PROBLEMS IN THE AREAS OF MIXING, STORAGE, PUMPING, AND LOADING.						
	SOLUTION - DETERMINE PROCESS AND MANUFACTURING TECHNIQUES SUITABLE FOR MASS PRODUCING, TRANSPORTING, AND LOADING THIXOTROPIC GEL CONTAINING PROPYLENE OXIDE FUEL AND EVALUATE AVAILABLE PROCESSING EQUIPMENT.						
(4287)	TITLE - DEV OF DETONATION TRAPS FOR IMPROVED SAFETY					450	
	PROBLEM - NO EFFECTIVE MEANS EXIST TO PREVENT DETONATION PROPAGATION THROUGH PIPELINES TRANSPORTING MOLTEN EXPLOSIVES, FLUIDIZED PROPELLANTS, EXPLOSIVE SLURRIES, EMULSIONS, ETC.						
	SOLUTION - DEVELOP A DETONATION TRAP FOR INSTALLATION IN PIPELINES TRANSPORTING EXPLOSIVE MATERIALS, UTILIZE DATA DEVELOPED EARLIER FOR SUB-SCALE TRAPS TO DESIGN AND ESTABLISH RELIABILITY OF PRODUCTION-SCALE TRAPS WITH IMPROVED SENSING AND FIRING CIRCUITRY.						
COMPONENT -- PROPELLANTS/EXPLOSIVES							
(1600)	TITLE - SAFETY CONVEYORS IN AAP'S					50	
	PROBLEM - PREVENT PROPAGATION BETWEEN AMMUNITION ITEMS AND IN-PROCESS MATERIALS ON CONVEYORS.						
	SOLUTION - PROPAGATION BETWEEN AMMUNITION ITEMS AND IN-PROCESS MATERIALS MAY BE PREVENTED THROUGH THE USE OF CERAMIC TYPE CURTAINS.						
(4285)	TITLE - TNT EQUIV TESTING FOR SAFETY ENGINEERING	1186	420	408	420	236	
	PROBLEM - PRESENT CRITERIA FOR BLAST RESISTANT STRUCTURES IS IN TERMS OF SURFACE BURST OF HEMISPHERICAL TNT. IN STRUCTURAL DESIGN, TO PROTECT FROM THE OUTPUT OF OTHER ENEGETICS, THE DESIGNERS MUST HAVE DATA PERTINENT TO THE MATERIAL IN QUESTION.						
	SOLUTION - BY TESTING TO GENERATE PEAK PRESSURE AND POS IMPULSE DATA FROM BLAST MEASUREMENTS OF HIGH ENERGY MATERIALS IS GENERATED. THESE RESULTS ARE COMPARED WITH THE BLAST OUTPUT OF HEMISPHERICAL TNT TO DETERMINE THE TNT EQUIVALENCY OF THE MATERIAL.						

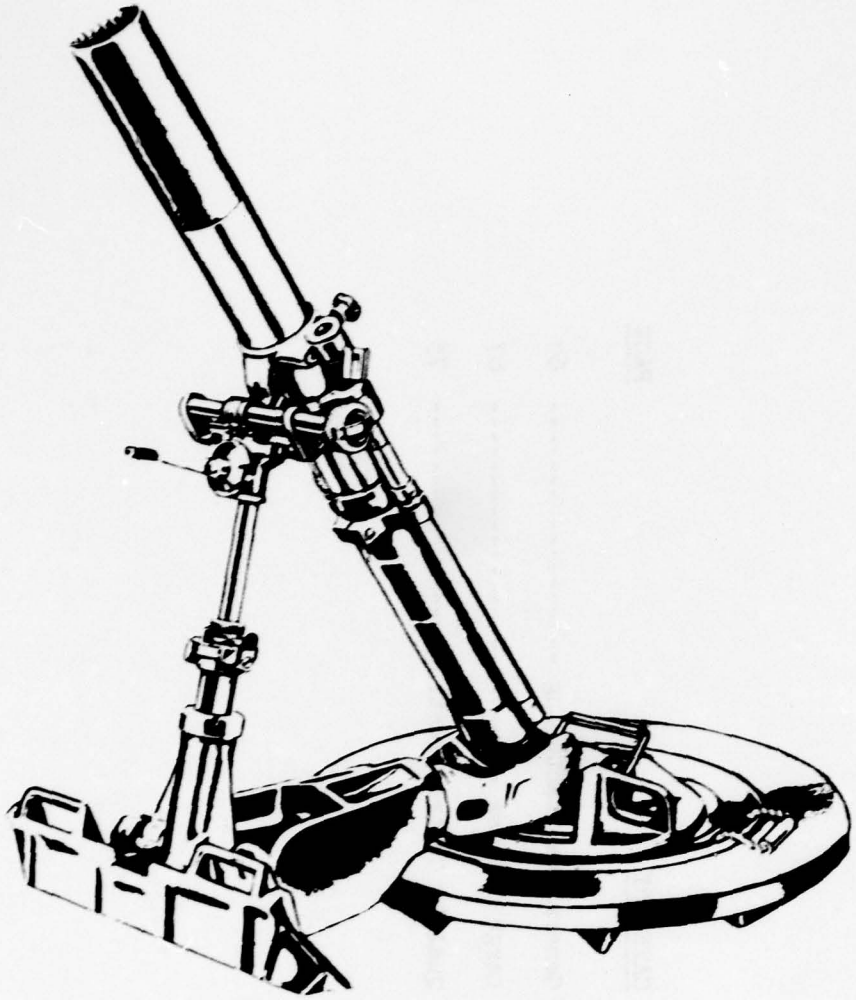
		FUNDING ($000)					
		PRIOR	79	80	81	82	83
COMPONENT -- PROPELLANTS/EXPLOSIVES (CONTINUED)							
(4288)	TITLE = EXPLOSIVE SAFE SEPARATION AND SENSITIVITY CRITERIA	2153	643	767	687		
	PROBLEM = DATA IS REQUIRED TO UPGRADE PROCESSES AND MATERIAL FOR THE MAXIMUM SAFETY OF PERSONNEL AND EQUIPMENT AGAINST EXPLOSION PROPOGATION.						
	SOLUTION = TESTS WILL BE DESIGNED AND CONDUCTED FOR EXPLOSIVES AND END ITEMS TO DETERMINE THE SAFE SEPARATION DISTANCE AND THE EXPLOSIVE DEPTH ON CONVEYORS.						

CATEGORY

SMALL ARMS

COMPONENT -- GENERAL							
(3410)	TITLE = TRACER BULLET JACKET IMPR MFG PROCESS					185	100
	PROBLEM = TRACER AMMO IS MORE SENSITIVE TO BULLET JACKET DRAW QUALITY THAN STANDARD CARTRIDGE. GILDING METAL CLAD STEEL JACKET DRAW PROCESS REQUIRES IMPROVED TOOL CONTROL, EQUIPMENT AND INCREASED PROCESS SURVEILANCE.						
	SOLUTION = EVALUATE DRAW PROCESS TO DETERMINE CRITICAL PROCESS PARAMETERS THAT CONTROL JACKET QUALITY. ENDEAVOR TO ESTABLISH IMPROVED TOOL DESIGN.						
(3413)	TITLE = COMPUTER/GROUP TECHNOLOGY FOR SMALL CAL AMMO					220	180
	PROBLEM = PRESENTLY THERE IS NO METHOD TO OPTIMIZE DESIGN OF TOOLING AND TO SELECT PROPER EQUIPMENT FOR SMALL CALIBER AMMO.						
	SOLUTION = INVESTIGATE POSSIBLE USE OF COMPUTER FOR OPTIMUM TOOL AND EQUIPMENT DESIGN, AND TO PREDICT PROCESS PARAMETERS AND COSTS.						
(3414)	TITLE = EXTRUDER TRACER ELEMENT F/SMALL CAL MUN					430	686
	PROBLEM = CURRENT LOADING AND CONSOLIDATION OF SEPARATE INCREMENTS OF TRACER COMPOSITIONS IN BULK USES ANTIQUATED METERING AND CHARGING MACHINES.						
	SOLUTION = INVESTIGATE USE OF TRACER CORED THIN LEAD WIRE. TRACER BULLETS WOULD BE MANUFACTURED FROM WIRE CUT INTO SLUGS AND INPUTTED INTO CONVENTIONAL BALL BULLET MACHINERY.						
(6774)	TITLE = MFG METHODS FOR APDS PROJ (25MM) FVS	300	895				
	PROBLEM = MASS PRODUCTION METHODS FOR THE FABRICATION OF MAJOR PROJECTILE COMPONENTS PARTICULARLY SABOT PRESENT PROCESS VARIABLES WHICH ARE DIFFICULT TO CONTROL TO OBTAIN CONSISTENT QUALITY.						
	SOLUTION = DEVELOP TECHNIQUES FOR INJECTION MOLDING THE PLASTIC COMPONENTS AROUND THE PENETRATOR ALSO DEVELOP AUTOMATED MECHANISMS TO DEMONSTRATE MAXIMUM MANUFACTURING RATES.						

		FUNDING ($000)				
		PRIOR	79	80	81	82	83
COMPONENT -- 5.56MM & .30 CAL							
(8407)	TITLE - 7.62MM BULLET MFG BY ROLL FORMING						195
	PROBLEM - METHOD TO MANUFACTURE 7.62 UTILIZES SAME PROCESS AS 5.56. IT IS UNCERTAIN WHETHER IT WILL WORK ON 7.62.						
	SOLUTION - INVESTIGATE OTHER METHODS OF PRODUCING 7.62 BULLET ROLL FORMING APPEARS VERY PROMISING.						
(8411)	TITLE - PROCESS F/20MM TUBULAR PROJ F/AIR DEFENSE						686
	PROBLEM - HIGH VOLUME PRODUCTION PROCESS DOES NOT EXIST FOR METAL PARTS, LOAD ASSEMBLE AND PACK.						
	SOLUTION - DEVELOP PRODUCTION PROCESS.						
(4150)	TITLE - NEW MFG PROCESSES FOR SMALL CAL PENETRATORS	376	469	198			
	PROBLEM - MANUFACTURE OF PENETRATORS INTO BALL BULLETS IS VERY COSTLY.						
	SOLUTION - INVESTIGATE SKEWED AXIS ROLL FORMING OF PENETRATOR AS WELL AS HYBRID SLUGS MANUFACTURING AND FEEDING METHODS. COLD HEADING WILL ALSO BE EVALUATED.						
(4177)	TITLE - NEW METH OF 5M CAL TRACER CHARGE					850	530
	PROBLEM - CURRENT FACILITIES AT LCAAP ARE 1942 VINTAGE CRANK TYPE CHARGING MACHINES AND ARE LABOR INTENSIVE.						
	SOLUTION - DEVELOP MODERNIZED TRACER CHARGING EQUIPMENT TO MEET REQUIREMENTS OF BULLET SUBMODULES AND TO IMPROVE PRODUCT UNIFORMITY AND INCREASED PERFORMANCE.						



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ARMAMENT R&D COMMAND

ARMAMENT MATERIEL READINESS COMMAND

(ARRADCOM, ARRCOM)

(WEAPONS)

WEAPONS PROGRAM

The US Army Armament Materiel Readiness Command (ARRCOM), headquartered at Rock Island, IL, has responsibility for MMT projects on weapons in full scale production. ARRADCOM is responsible for MMT projects for weapons in development or initial production. Projects for large caliber weapons (larger than 60mm) are performed through Watervliet Arsenal (WVT) and those for small caliber weapons (less than 40mm) through Rock Island Arsenal (RIA). The main emphasis of the weapons MMT program is the modernization and upgrading of operations through the REARM program. The purpose is to reduce costs and improve product quality by taking advantage of the advances in metalworking technology.

Many of the projects planned for FY79-83 at Watervliet Arsenal are related, in whole or in part, to the handling and fixturing of cannon tubes and their components. Since most items produced at Watervliet are complex and/or require close tolerances, the setup and movement time are important cost drivers. While it is not economically or practically feasible to develop an integrated material handling system for the Arsenal, extensive savings can be realized through improvement of present methods. Projects (8104 and 8240) to upgrade procedures and equipment for the manufacture of breech rings and blocks are prime examples of this attempt.

Another major cost driver at WVT is the machining of items to final shape. Since the alloys used in weapons are expensive and difficult to work, producing components close to final shape will reduce the cost and time required for finishing. Methods being explored include hot isostatic pressing (HIP) (7926), powder metallurgy (PM) (8102), squeeze casting (8116) and hydrostatic extrusion (7162). Projects are also proposed to improve the metal removal process. High speed metal removal is addressed in three projects (8024, 8103, and 8106), and three projects are included to perform multiple operations at one time (8105, 7925, and 8342). Some of the other areas in the Watervliet submission include group technology (7724), computer-aided manufacturing (8118, and 7928), and finding substitutes for critical materials (7920).

Cost reductions and productivity increases in manufacturing continue to be the prime objectives of MMT at Rock Island Arsenal. Because RIA is a job-shop organization, administration and planning overhead is a significant cost driver. By developing an integrated computer-aided manufacturing/management information system the Arsenal will be able to efficiently control all operations from receipt of an order to delivery of the product. Some of the management areas addressed include production scheduling (8131), process modeling (8130), group technology (7949), collection of shop floor data (8034), performance measurement (8132) and a computer-aided work measurement system (8226). Cost

benefits are also expected from improved material handling and in-process control projects which are tied into the overall CAM/MIS effort at RIA. Efforts in this area include robot loading of machines (8227), automated process control (7707) and adaptive control of NC machines (8204).

Since RIA's task is primarily metalworking, there are several projects included in this area. While all efforts will in themselves reduce costs, coupling with the Arsenal's overall CAM/MIS will further increase the benefits. Some of the areas covered include casting (8231 and 7605), forging (7615), welding (8304), cutting fluids (7948 and 8124), coatings (8134), high-speed abrasive machining (8206), and electro-chemical grinding (8225).

The minimization of energy consumption and pollution during manufacturing is a national priority and an important part of RIA's MMT submission. Areas being studied include heat recovery (7945), non-polluting manufacturing processes (8017), recovery of plating effulents (8229), and improvement of air and water quality (8126, 8217, and 8230). As anti-pollution requirements become more stringent, it is necessary for manufacturers to improve their environmental posture while maintaining a competitive position or face close down by economic or legal factors. Rock Island Arsenal's MMT submission will correct present environmental difficulties and help prevent future ones so that the Arsenal's vital defense role will not be jeopardized.

Improved metalworking methods and increased use of computer-aided manufacturing are major production trends and the results of the projects in this submission are expected to hold significant interest for other producers, both Government and non-government. These projects will also be of importance in the modernization and upgrading of the facilities of weapons contractors, many of which are seriously outdated.

ARRCOM

COMMAND FUNDING SUMMARY
(THOUSANDS)

CATEGORY	FY79	FY80	FY81	FY82	FY83
GENERAL MANUFACTURING	651	912	2147	3135	2954
LARGE CALIBER	1709	3815	3767	4057	6045
QUALITY CONTROL/TESTING	0	0	80	800	550
TOTAL	2360	4727	5994	7992	9549

CATEGORY	MMT FIVE YEAR PLAN RCS DRCMT 126	FUNDING ($000)					
GENERAL MANUFACTURING		PRIOR	79	80	81	82	83

COMPONENT -- EQUIPMENT

(7615) TITLE - AUTOMATED FORGING OF WEAPON COMPONENTS (CAM RELATED) 561

PROBLEM - PRESENT FORGING METHODS ARE COMPARATIVELY SLOW AND COSTLY DUE TO CONVENTIONAL EQUIPMENT SPEED LIMITATIONS AND DEPENDENCY ON THE SKILL AND SPEED LEVELS OF THE OPERATOR. WORKING CONDITIONS AROUND DROP HAMMERS ARE HOT, DIRTY AND NOISY.

SOLUTION - ESTABLISH A HIGH SPEED AUTOMATED FORGING CENTER INCLUDING A PROGRAMABLE FORGING HAMMER, ELECTRIC BILLET-HEATING SYSTEM, PROGRAMABLE ROBOT MATERIAL HANDLING DEVICE, RELATED CONVEYORS AND OPERATION PARAMETERS.

(7802) TITLE - ESTABLISH MACHINE TOOL PERFORMANCE SPECIFICATIONS 195 209

PROBLEM - PERFORMANCE CAPABILITY OF PRODUCTION MACHINE TOOLS IS NOT KNOWN.

SOLUTION - ESTABLISH REALISTIC TEST CRITERIA.

(8227) TITLE - ROBOT LOADING OF NC MACHINES 220

PROBLEM - ALTHOUGH MODERN NUMERICALLY CONTROLLED MACHINES CAN MACHINE MANY PARTS WITH VIRTUALLY NO OPERATOR ATTENTION, OPERATORS ARE STILL REQUIRED TO LOAD AND UNLOAD THE MACHINES.

SOLUTION - DESIGN FIXTURES AND BANKS OF MACHINES THAT CAN BE LOADED AND UNLOADED BY A PROGRAMMABLE ROBOT FOR JOB SHOP OPERATION DESIGN THE SYSTEM SO ONE ROBOT CAN LOAD SEVERAL MACHINES WHICH ARE MACHINING DIFFERENT PARTS.

(8304) TITLE - APPLICATION OF NC WELDING (CAM) 200

PROBLEM - ALTHOUGH RIA IS A JOB SHOP, MANY MANUFACTURED ITEMS SUCH AS THE M140 GUN MOUNT, M45 RECOIL MECHANISMS, ETC., HAVE PRODUCTION LIFE SPANS OF MANY YEARS. FOR THOSE ITEMS, NC WELDING WILL PROVE MORE ECONOMICAL AND PROVIDE BETTER QUALITY.

SOLUTION - APPLY NC WELDING TO LONG RUN PRODUCTION PARTS. ON APPLICABLE ITEMS, NC WELDING WILL PROVIDE BETTER REPEATABILITY, EASIER FINAL MACHINING OF THE WELDMENT, REDUCED WELDING TIMES, AND REDUCE THE AMOUNT OF COSTLY WELDING CERTIFICATION REQUIRED.

COMPONENT -- INFORMATION SYSTEMS

(7709) TITLE - MANAGEMENT INFORMATION SYSTEM FOR NC EQUIPMENT (CAM) 343

PROBLEM - LACK OF 'MACHINE LEVEL' MANAGEMENT INFORMATION SYSTEM FOR COSTLY NC MACHINES PREVENTS FULL PRODUCTIVITY.

SOLUTION - INSTALL AND TEST A PILOT NC 'MACHINE LEVEL' MANAGEMENT INFORMATION SYSTEM AT ROCK ISLAND ARSENAL.

	FUNDING ($000)				
PRIOR	79	80	81	82	83

COMPONENT -- INFORMATION SYSTEMS (CONTINUED)

(8034) TITLE - MANUFACTURING SHOP FLOOR FEEDBACK SYSTEM (CAM) 84 296

PROBLEM - ROCK ISLAND ARSENAL'S CURRENT METHOD OF COLLECTING SHOP FLOOR DATA IS COSTLY, UNRELIABLE AND DOES NOT PROVIDE ENOUGH DATA FOR PROPER CONTROL OF PRODUCTION.

SOLUTION - DESIGN AND INSTALL A MANUFACTURING SHOP FLOOR FEEDBACK SYSTEM UTILIZING THE LATEST ADVANCEMENTS IN COMPUTER HARDWARE AND PRODUCTION MANAGEMENT CONCEPTS.

(8130) TITLE - LOWEST COST CHARGING SYSTEM FOR FOUNDRY (CAM) 115

PROBLEM - PRESENT METHODS OF DETERMINING THE CHARGE FOR PARTICULAR ALLOYS DO NOT ALLOW FOR THE MOST EFFICIENT USE OF RAW MATERIAL.

SOLUTION - DESIGN AND INSTALL A COMPUTERIZED LINEAR PROGRAMMING MODEL THAT WILL SELECT RAW MATERIALS, INCLUDING SCRAP, TO PROVIDE THE LOWEST COST CHARGE FOR THE DESIRED ALLOY.

(8131) TITLE - COMPUTER AIDED PBS PLANNING (CAM) 160

PROBLEM - MANUAL METHODS OF SELECTING EQUIPMENT REPLACEMENT CANDIDATE MACHINES CANNOT TAKE ADVANTAGE OF THE COMPUTERIZED PRODUCTION DATA COLLECTED ON EACH MACHINE.

SOLUTION - DESIGN A SET OF COMPUTER PROGRAMS THAT CAN EVALUATE PRODUCTION DATA SUCH AS PROJECTED WORKLOAD, MAINTENANCE COSTS, DOWNTIME, EFFICIENCY AGAINST STANDARD, ETC. AND IDENTIFY CANDIDATE MACHINES FOR REPLACEMENT.

(8132) TITLE - PERFORMANCE MEASUREMENT PARAMETERS FOR GOGO MFG. 150

PROBLEM - MEASURING THE PERFORMANCE OF A GOVERNMENT MANUFACTURING OPERATION IS DIFFICULT. GOGO OPERATIONS, ALTHOUGH PARTIALLY COMPETITIVE, ARE NOT IN A FULLY COMPETITIVE MARKETPLACE, ACCOUNTING DATA BE ITSELF IS NOT SUFFICIENT TO MEASURE PERFORMANCE.

SOLUTION - DEVELOP A SERIES OF MEASUREMENTS THAT COMBINE ACCOUNTING DATA AND PRODUCTION DATA TO ADEQUATELY ASSESS PERFORMANCE. INCLUDE DATA ON TECHNOLOGICAL IMPROVEMENTS, INFLATION, PRODUCT COST, ETC. MEASUREMENTS WILL BE USEFUL IN LONG RANGE PLANNING.

(8133) TITLE - INTEGRATED DATA BASE FOR MFG. SYSTEMS (CAM) 250

PROBLEM - PRESENT CAM RELATED SYSTEMS AT RIA USE SEPERATE DATA BASES MAKING INTERACTION BETWEEN SYSTEMS DIFFICULT AND COSTLY. THE ABILITY TO DESIGN NEW SYSTEMS TO USE PRESENTLY AVAILABLE DATA IS IMPAIRED.

SOLUTION - DEFINE THE HARDWARE AND SOFTWARE REQUIREMENTS FOR AN INTEGRATED DATA BASE THAT WOULD ALLOW ALL CAM SYSTMES TO OPERATE FROM A SINGLE DATA BASE. PROCURE, ADAPT AND INSTALL THE REQUIRED DATA BASE MANAGEMENT SYSTEM.

		FUNDING ($000)					
		PRIOR	79	80	81	82	83
COMPONENT -- INFORMATION SYSTEMS (CONTINUED)							
(8218)	TITLE - INTEGRATED COMPUTER AIDED MANUFACTURING (CAM)					350	350
	PROBLEM - ROCK ISLAND ARSENAL IS PERFORMING CAM RELATED PROJECTS IN MANY AREAS, E.G., MACHINE CONTROL, PRODUCTION CONTROL, PROCESS ENGINEERING, ETC. THE TASK OF BRIDGING THE GAP BETWEEN THE AREAS HAS NOT YET BEEN ADDRESSED.						
	SOLUTION - INTEGRATE THE VARIOUS AREAS OF COMPUTER AIDED MANUFACTURING. FOR INSTANCE, LINK SHOP PERFORMANCE ON MANUFACTURING OPERATIONS BACK TO THE PROCESS PLANNING OPERATION.						
(8226)	TITLE - COMPUTER AIDED WORK MEASUREMENT SYSTEM (CAM)					190	
	PROBLEM - TIME STUDIES AND USE OF STANDARD DATA PRESENTLY REQUIRE TIME CONSUMING MANUAL CALCULATIONS TO DEVELOP PRODUCTION STANDARDS.						
	SOLUTION - DEVELOP A COMPUTERIZED WORK MEASUREMENT SYSTEM THAT WILL VIRTUALLY ELIMINATE MANUAL CALCULATIONS IN THE DEVELOPMENT OF PRODUCTION STANDARDS. ROUTINES WILL INCLUDE PROGRAMS TO DEVELOP FINISHED STANDARDS FROM RAW TIME STUDIES OR STANDARD DATA.						
COMPONENT -- MISCELLANEOUS							
(7945)	TITLE - HEAT RECOVERY FROM MANUFACTURING PROCESSES						150
	PROBLEM - LARGE AMOUNTS OF ENERGY ARE WASTED IN MANUFACTURIN PROCESSES, E.G., HEAT TREATING, FORGING, SURFACE TREATMENT, AND CASTING.						
	SOLUTION - ANALYZE ENERGY CONSUMPTION RELATED TO THESE MANUFACTURING PROCESSES TO DETERMINE AREAS WHERE HEAT CAN BE ECONOMICALLY RECOVERED. DESIGN, INSTALL, AND PROVE OUT HEAT RECOVERY DEVICES WHERE ECONOMICAL.						
(8017)	TITLE - POLLUTION ABATEMENT PROGRAM	82	42	171			
	PROBLEM - MORE STRINGENT ENVIRONMENTAL REQUIREMENTS ARE BEING ESTABLISHED FOR AIR AND WASTE WATER DISCHARGE.						
	SOLUTION - NEW NON-POLLUTING MANUFACTURING PROCESSES WILL BE EVALUATED AS SUBSTITUTES FOR PRESENT AIR AND WATER POLLUTING PROCESSES IN THE AREAS OF PLATING, MACHINING AND RUBBER COMPOUNDING.						
(8030)	TITLE - MANUFACTURING GUIDE FOR ELASTOMERIC SEALS			100	85		
	PROBLEM - CONSTANT PROBLEMS IN THE PROCUREMENT OF SATISFACTORY SEALS FOR WEAPONS SYSTEMS, I.E., M140, M127, ETC., ARE EXPERIENCED WITH RESULTANT SOLE SOURCE PURCHASES.						
	SOLUTION - ELIMINATE SOLE SOURCE PROCUREMENT BY DOCUMENTING PROCESSING TECHNIQUES AND FORMULA VARIATIONS FOR A VARIETY OF MILITARY SEALS FOR PUBLICATION IN A GUIDE FOR USE BY INDUSTRY.						

		FUNDING ($000)				
		PRIOR	79	80	81	82	83
COMPONENT -- MISCELLANEOUS (CONTINUED)							
(8126)	TITLE - SEPARATION OF OILS AND CUTTING FLUIDS FROM WASTE WATER				100	100	
	PROBLEM - REMOVAL OF OILS AND CUTTING FLUIDS FROM WASTE WATER IS NECESSARY TO MEET EPA REQUIREMENTS.						
	SOLUTION - EVALUATE CHEMICAL AND MECHANICAL METHODS FOR OIL AND CUTTING FLUID REMOVAL FROM WASTE WATER.						
(8217)	TITLE - TRICHLORDETHANE EMISSION REDUCTION						
	PROBLEM - FORTY THOUSAND GALLONS OF TRICHLORDETHANE FOR VAPOR DEGREASING OPERATIONS ARE USED AT RIA EVERY YEAR. STRICTER ILLINOIS EPA REGULATIONS HAVE BEEN PROPOSED WHICH WOULD REQUIRE REDUCTIONS IN THE EMISSION OF HYDROCARBONS SUCH AS TRICHLORDETHANE.					125	
	SOLUTION - IMPLEMENT EFFECTIVE METHODS FOR REDUCING RIA'S TRICHLORDETHANE EMISSIONS TO MEET ILLINOIS EPA REGULATIONS.						
(8229)	TITLE - RECOVERY AND RECYCLING PLATING EFFLUENTS						
	PROBLEM - ENVIRONMENTAL REGULATIONS OF EFFLUENT DISCHARGE ARE BECOMING INCREASINGLY MORE SEVERE. THUS, TREATMENT OF PLATING EFFLUENT EFFECTIVELY TO MEET REGULATIONS BECOMES MANDATORY AND A COSTLY FACTOR IN PLATING SHOP OPERATIONS.					100	125
	SOLUTION - DETERMINE WHICH OF THE CURRENTLY AVAILABLE METHODS FOR RECOVERY AND RECYCLING OF PLATING EFFLUENTS CAN EFFECTIVELY BE USED IN THE RIA PLATING SHOPS TO REDUCE TREATMENT COSTS AND MEET FUTURE ENVIRONMENTAL REGULATIONS.						
COMPONENT -- PROCESSES							
(7605)	TITLE - CHEMICALLY BONDED SAND FOR CLOSE TOLERANCE CASTINGS		127	130			
	PROBLEM - PRESENT METHODS OF MOLDING AND CORE MAKING ARE COSTLY, ENERGY WASTEFUL, AND UNSUITABLE FOR HOLDING CLOSE TOLERANCES.						
	SOLUTION - INSTALL CHEMICALLY BONDED SAND CORE MAKING AND MOLDING SYSTEM AT ROCK ISLAND ARSENAL WHICH WILL REDUCE LABOR COST, ELIMINATE BAKING CORES, AND CREATE MORE RIGID MOLDS.						
(7707)	TITLE - AUTOMATED PROCESS CONTROL FOR MACHINING (CAM)		95	114			
	PROBLEM - MACHINING OPERATIONS ARE SELECTED, PARAMETERS ARE SET, AND STANDARDS ARE ESTABLISHED EMPIRICALLY WITH LITTLE OR NO ENGINEERING ANALYSES, CONTROL OR FEEDBACK.						
	SOLUTION - APPLY COMPUTERIZED CONTROLS FOR OVERALL SELECTION OF PROCESSES, OPERATIONS, PARAMETERS, FEEDBACK AND OPTIMATION, WITH AUTOMATED ESTIMATING AND DETERMINATION OF REAL TIME AND COSTS.						

		FUNDING ($000)				
		PRIOR	79	80	81	82	83
COMPONENT -- PROCESSES (CONTINUED)							
(7948)	TITLE = ESTABLISH CUTTING FLUID CONTROL SYSTEM		150	158	164		
	PROBLEM = THE LACK OF A CONTROLLED PROGRAM FOR THE USE OF CUTTING FLUIDS RESULTS IN HIGH MACHINING COSTS AND STOCKING OF MANY FLUIDS.						
	SOLUTION = ESTABLISH A PROGRAM TO CONTROL SHOP FLOOR TESTING AND DEFINE METHODS TO CONTROL USE OF CUTTING FLUIDS DURING MANUFACTURING OPERATIONS.						
(7949)	TITLE = APPLICATION OF GROUP TECHNOLOGY MANUFACTURING (CAM)		127	155	177	200	
	PROBLEM = PRESENT PLANNING, SCHEDULING, AND MANUFACTURE OF WEAPON ASSEMBLIES AND COMPONENTS ARE BY SEPARATE LOTS AND PARTS WHICH REQUIRE MULTIPLE, MACHINING OPERATIONS, SET-UPS AND CHANGES OF TOOLING, AND CAUSE LOSS OF TIME AND MONEY.						
	SOLUTION = APPLY GROUP TECHNOLOGY TO CLASSIFY, CODE AND MANUFACTURE WEAPON ASSEMBLIES AND COMPONENTS AS FAMILIES-OF-PARTS, MATCH PARTS BY CONTOUR AND SIZE FOR SIMULTANEOUS MACHINING= AND, SUB-GROUP FOR MORE EFFICIENT MACHINING AND ASSEMBLY.						
(8008)	TITLE = 'MANUAL' ADAPTIVE CONTROL (CAM)					120	
	PROBLEM = APPLICATION AND ADJUSTMENT OF MACHINING RATES AND OTHER PARAMETERS IS UNCERTAIN, SLOW AND COSTLY.						
	SOLUTION = APPLY MANUAL-COMPUTER PROGRAMS ON SHOP FLOOR TO OPTIMIZE AND CONTROL MACHINING OPERATIONS.						
(8134)	TITLE = ION VAPOR DEPOSITION OF ALUMINUM COATINGS				150	250	
	PROBLEM = CADMIUM PLATE IS USED FOR PROVIDING CORROSION RESISTANCE OF STEEL IT HAS DRAWBACKS IN THAT STEEL FASTENERS CORRODE IN COUNTERSINKS AND EMBRITTLEMENT OCCURS IN ELECTROPLATED CADMIUM ON STEEL. CADMIUM IS ALSO TOXIC AND MAY POSSIBLY BE BANNED FROM USE.						
	SOLUTION = ION VAPOR DEPOSITED ALUMINUM HAS SUPERIOR CORROSION RESISTANCE FOR STEEL WITHOUT THE DRAWBACKS OF CADMIUM PLATING. THIS ALUMINUM PROCESS WOULD ALSO ELIMINATE TOXIC CADMIUM POLLUTION.						
(8135)	TITLE = SECOND ORDER MFG. METHODS FOR WEAPON COMPONENTS				500	500	
	PROBLEM = DURING MFG. OF RECOIL CONTROL ORIFICES, ERRORS ARE INTRODUCED WHICH REQUIRE REWORK. CORRECTIVE ACTIONS INVOLVE COSTLY DETAILED INSPECTION AND REANALYSIS WITH COMPUTERIZED DESIGN PROGRAMS TO DEFINE POSSIBLE REWORK ALTERNATIVES.						
	SOLUTION = USE SURFACESENSORS/MEASUREMENT TRANSDUCERS TO DETERMINE REAL PART CONFIGURATION DURING MACHINING, AND THRU INTERACTIVE FEEDBACK WITH COMPUTERIZED DESIGN PROGRAM, SELECT A CONTINGENCY MACHINING PATH TO OPTIMIZE ORIFICE CONTROLLED PERFORMANCE CONDITION						

		FUNDING ($000)					
		PRIOR	79	80	81	82	83
COMPONENT -- PROCESSES (CONTINUED)							
(8204)	TITLE - ADAPTIVE CONTROL OF N/C MACHINE TOOLS						225
	PROBLEM - MACHINING CAPABILITIES ARE LIMITED BY INACCURACIES OF NC MACHINE TOOLS AND THE INABILITY TO HANDLE NEW WEAPON COMPONENTS OF CLOSE TOLERANCES AND COMPLEX CONTOURS. MACHINING RATES FOR CLOSE-TOLERANCE COMPONENTS ARE EXCESSIVELY SLOW.						
	SOLUTION - APPLY ADAPTIVE CONTROLS IN NC MACHINING FOR CLOSER TOLERANCES AT OPTIMIZED FASTER RATES.						
(8205)	TITLE - SURFACE PREPARATION OF METALS BY PRESSURE BLASTING					100	
	PROBLEM - METAL SURFACES ARE CLEANED FOR FINISHING BY USING CHEMICALS THAT REQUIRE POLLUTION ABATEMENT PROCEDURES.						
	SOLUTION - DEVELOP PARAMETERS FOR THE USE OF HIGH PRESSURE WATER-INERT MEDIA BLASTING METHODS TO REMOVE DRY FILM LUBRICANTS, AND TO USE FOR DERUSTING, DESCALING AND PAINT STRIPPING OPERATIONS.						
(8206)	TITLE - APPLICATION OF HIGH-RATE ABRASIVE MACHINING					75	200
	PROBLEM - CONVENTIONAL GRINDING IS SLOW AND COSTLY. LONG, MULTIPLE PASSES AND INFEEDS ARE REQUIRED TO SIZE AND FINISH WEAPON COMPONENTS.						
	SOLUTION - APPLY HIGH-SPEED ABRASIVE-BELT MACHINING.						
(8214)	TITLE - LESS CRITICAL MATERIALS FOR USE AS CUTTING FLUIDS					150	150
	PROBLEM - THE SHORTAGE OF PETROLEUM WILL BECOME MORE ACUTE AND CUTTING FLUIDS WILL BECOME MORE EXPENSIVE AND DIFFICULT TO OBTAIN.						
	SOLUTION - EVALUATE VARIOUS SYNTHETIC MATERIALS FOR USE IN MACHINING OPERATIONS IN LIEU OF THE PRESENT PETROLEUM BASE FLUIDS TO CONSERVE CRITICAL PETROLEUM MATERIALS AND STILL MEET PRODUCTION SCHEDULES.						
(8215)	TITLE - RHEOLOGICAL CONTROL OF RUBBER-PLASTIC MOLDED ITEMS					115	120
	PROBLEM - CURRENT IN-PROCESS CONTROL MEASURES FOR MIXING AND MOLDING RUBBER AND PLASTICS DO NOT ADEQUATELY CONTROL MATERIAL SCORCH OR CURE CYCLE TIMES.						
	SOLUTION - EMPLOY IN-PROCESS RHEOLOGICAL (MATERIAL FLOW) CONTROL OF NON-METALLIC MOLDING MATERIALS TO ASSURE DIMENSIONAL STABILITY AND TO ELIMINATE DEFECTS.						

FUNDING ($000)

	PRIOR	79	80	81	82	83
COMPONENT -- PROCESSES (CONTINUED)						
(8225) TITLE - ELECTROCHEMICAL GRINGING OF WEAPON COMPONENTS					100	
PROBLEM - SIZING AND FINISHING OF LARGE, LONG WEAPON COMPONENTS BY CONVENTIONAL GRINDING IS SLOW AND COSTLY, OFTEN REQUIRING MULTIPLE OPERATIONS, SET UPS, WHEEL CHANGES, AND REPETITIVE MULTIPLE PASSES. FOR EXAMPLE- PLANNING / GRINDING HOWITZER MOUNT RAIL.						
SOLUTION - RETROFIT EXISTING, SPECIAL LONG BED, HORIZONTAL, SURFACE GRINDER WITH ELECTROLYTIC SYSTEM TO PROVIDE FAST, SINGLE PASS ROUGHING FINISHING OF LARGE COMPONENTS, ELIMINATE ROUGHING BY PLANNING OR MILLING BEFORE ELECTROLYTIC GRINDING.						
(8230) TITLE - NON SOLVENT BASED PAINTING PROCESSES					150	
PROBLEM - CURRENTLY, SPRAY PAINT BOOTHS ARE USED FOR COATING METALS FOR HIDING POWER AND CORROSION RESISTANCE. THIS METHOD REQUIRES HYDROCARBON SOLVENTS AS A VEHICLE FOR THE PAINT. CONSEQUENTLY, THE SOLVENT IS DISCHARGED TO THE ATMOSPHERE.						
SOLUTION - NEW SPECIFICATIONS MUST BE PREPARED TO SPECIFY THE USE OF NON SOLVENT BASED PAINT. METHODS SUCH AS ELECTROSTATIC PAINTING WILL BE ADAPTED TO ELIMINATE HYDROCARBON SOLVENTS. THIS WILL ALSO REDUCE WATER CONSUMPTION REQUIRED FOR ENTRAPMENT OF SOLVENTS.						
(8231) TITLE - IMPROVED CASTING TECHNOLOGY (CAM)					200	250
PROBLEM - EXCESSIVE METAL MUST BE MELTED IN CASTING OPERATIONS. THE YIELD RATIO OF SOME CASTS IS TOO LOW AND THE GATES AND RISERS TOO DIFFICULT TO CUT OFF. MATERIAL PROPERTIES OFTEN VARY WITH CASTING PROCEDURES.						
SOLUTION - USING COMPUTERIZED TECHNIQUES AND PRODUCTION CASTING FACILITIES, THE OPTIMUM SHAKE OUT TIMES, RISER SLEEVES AND GATING AND RISERING CONFIGURATIONS WOULD BE DETERMINED. PROPERTIES OF CAST MATERIALS WILL BE EVALUATED FOR DIFFERENT CAST DESIGNS.						
(8232) TITLE - ACCELERATED CURING SYSTEMS FOR RUBBER END ITEMS					110	
PROBLEM - CURING SYSTEMS FOR ELASTOMERIC END ITEMS ARE INEFFICIENT AND THEREFORE EXCESSIVE CURING CYCLES ARE REQUIRED FOR VULCANIZATION.						
SOLUTION - EVOLUTIONARY DEVELOPMENTS IN THE STATE OF THE ART OF CURING AGENTS AND CURING SYSTEMS WILL BE INCORPORATED INTO RUBBER FORMULATIONS TO REDUCE CURING CYCLE TIMES. IN SOME INSTANCES, VULCANIZATION TIME IS EXPECTED TO BE REDUCED BY 66 PERCENT.						

		FUNDING ($000)				
	PRIOR	79	80	81	82	83
COMPONENT -- PROCESSES (CONTINUED)						
(8233) TITLE = APPLICATION OF ELECTRICAL-DISCHARGE WIRE MACHINING					200	
PROBLEM = MACHINING OF STRAIGHT AND CONTOURED THROUGH SLOTS IN BOTH PRODUCTION OF WEAPON COMPONENTS AND RELATED TOOL MFG. IS SLOW AND COSTLY, OFTEN REQUIRING MULTIPLE TOOLING AND OPERATIONS TO ROUGH, SEMI FINISH AND FINISH NON RIGID THIN WALL SECTIONS.						
SOLUTION = APPLY ELEC. DISCHARGE WIRE (EDW) CUTTING FOR SINGLE PASS, NUMERICALLY CONTROLLED, UNATTENDED MACHINING, WITH ADAPTATION OF EDW TO CONTOUR SLOTTED RECOIL CYLINDER PRODUCTION.						
(8303) TITLE = CENTRALIZED SYSTEM FOR COOLANTS						80
PROBLEM = CURRENTLY, A NUMBER OF MACHINE TOOLS USE THE SAME COOLANTS. INTERMITTENT USE PRODUCES STAGNATION AND RISE IN BACTERIA. CONTROL OF SYSTEMS IS DIFFICULT ON AN INDIVIDUAL MACHINE BASIS.						
SOLUTION = THE IMPLEMENTATION OF A CENTRAL SYSTEM WILL USE LESS COOLANTS BY PROPER CONTROL AND PROVIDE MORE AERATION. CENTRAL SYSTEM WILL REDUCE THE MAINTENANCE, COST AND IMPROVE COOLANT QUALITY.						

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* CATEGORY *
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*LARGE CALIBER *
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COMPONENT -- BREECH MECHANISMS						
(7246) TITLE = SIMPLIFICATION OF BREECH RING MFG. AND HANDLING		75	60			
PROBLEM = A PRIOR YEAR STUDY HAS IDENTIFIED MANY AREAS WHERE COST REDUCTIONS ARE POSSIBLE IN THE MFG OF THE 105MM M68 BREECH RING.						
SOLUTION = SELECTED OPERATIONS WILL BE COMBINED, EQUIPMENT WILL BE MODIFIED RESULTING IN REDUCED TIME AND COST.						
(7317) TITLE = OPTIMIZATION OF STEP THREAD TOOLING			75			
PROBLEM = MUCH OF THE TOOL IS LOST DUE TO LIMITATIONS OF SHARPENING. THE CUTTER BLADES SHOLD BE EVALUATED IN AN ATTEMPT TO OBTAIN MORE DURABLE AND READILY GRINDABLE STEEL.						
SOLUTION = REDESIGN OF CUTTER BLADE AND/OR ITS HOLDER TO PROVIDE MORE RESHARPENING CAPABILITY. NEWER CUTTING STEELS OFFER BETTER FORMABILITY AND CAN PROVIDE CAPABILITY OF FASTER SPEED AND FEED.						
(7555) TITLE = DYNAMIC PRESSURIZATION SLIDE BLOCK BREECH MECH.		98	121			
PROBLEM = HIGH TESTING COSTS FOR PROOF FIRING SLIDE BLOCK BREECH MECHANISMS.						
SOLUTION = DESIGN + FABRICATE A DYNAMIC PRESSURIZATION TEST STAND TO SIMULATE PROOF FIRING.						

COMPONENT -- BREECH MECHANISMS (CONTINUED)

		FUNDING ($000)				
	PRIOR	79	80	81	82	83
(7730) TITLE = MANUFACTURE OF SPLIT RING BREECH SEALS		137	453			
PROBLEM = SPLIT RINGS REQUIRE PRECISE MFG. PRESENT METHODS ARE OUTDATED AND COSTLY REQUIRING MUCH HAND FINISHING BY HIGHLY SKILLED WORKERS. REJECTION RATE HIGH WITH MUCH REWORK.						
SOLUTION = AUTOMATED AND IMPROVED PROCEDURES WILL BE ADOPTED. NEW METHOD OF SLITTING RING REQUIRING LESS STOCK REMOVAL. SPECIAL EQUIPMENT WILL BE DESIGNED AND PURCHASED TO MINIMIZE HAND FINISHING BY HIGH SKILL OPERATORS.						
(7926) TITLE = HOT ISOSTATIC PRESSING (HIP) OF LARGE CANNON COMP			216		245	
PROBLEM = MANY HOURS ARE REQUIRED TO MACHINE THE BREECH BLOCK FORGING TO THE FINISHED PART. MORE THAN 25% OF FORGING BECOMES CHIPS, WITH HIGH COST OF ALLOY STEEL, THIS BECOMES A VERY COSTLY WASTE OF MATERIAL.						
SOLUTION = HOT ISOSTATIC PRESSING (HIP) WILL FORM BREECH BLOCKS TO NEARLY FINAL SHAPE, GREATLY REDUCING MACHINING COSTS.						
(7927) TITLE = GENERATION OF BASE MACHINING SURFACES			86	137		
PROBLEM = TO OBTAIN A DISTR OF STOCK ON A ROUGH CAST COMPONENT, IT IS CURRENTLY NECESSARY TO 'DRAW' THE FINISHED COMPONENT ON THE MATERIAL USING HT GAGE AND LAYOUT TEMPLATES. THIS IS DONE ON A TABLE FROM WHICH THE PART MOVES TO A MACHINE FOR SIMILAR SET-UP.						
SOLUTION = USING PRESENT LAYOUT TECHNIQUES SUCH AS OPTICAL SHADOW LAYOUT TEMPLATES, THE COMPONENT CAN BE POSITIONED DIRECTLY ON THE MACHINE TO ESTABLISH THE FIRST CUT ELIMINATING THE INITIAL LAYOUT OPERATION.						
(7928) TITLE = ROBOTIZED BENCHING OPERATIONS (CAM)			113	287		
PROBLEM = BENCHING OPERATIONS ON BREECHBLOCKS AND RINGS ARE UNSAFE AND TIME CONSUMING.						
SOLUTION = DEVELOP INDUSTRIAL ROBOT TO PERFORM THESE OPERATIONS.						
(8102) TITLE = APPLIC. OF POWDER METALLURGY FORGINGS TO COMP.				150		
PROBLEM = FORGINGS AND CASTINGS ARE FABRICATED OVERSIZE AND SUBSEQUENTLY MACHINED DOWN TO FINAL DIMENSIONS. FINAL COMPONENT CONFIGURATION INVOLVES A LARGE AMOUNT OF MANPOWER AND MACHINES TO REMOVE ALLOY STEEL AS CHIPS.						
SOLUTION = RECENT ADVANCES HAVE OCCURRED IN POWDER METALLURGY FORGING. THE ADVANCES WILL PRODUCE 'NEAR NET SHAPE' COMPONENTS WHICH REDUCES AMOUNT OF MACHINING REQUIRED WHILE KEEPING ADEQUATE MECHANICAL PROPERTIES. UTILIZE NEW TECHNIQUE.						

		FUNDING ($000)				
	PRIOR	FY	81	81	82	83
COMPONENT -- BREECH MECHANISMS (CONTINUED)						
(8104) TITLE - IMPROVED BREECH BLOCK MANUFACTURING				130	1600	1600
PROBLEM - THE WIDE VARIETY OF MACHINE TABLE STANDARDS INVOLVES EXPENSIVE AND SPACE WASTING ALTERNATIVES TO SPECIFICALLY DESIGNED MANUFACTURING PROCESSES.						
SOLUTION - A SPECIFICALLY DESIGNED MANUFACTURING FACILITY USING A PALLETIZED SYSTEM OF FIXTURING, MAXIMUM TOOL EFFICIENCY, AND REDUCED MATERIAL HANDLING.						
(8105) TITLE - ESTABLISH ROUGH THREAD BLANKS 8 IN, M201 BUSHING			88	307		
PROBLEM - A SINGLE POINT TOOL IS NOW USED TO PRODUCE THE ROUGH FORMED BLANK FOR STEP THREADS ON STEP BLOCKS, CURRENT TIME VALUE IS 13.9 HOURS.						
SOLUTION - POSSIBLE APPLICATIONS OF MULTIPLE SLOTTING TOOLS AND MILLING OFFER A FAR MORE EFFICIENT METAL REMOVAL PROCESS AIMED AT TIME/COST REDUCTION.						
(8110) TITLE - SQUEEZE CASTING OF CANNON COMPONENTS				250	250	
PROBLEM - CONVENTIONAL FORGING AND SAND CASTING INVOLVE CONSIDERABLE MACHINING TO ACHIEVE REQUIRED SHAPE.						
SOLUTION - SELECTION OF A NEW FORGING PROCESS FOR CANNON COMPONENTS USING RECENTLY INTRODUCED TECHNOLOGY. THIS WILL BRING NET-SHAPE TECHNOLOGY INTO THE METALFORMING PRODUCTION.						
(8117) TITLE - SHAPED CASTING OF ESR MATERIAL				150		
PROBLEM - COMPONENTS REQUIRE FORGING PLUS EXTENSIVE MACHINING TO ACHIEVE THE FINAL DIMENSIONS. THE FORGING PROCESS HAS IMPARTED SOME PROBLEMS WITH THE MECHANICAL PROPERTIES OCCURRING IN THE STEEL.						
SOLUTION - A PRODUCTION PROCESS CAPABLE OF PRODUCING A SHAPED CASTING.						
(8118) TITLE - PROGRAMMABLE GRINDING (CAM)				95	587	75
PROBLEM - PRODUCTION OF OBTURATOR SPINDLES IS A BOTTLENECK THAT NEEDS MANUFACTURING IMPROVEMENT. PRESENTLY THE SPINDLES REQUIRE MANUFACTURING TECHNIQUES SIMILAR TO THAT OF A TOOL ROOM ATMOSPHERE. (SUCH AS CONTR TEMP, HUMIDITY, ETC.)						
SOLUTION - DEVELOPMENT OF COMPUTERIZED GRINDING INTO A COMPREHENSIVE REVIEW AND COMPONENT TEST. EQUIPMENT IS CURRENTLY AVAILABLE THAT IS CAPABLE OF BEING PROGRAMMED FOR PRECISE POSITIONING TO GRIND VARIOUS DIAMETERS.						
(8240) TITLE - PALLETIZED BREECH RING MANUFACTURE					470	3791
PROBLEM - PRIOR YEAR FUNDS ESTABLISHED A STUDY OF AUTOMATING BREECH RING PRODUCTION. THE PROBLEM IS TO PROVE STUDY RESULTS THROUGH TESTING AND EVALUATION.						
SOLUTION - TESTING AND EVALUATION OF STUDY RESULTS.						

		FUNDING ($000)				
	PRIOR	79	80	81	82	83
COMPONENT -- BREECH MECHANISMS (CONTINUED)						
(8339) TITLE = APPLIC OF NON-TRADITIONAL SURF. HARDENING METHODS				150		
PROBLEM = PRESENT METHODS OF SURFACE HARDENING WEAPON COMPONENTS ARE COSTLY, TIME CONSUMING, AND MAY IMPART UNDESIREABLE RESIDUAL STRESSES.						
SOLUTION = TO TRANSFORM THE SURFACE LAYER OF THE STEEL TO ALLOW MATERIAL TO BE UNIFORMALY QUENCHED. THE ADVANTAGES ARE LESS ENERGY USAGE, POLLUTION FREE, ALLOW HIGHER PRODUCTION RATES, AND MINIMAL POST-PROCESSING SUCH AS CLEANING AND STRAIGHTENING.						
COMPONENT -- GENERAL						
(7724) TITLE = GROUP TECHNOLOGY OF WEAPON SYSTEMS	83		200	200		
PROBLEM = THERE IS A NEED TO REDUCE AND CONTROL THE PROLIFERATION OF DESIGNS AND PARTS IN MANUFACTURING SYSTEM.						
SOLUTION = APPLY THE =END ITEM MANUFACTURING GUIDE= DEVELOPED UNDER PROJECT 671 7042.						
(8026) TITLE = APPLIC OF SYNTHETIC QUENCH TO GUN TUBES + COMP.			143			
PROBLEM = QUENCHANTS ARE NOT SATISFACTORY FROM BOTH THE THERMAL AND SAFETY STANDPOINT.						
SOLUTION = USE OF POLYMERIC MATERIALS TO ALTER QUENCH POWER OF BATH AND ALLOW HEAT TRANSFER TO OBTAIN RANGE OF COOLING RATES WHILE ELIMINATING HAZARDS ASSOCIATED WITH OIL QUENCHING.						
(8059) TITLE = SALVAGE OF CANNON COMPONENTS BY ELECTRODEPOSITION			192			
PROBLEM = COMPONENTS AND GUN TUBES HAVE BEEN REJECTED AND CONDEMNED DUE TO EXCESS STOCK REMOVAL OR MISMACHINING.						
SOLUTION = DEVELOP A PROCESS TO DEPOSITE ADDITIONAL METAL TO COMPENSATE FOR EXCESS STOCK REMOVAL.						
(8207) TITLE = HIGH TOUGHNESS CAST ARMOR STEELS					150	150
PROBLEM = PRODUCTION OF ARMOR CASTINGS MEETING THE MATERIAL TOUGHNESS REQUIREMENT OF MIL-S-11356 IS VERY DIFFICULT AND COSTLY.						
SOLUTION = CONTROL OF SLAG COMPOSITIONS CAN REDUCE SULFUR AND PHOSPHORUS LEVELS, THUS IMPROVING MATERIAL TOUGHNESS.						

		FUNDING ($000)					
		PRIOR	79	80	81	82	83
COMPONENT -- GUN MOUNTS							
(8035)	TITLE - COATING TUBE SUPPORT SLEEVES WITH BEARING MATERIALS			140	100		
	PROBLEM - METALLIZED COATINGS ON SUPPORT SLEEVES FOR GUN MOUNTS ARE BRITTLE AND LACK BOND STRENGTH.						
	SOLUTION - USE INDUCTION/ARC-INERT GAS METHODS TO COAT SLEEVES WITH BEARING MATERIALS.						
COMPONENT -- RECOIL MECHANISMS							
(8228)	TITLE - BALL SIZING OF RECOIL CYLINDERS					50	230
	PROBLEM - INTERNAL HONING IS REQUIRED TO ACHIEVE THE SURFACE FINISHES AND TOLERANCES REQUIRED FOR RECOIL CYLINDERS. HONING IS EXTREMELY TIME CONSUMING AND ALSONOISY.						
	SOLUTION - REPLACE INTERNAL HONING WITH BALL SIZING ON RECOILMECHANISMS. BY FORCING A BALL (WITH A DIAMETER SLIGHTLY LARGER THAN THE DIAMETER OF THE CYLINDER) THROUGH THE CYLINDER, THE SURFACE FINISH AND TOLERANCE CRITERIA CAN BE ACHIEVED.						
COMPONENT -- TUBES							
(7162)	TITLE - APPLICATION OF HYDROSTATIC EXTRUSION	100			200		
	PROBLEM - MORTAR TUBES ARE NOW MADE FROM FORGINGS, WITH MACHINING TIME AND MATERIAL LOSS BEING REQUIRED IN ORDER TO OBTAIN A FINISHED TUBE. TOTAL PRODUCT COST REFLECTS NOT ONLY LABOR INVOLVED, BUT ALSO LOSSES INCURRED IN POOR MATERIAL USAGE.						
	SOLUTION - HYDROSTATIC EXTRUSION WILL RESULT IN A PRODUCT AT OR CLOSE TO FINISHED SIZE WITH MORE OF THE RAW MATERIAL NOW PURCHASED GOING INTO FINISHED PRODUCT. PRIOR YEARS FUNDING DEMONSTRATED THE SUCCESS OF PROPOSED TECHNIQUE.						
(7213)	TITLE - HIGH SPEED CHROMIUM PLATING TECHNIQUE	266	199				
	PROBLEM - CHROMIUM PLATING TECHNIQUES ARE SLOW BECAUSE THE EQUIPMENT IS SLOW.						
	SOLUTION - DEVELOP A PROTOTYPE HIGH SPEED CHROMIUM PLATING PROCESS.						
(7482)	TITLE - MODIFIED RIBBON RIFLING GENERATING MACHINE		136				
	PROBLEM - RIFLING OF GUN TUBES REQUIRES AN EXCESSIVELY LONG HONING TIME.						
	SOLUTION - MODIFY THE RIFLER TO ACCEPT TWO TUBES SIDE BY SIDE TO PRODUCE TWO TUBES IN THE TIME NOW NEEDED FOR ONE.						
(7726)	TITLE - APPLICATION OF COLD AND WARM FORGING	702	462				
	PROBLEM - PROCESSING PARAMETERS FOR WARM AND COLD FORGING ARE NOT AVAILABLE.						
	SOLUTION - PROCESS WARM AND COLD FORGING THROUGH THE ROTARY FORGE.						

(CONTINUED)

	FUNDING ($000)				
	PRIOR	79	80	81	82	83
COMPONENT -- TUBES	224	248				
(7727) TITLE - RECYCLING OF SCRAP GUN TUBES BY ROTARY FORGING						
PROBLEM - FIRED OUT AND DEMILITARIZED GUN TUBES ARE NOW BEING SOLD AS SCRAP THUS WASTING VALUABLE GUN TUBE MATERIAL.						
SOLUTION - DEVELOP PROCESS FOR REFORGING THESE TUBES WITHOUT REMELTING AND CASTING, THUS SAVING CONSIDERABLE COST OF TUBE MANUFACTURE.				150		
(7916) TITLE - APPLICATION OF LOW COST MANDREL MATERIALS						
PROBLEM - TO PRODUCE A SATISFACTORY SUBSTITUTE FOR TUNGSTEN CARBIDE MANDREL TO ELIMINATE SOLE SOURCE PROCUREMENT. THE PRICE OF THE MANDRELS HAS INCREASED FIFTY PERCENT OVER THE LAST 5 YEARS.						
SOLUTION - HIGH SPEED STEEL MANDRELS HAVE BEEN USED FOR SWAGE PROCESS IN UNITED KINGDOM. THIS SHOULD BE A SUBSTITUTE FOR TUNGSTEN CARBIDE MANDRELS.			236			
(7920) TITLE - CONSERVATION OF CRITICAL MATERIALS FOR GUN TUBES						
PROBLEM - GUN STEEL REQUIRES ALLOY SUCH AS CHROMIUM WHICH IS BECOMING IN SHORT SUPPLY AND WHICH MUST BE OBTAINED FROM OUT OF COUNTRY AND FROM A RELATIVELY FEW NATIONS. THERE IS A NEED FOR MATERIALS AND PROCESSES WHICH USE LESS OF CRITICAL ELM SUCH AS CHROMIUM.						
SOLUTION - ALLOY STEEL VARIATIONS WHICH REPLACE CHROMIUM WITH BORON AND MOLYBDENUM HAVE BEEN DEVELOPED BUT HAVE PROCESSING PROBLEMS. THIS PROJECT WILL GENERATE PROCESS MODIFICATIONS TO ALLOW USE OF STEELS WITH LESS CRITICAL ALLOYS.			111	248		
(7925) TITLE - BORE EVACUATOR BORING						
PROBLEM - BOTH ENDS OF THE BORE EVACUATOR HAVE SIMILAR DIAMETER BORES AND REQUIRE ALMOST EQUAL MACHINING WITH HIGH COST OF MACHINING TIME. REDUCTION OF MACHINING TIME IS IMPERATIVE. ORIENTATION OF THE BORES IS IN RELATION TO EACH OTHER.						
SOLUTION - A SPECIAL PURPOSE MACHINE AND TOOLING PKG PROVIDING A HEAD FOR EACH END OF THE EVAC CHAMBER CAN BE DEVELOPED TO PRODUCE BOTH BORES SIMULTANEOUSLY. IF BOTH SURFACES WERE PRODUCED FROM THE SAME SET UP, ORIENTATION OF CENTERLINES WOULD BE AUTO ASSURED.			324	122		
(8024) TITLE - HIGH SPEED ABRASIVE BELT GRINDING						
PROBLEM - SLIDE SURFACE DIAMETER AND FINISH IS PRESENTLY PRODUCED ON CYLINDRICAL GRINDING MACHINES USING ABRASIVE WHEELS. THE TIME IT TAKES FOR THIS OPERATION CAN BE SIGNIFICANTLY REDUCED.						
SOLUTION - ABRASIVE BELT GRINDING DEPENDING ON ITS APPLICATION HAS METAL REMOVAL RATES WHICH CAN EXCEED MILLING OR GRINDING AT THE SAME TIME PRODUCING EXCELLENT TOLERANCES AND SURFACE FINISH.						

		FUNDING ($000)					
		PRIOR	79	80	81	82	83
COMPONENT -- TUBES (CONTINUED)							
(8025)	TITLE - ELECTRONIC PROFILE READOUT GAGE FOR POWDER CHAMBERS		106				
	PROBLEM - POWDER CHAMBER SIZE IS CHECKED BY 4-6 PLUSH PIN GAGES EACH WEIGHING ABOUT 35 LBS. FROM EACH CHECK, MACHINE ADJUSTMENTS MUST BE MADE TO MACHINE CHAMBER TO REQUIRED SPEC.						
	SOLUTION - USING NEW PROXIMITY SENSING DEVICES 1 LT WEIGHT GAGE WOULD REPLACE THE 4-6 PRESENT GAGES. IT WOULD PROVIDE A SIGNAL FOR DIGITAL READOUT AND FOR TOOL CONTROL IN LATTER PHASE OF PROJECT.						
(8047)	TITLE - PASS THRU STEADY RESTS FOR TUBE TURNING	139		269			
	PROBLEM - ROLLER RESTS PROVIDE NECESSARY SUPPORT FOR GUN TUBE TURNING BUT IT WILL NOT ALLOW TURNING FULL LENGTH IN 1 SET UP. PRESENT METHOD IS TO USE 2 LATHES WITH 2 SET UPS OR LATHE MUST HAVE 2 CARRIAGES.						
	SOLUTION - A PASS THRU REST WILL ALLOW THE CARRIAGE TO MOVE FROM ONE SUPPORTED AREA OF THE TUBE TO THE OTHER WITHOUT DISTURBING THE SETUP. THE DESIGN WILL BE APPLICABLE TO CURRENTLY AVAILABLE EQUIP BUT WILL HAVE EVEN GREATER IMPACT ON NEW EQUIP ACQUISITIONS.						
(8050)	TITLE - RECYCLING SPENT GUN TUBES BY ESR MELTING	20		170			
	PROBLEM - BECAUSE OF ANTICIPATED SHORTAGES IN THE AVAILABILITY OF CRITICAL ALLOYS, IT IS ADVANTAGEOUS TO UTILIZE SPENT GUN TUBES.						
	SOLUTION - TUBES WHICH CANNOT BE DIRECTLY ROTARY FORGED MIGHT BE REMELTED DIRECTLY BY ESR INTO INGOTS FOR USE ON THE ROTARY FORGE.						
(8057)	TITLE - DUAL RIFLING BROACH REMOVAL SYSTEM			215			
	PROBLEM - LATE START, INFORMATION COMING.						
	SOLUTION - LATE START, INFORMATION COMING.						
(8060)	TITLE - IMP MFG PROCESSES RELATED TO FINAL INSPECTION			268			
	PROBLEM - THE CURRENT INSPECTION PROCESS FOR GUN TUBES IS IS SLOW AND AWKARD.						
	SOLUTION - DEVELOP AN INSPECTION PROCESS WHICH USES MECHANIZATION AND NEW TECHNOLOGY.						
(8103)	TITLE - HIGH VELOCITY MACHINING				61	191	200
	PROBLEM - SPEED OF MACHINING CANNON TUBES IS LIMITED WITH CURRENT EQUIPMENT.						
	SOLUTION - EVALUATE HIGH SPEED METAL REMOVAL METHODS AND AVAILABLE EQUIPMENT; FUTURE YEARS FUNDING WILL PROVIDE FOR ACQUISITION AND TESTING OF NEW MACHINE AND PROCESS.						

		FUNDING ($000)				
	PRIOR	79	80	81	82	83
COMPONENT -- TUBES (CONTINUED)						
(8106) TITLE = LARGE CALIBER POWDER CHAMBER BORING	100		59	159	64	
PROBLEM = POWDER CHAMBERS PRODUCTION ON LARGE BORE CANNON 8"M201 CURRENTLY REQUIRES 14 HRS TO ACCOMPLISH BOTH ROUGH AND FINISH OPERATIONS.						
SOLUTION = PERFORM THE FINISHING OPERATION IN THE SAME SETUP AS THE ROUGHING OPERATION BUT USING AS A CUTTING MEDIA DIAMOND FINISHING TOOLS WHICH AT VERY HIGH SPEEDS PRODUCE EXCELLENT SURFACE FINISH. THIS PROCESS WOULD ELIMINATE ONE GRINDING OPERATION.						
(8107) TITLE = CREEP FEED CRUSH FORM GRINDING		82	348	73		
PROBLEM = THE BRACKET SLOT ON THE 105MM M68 BREECH RING IS A HIGH COST OPERATION. IT IS CURRENTLY MILLED WITH FORM TOOLS IN TWO OPERATIONS=ROUGH AND FINISH.						
SOLUTION = A NEW PROCESS IS BEING DEVELOPED THAT RESEMBLIES THE CRUSH FORM ABRASIVE MACHINE FOR CYLINDRICAL PARTS EXCEPT THAT THE PROCESS IS USED TO PRODUCE FLAT CONTOURED SURFACES. IT IS PROPOSED THIS PROCESS BE ADAPTED TO PRODUCTION OF THE BRACKET SLOT.						
(8115) TITLE = ROTARY FORGING OF INTEGRAL TUBES				250	250	
PROBLEM = COMPONENTS USED IN CANNON ASSEMBLIES INVOLVE CONSIDERABLE MACHINING TO MAKE AN ASSEMBLY. SOLE PROCUREMENT SOURCES ADD CONSIDERABLY TO OVERALL COSTS.						
SOLUTION = WITH THE ROTARY FORGE IT IS POSSIBLE TO FORGE A TUBE WITH INTEGRAL BREECH RING AND MUZZLE BRAKE. THIS REDUCES NUMBER OF CASTINGS REQUIRED FOR A CANNON ASSEMBLY, WHICH MEANS REDUCTION IN MACHINING, HANDLING, AND ASSEMBLING REQUIRED.						
(8119) TITLE = ELIMINATE HEAT TREAT STRESS RELIEF BY VIBRATION				384		
PROBLEM = CANNON TUBES REQUIRE TIME CONSUMING HEAT TREATMENTFOR STRESS RELIEF AFTER SWAGING. THIS PROCESS ALSO REQUIRES CONSIDERABLE EXPENDITURE OF ELECTRICAL ENERGY.						
SOLUTION = ELIMINATE THE HEAT TREAT PROCESS AND PROVIDE STRESS RELIEF BY VIBRATION.						
(8208) TITLE = MATERIAL HANDLING			113			
PROBLEM = A STUDY MADE ON THE 105MM M68 GUN TUBE PRODUCTION LINE REVEALED 12% OF TIME TO PRODUCE THE TUBE WAS CONSUMED IN MOVING THE TUBE ABOUT! ANOTHER 20% OF THE MFG TIME SPENT IN MAKING THE TUBE READY AND TAKING THE TUBE DOWN FROM THE MACHINES.						
SOLUTION = ONE METHOD TO REDUCE THE HANDLING TIME AND TERMINAL (POSITIONING AND REMOVING) TIME WOULD BE TO DEVELOP NEW EQUIPMENT FOR POSITIONING LIFTING AND TRANSFERING OF GUN TUBES AND COMPONENTS.						

		FUNDING ($000)				
	PRIOR	79	80	81	82	83

COMPONENT -- TUBES (CONTINUED)

(8341) TITLE - HOLLOW CYLINDER CUT OFF MACHINE — 80: 69, 81: 164

PROBLEM - ESTAB. CYL LENGTH IS DONE 1 OF 2 WAYS, PARTED OFF IN A LATHE AND FACED TO LENGTH OR SAWED OFF AND THEN SET UP IN A LATHE FOR FACING TO FINAL LENGTH DIMENSIONS. IN EITHER CASE, THE OPERATION REQUIRES DOUBLE HANDLING OR SLOW OPERATING PROCEDURES.

SOLUTION - NEW TECHNOLOGY IS BEING DEVELOPED WHEREBY A SET OF ROTATING CUTTERS MILLS THE CYLINDER TO LENGTH PRODUCING A FACE SURFACE TO SATISFY OUR TUBE LENGTH REQUIREMENTS CURRENT MACH. DESIGN WILL NOT PERFORM THIS FUNCTION BUT THE TECHNOLOGY IS APPLICABLE.

(8342) TITLE - KEYWAY MILLING MACHINE — 80: 242

PROBLEM - 155MM M185 REQUIRES 3 KEYWAYS BE MILLED ON C/L TO CLOSE DIMENSIONS AND TOLERANCES. PRESENTLY MILLED IN 3 DIFFERENT MACHINES REQUIRING 3 SET UPS AND 3 MOVES.

SOLUTION - A SPECIAL PURPOSE KEYWAY MILLING MACHINE WILL BE DEVELOPED TO HOLD THE TUBE ON LOCATION AND MILL ALL 3 KEYWAYS SIMULTANEOUSLY. ALLIGNMENT OF ALL KEYWAYS TO C/L WOULD BE ASSURED.

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* CATEGORY *
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*QUALITY CONTROL/TESTING *
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COMPONENT -- GUN SYSTEMS

(8136) TITLE - IMPROVE IMPULSE PROGRAMMER FOR HYDRAULIC SIMULATOR — 81: 80, 82: 300

PROBLEM - UNDESIRABLE SHOCK AND VIBRATION IN TESTS OF CERTAIN RECOIL MECHANISMS LIMIT THE EXTENT OF TESTING THAT CAN BE ACCOMODATED ON THE HYDRAULIC ARTILLERY TEST SIMULATOR.

SOLUTION - DESIGN AND MANUFACTURE IMPROVED IMPULSE PROGRAMMERS TO GET BETTER SIMULATED FIRING THAT WILL BE MORE EFFECTIVE FOR A GREATER NUMBER OF WEAPONS.

(8234) TITLE - OSCILLATING FORCE RECOIL MECHANISM TESTER — 82: 250, 83: 450

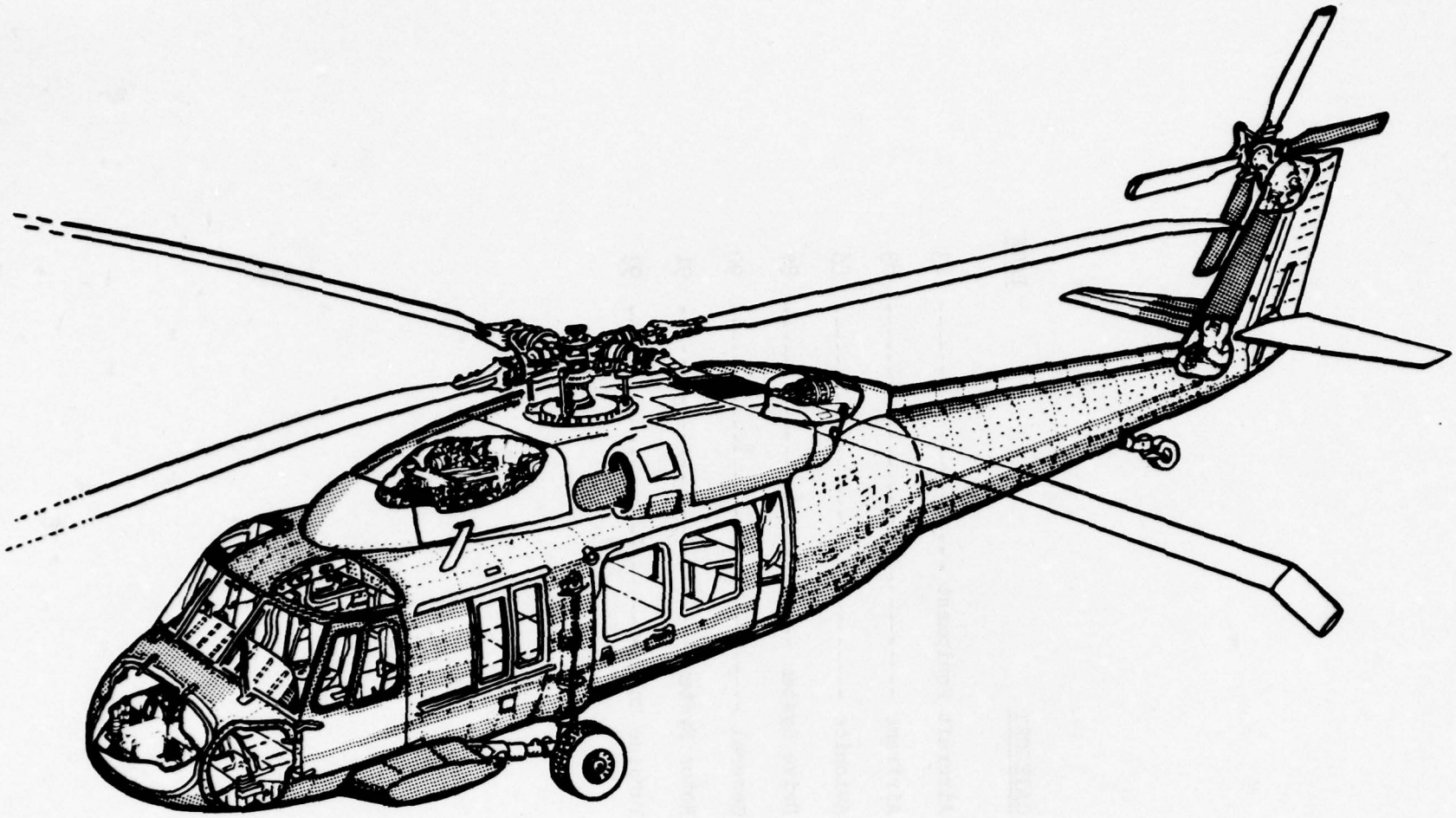
PROBLEM - PRESENT TEST METHODS USE LARGE FORCES WHICH ARE COSTLY AND HAZARDOUS. THERE IS NEED FOR A TEST METHOD WHICH USES LOWER FORCES, HAS HIGHER EFFICIENCY AND INCREASED SAFETY.

SOLUTION - THE OSCILLATING FORCE TEST WOULD MEASURE RESPONSE OF RECOIL PRESSURE AND VELOCITY TO OSCILLATING FORCES APPLIED TO THE RECOIL ROD. THIS WOULD DETECT FAULTY RECOIL MECHANISMS WITHOUT FIRING WITHOUT HIGH IMPACT FORCE.

		FUNDING ($000)					
		PRIOR	79	80	81	82	83
COMPONENT -- GUN SYSTEMS (CONTINUED)							
(8235)	TITLE = AUTOMATIC ADJUSTMENT FOR SIMULATOR ARTILLERY TEST					250	100

PROBLEM = HIGH OPERATING COSTS DUE TO NECESSITY OF MANUAL ADJUSTMENT OF VALVES AND OF SPACING BETWEEN SIMULATOR AND WEAPON.

SOLUTION = PROVIDE INCREASED TEST EFFICIENCY BY PROVIDING REMOTE AND AUTOMATIC ADJUSTMENT OF SIMULATOR SPACING TO WEAPON, AND FOR AUTOMATIC ADJUSTMENT OF PRECHARGE PRESSURES.



AVIATION R&D COMMAND

(AVRADCOM)

US ARMY AVIATION RESEARCH AND DEVELOPMENT COMMAND

(AVRADCOM)

The US Army Aviation Research and Development Command (AVRADCOM), with headquarters at St. Louis, MO, is responsible for Army aviation research, development, product improvement, acquisition for assigned materiel and research projects, initial procurement, and production. The Command directs the Research and Technology Laboratories with headquarters at NASA - Ames Research Center, Moffett Field, CA; US Army Avionics Agency and Laboratory, Fort Monmouth, NJ; US Army Bell Plant Activity, Fort Worth, TX; US Army Hughes Plant Activity, Culver City, CA; and three project managers: Aircraft Survivability Equipment, CH-47 Modernization Program, and Navigation/Control Systems. PM Advanced Attack Helicopter (AAH) and PM Blackhawk are collocated with AVRADCOM, but are under the direct control of HQ, DARCOM.

In November 1977, AVRADCOM sponsored the first Army Aviation Manufacturing Technology Conference in Palo Alto, CA. The objective of this meeting was to develop a five year plan for the aviation MMT program by identifying major cost drivers and problem areas, and by obtaining and ranking proposed solutions. The results of the conference are the basis for long term aviation MMT planning, and are reflected in this submission.

The most important criteria of aircraft material are strength and low weight. A large part of the aviation MMT program is the attempt to replace metals with materials having better strength to weight ratios. Composite materials suitable for aviation have been developed and are being used. Composites are pound for pound less expensive than metals traditionally used in aircraft, are stronger, and do not need the extensive and expensive machining that metals do. However, techniques for the production and application of composites need further development to reach optimum efficiency and savings.

The accelerating adoption of composite materials in Army aircraft is reflected in the increase in funding given to composite related manufacturing technology projects through FY81 (FY79 = 44%, 80 = 69%, and 81 = 54%). In FY82 and 83 the percentage of funding is planned to be 33 and 37%, respectively; however, this level is anticipated to increase as current work in MT and in R&D leading toward an all-composite helicopter fuselage nears completion. In addition, raw material costs are expected to decrease with the increased use of composites in DOD and Industry. Also, as confidence increases in composites, current reservations held by designers (especially quality control segments) will be removed, and composites will be incorporated in the earliest stages of weapon development with consequent increases in necessary MMT work.

The disproportionate increase in funding for composites work in FY79-81 is primarily for the establishment of manufacturing processes to support composite main and tail rotors and the tail boom for the YAH-64 Advanced Attack Helicopter (AAH). The rotor projects build upon previous Government and Industry R&D and MT work. In the case of the main rotor blade, costs will be reduced by incorporation of unique techniques that reduce cure cycles and handling. The tail rotor program will establish for the first time a manufacturing process that can be automated with consequent cost savings. The tail boom project will resolve several manufacturing problems and will make composite tail booms economically feasible with significant weight savings.

Composite projects are planned for virtually every part of the helicopter except the avionics area; however, an avionics project is planned for the remote piloted vehicle (RPV). Several projects are planned in the airframe area. One will establish manufacturing methods for the first application of composites to a main fuselage primary structure (the rear fuselage of the Blackhawk). Five projects are planned in the rotor area. The principle projects are those for the AAH, but a project is also planned for establishing a production method for the blades of the RPV. In the drive area, three projects are planned. One will focus on the drive shaft and another will result in methods for manufacturing a gearbox housing. In the engine area, a project is included for methods to fabricate the particle accelerator. The decrease in weight of this component will improve engine performance and provide cascading beneficial effects in the bearing and lubrication areas.

Several projects will attack technical problem areas that affect all composite manufacturing. These projects address automation of cutting and layup operations, machining, fastening, technology transfer, and new materials. The development of automation techniques will be pursued in cooperation with the Air Force, the lead service in this area.

The most significant project areas in terms of advancing composites manufacturing and usage is in the development of quality control techniques. Three projects are planned in this area; they will address materials characterization, in-process controls, and non-destructive evaluation. These projects will ensure optimum processing and material performance, and increase confidence in composites.

There are many areas in aircraft in which metals can not be replaced and projects are included in this submission to improve production of these items. Since many aircraft metals used in the propulsion system are tough and expensive, machining a casting to final shape is difficult and produces costly scrap. Improving powder metal technology will give castings much closer to final shape, greatly reducing the time and effort to produce the final product. Several projects are included to

implement recent advances in gear manufacturing and should provide an improved item at a lower cost. Projects are also planned to find ways of repairing rather than scrapping complex items which are damaged in the manufacturing process. An effort is planned to replace metal turbine blades with ceramic ones. This will provide better operating characteristics at lower cost.

The overall emphasis of the Army's aviation MMT program is to perfect technologies which have a good probability of implementation and high potential benefits. For the most part, efforts are directed towards projects which offer both cost reductions and product improvements. The results of these projects will be made available to other Government agencies and to Industry.

AVRADCOM

COMMAND FUNDING SUMMARY
(THOUSANDS)

CATEGORY	FY79	FY80	FY81	FY82	FY83
AIRCRAFT EQUIPMENT	225	0	150	335	270
AIRFRAME	2577	2830	3005	1460	2640
AVIONICS	397	250	50	705	895
DRIVE SYSTEM	325	600	3345	3325	2395
GENERAL	0	0	255	70	320
ROTOR SYSTEM	1962	4525	2525	990	2120
TURBINE ENGINE	1773	1170	2366	4185	4645
TOTAL	7259	9375	11696	11070	13285

[redacted]

FUNDING ($000)

		PRIOR	79	80	81	82	83
[redacted] -- GENERAL							
(7288)	TITLE = MANUFACTURING TECHNOLOGY FOR HELICOPTER EQUIPMENT					170	270
	PROBLEM = MANUFACTURING PROBLEMS ARISING FROM INSUFFICIENTLY DEVELOPED STATE-OF-THE-ART TECHNOLOGY ARE RESPONSIBLE FOR VARIOUS FAILURES IN PRODUCTION BUY ITEMS.						
	SOLUTION = DEVELOP TECHNOLOGY TO MANUFACTURE HELICOPTER EQUIPMENT FROM EXISTING OR NEW MATERIALS.						
(7287)	TITLE = MMT-MULTI-ELEMENT MODULES FOR ARRAY ANTENNAS	240	225				
	PROBLEM = CURRENT PHASE SHIFTING MODULES ARE ASSEMBLED USING DISCRETE COMPONENTS IN THE DRIVER CIRCUITS WHICH REQUIRES NUMEROUS MANUAL OPERATIONS DURING FABRICATION.						
	SOLUTION = DEVELOP AUTOMATED MANUFACTURING METHODS AND TECHNIQUES TO REPLACE MANUAL OPERATIONS USED IN THE FABRICATION AND TESTING OF PHASE SHIFTER MODULES.						
(7294)	TITLE = COMPOSITE APEX FITTING FOR ARMY A/C SLING APPLICTN					165	
	PROBLEM = CURRENT APEX FITTINGS ARE FORGED METAL (STEEL OR ALUMINUM) ITEMS WHICH REQUIRE CONSIDERABLE TIME AND LABOR FOR FINISHING AND ASSEMBLY.						
	SOLUTION = ESTABLISH MANUFACTURING TECHNOLOGY FOR PRODUCTION FABRICATION OF COMPOSITE APEX FITTINGS, THIS PROCESS/PRODUCT WILL INCLUDE BOTH MATERIALS AND LABOR COSTS FOR THIS TYPE ITEM.						
COMPONENT -- MISC COMPONENTS							
(7348)	TITLE = LIGHTWEIGHT COMPOSITE FASTENING SYSTEMS	216		150			
	PROBLEM = PRESENT METAL FASTENERS ARE EXCESSIVE IN COST, WEIGHT AND ARE SUBPAR IN PERFORMANCE.						
	SOLUTION = DEVELOP PRODUCTION METHODOLOGY FOR COMPOSITE FASTENERS APPLIED TO THE FABRICATION AND ASSEMBLY OF COMPOSITE HELICOPTER COMPONENTS.						

CATEGORY
AIRFRAME

		FUNDING ($000)				
	PRIOR	79	80	81	82	83
COMPONENT -- FUSELAGE STRUCTURES						
(7113) TITLE - MMT-LOW COST COMPOSITE FUSELAGE PRIMARY STRUCTURES		250	1000	900		
PROBLEM - CONVENTIONAL METALLIC FUSELAGE STRUCTURES ARE EXCESSIVE IN WEIGHT AND COMPOSITE FUSELAGE STRUCTURES ARE EXPENSIVE TO FABRICATE.						
SOLUTION - DEVELOP TECHNOLOGY TO MANUFACTURE A COMPOSITE BELLY PAN AND AFT FUSELAGE USING LOW COST COMPOSITE FABRICATION TECHNIQUES.						
(7183) TITLE - MMT-SEMI-AUTOMATED COMPOSITE MFG SYS FOR FUSELAGE	245	100	155	200		
PROBLEM - HELICOPTER FUSELAGE STRUCTURES HAVE HIGH MANUFACTURING COST DUE TO HIGH PART COUNT AND HIGH ASSEMBLY COSTS. METHODS OF COMPOSITE FABRICATION HAVE BEEN INVESTIGATED BUT HAND OPERATIONS RESULT IN HIGH LABOR COSTS.						
SOLUTION - FABRICATE AND DEMONSTRATE A SEMI-AUTOMATED COMPOSITE MANUFACTURING SYSTEM FOR THE PRODUCTION OF COMPOSITE HELICOPTER FUSELAGE STRUCTURAL PARTS.						
(7338) TITLE - MMT-COMPOSITE TAIL SECTION		980	990	350		
PROBLEM - MANUFACTURE OF HELICOPTER STRUCTURES DO NOT TAKE INTO ACCOUNT POTENTIAL ADVANTAGES RESULTING FROM COMPOSITES. COST, WEIGHT SAVINGS, AND BALLISTIC ADVANTAGES RESULT FROM THE USE OF COMPOSITES.						
SOLUTION - THIS PROJECT WILL DEVELOP FILAMENT WINDING MANUFACTURING TECHNOLOGY FOR FABRICATING AIRFRAME TAIL SECTION COMPONENTS.						
COMPONENT -- GENERAL						
(7001) TITLE - MFG TECHNOLOGY FOR AIRFRAME AND SECONDARY STRUCT				760	1270	1960
PROBLEM - MANUFACTURING PROBLEMS ARISING FROM INSUFFICIENTLY DEVELOPED STATE-OF-THE-ART TECHNOLOGY ARE RESPONSIBLE FOR VARIOUS FAILURES IN PRODUCTION BUY ITEMS.						
SOLUTION - DEVELOP TECHNOLOGY TO MANUFACTURE AIRFRAME AND SECONDARY STRUCTURES FROM EXISTING NEW METALLIC OR NONMETALLIC MATERIALS AT SUBSTANIALLY LOWER COSTS.						
(7302) TITLE - PROD OF TIB2 COATED LONG LIFE TOOLS				200		
PROBLEM - AIRFRAME FORGINGS REQUIRE EXTENSIVE MACHINING WHICH IS EXPENSIVE IN TERMS OF LABOR HOURS REQUIRED AND TOOL COSTS. COMPOSITES AND ABRASIVE MATERIALS ARE DIFFICULT TO MACHINE WITH CONVENTIONAL TOOLING.						
SOLUTION - DEVELOP AN ELECTRODEPOSITED TIB2 ON STEEL DRILLS THAT WILL INCREASE THE LIFE OF CONVENTIONAL TOOLS WHEN USED FOR DRILLING FIBERGLASS.						

		FUNDING ($000)					
		PRIOR	79	80	81	82	83
COMPONENT -- GENERAL (CONTINUED)							
(7341)	TITLE = STRUCTURAL COMPOSITE FABRICATION GUIDE			70	85		
	PROBLEM = THE NEED EXISTS TO DOCUMENT INDUSTRY EXPERIENCE IN COMPOSITES SO THAT COST AND MANUFACTURING COMPARISONS CAN BE MADE.						
	SOLUTION = THE GUIDE WILL PROVIDE INFORMATION IN A SYNERGISTIC FASHION TO PROVIDE PRODUCTION ANALYSIS, PROVIDE PROCESS/COST INTERRELATIONSHIPS AND PROMOTE A THOROUGH MANUFACTURING INTERFACE.						
COMPONENT -- MISC COMPONENTS							
(7238)	TITLE = PRECISION FORGED AL PM	72	443				
	PROBLEM = MANY HELICOPTER COMPONENTS ARE MADE FROM ALUMINUM ALLOY FORGINGS. THESE GENERALLY REQUIRE A LARGE NO OF MANUFACTURING OPERATIONS AND LOW MECHANICAL PROPERTIES.						
	SOLUTION = THIS PROJECT WILL DEVELOP TECHNOLOGY FOR REDUCING THE NUMBER OF MANUFACTURING STEPS AND INCREASING PROPERTIES AND PERFORMANCE OF THE COMPONENTS.						
(7240)	TITLE = MACHINING METHODS FOR ESR 4340 STEEL	130	75	125	110		
	PROBLEM = MANY CRITICAL HELICOPTER PARTS HAVE TO CONTAIN HIGH BALLISTIC TOLERANCE CHARACTERISTICS. TO OBTAIN THIS PROTECTION,THESE COMPONENTS ARE BEING FABIOFROM ESR 4340 STEEL. HOWEVER,THE MACHINING OF THISNEW MATERIAL IS NOT COST EFFECTIVE.						
	SOLUTION = TO ESTABLISH MACHINING PARAMETERS WHICH WILL ENABLE ESR 4340 TO BE MORE EFFICIENTLY MACHINED.						
(7243)	TITLE = MMT-EFFIC MACHINING METHODS FOR KEVLAR COMPOS STRU		104	150			
	PROBLEM = PRESENT TOOLING AND METHODS TEND TO CAUSE DELAMINATION AND EXCESSIVE FUZZING / FRAYING OF KEVLAR LAMINATES.						
	SOLUTION = DEVELOP TOOLING AND METHODS TO ACHIEVE BASIC MACHING OPERATIONS ON KEVLAR LAMINATES.						
(7244)	TITLE = LASER CUTTING AND WELDING OF METAL						330
	PROBLEM = TECHNIQUES ARE NEEDED THAT WILL REDUCE CUTTING AND WELDING TIMES ON AIRCRAFT PARTS.						
	SOLUTION = DEVELOP LASER WELDING TO PERMIT RAPID, PRECISE AND STRUCTURALLY SOUND WELDS. DEVELOP LASER CUTTING METHODS TO CUT COMPLEX CORNERS AT HIGH SPEED.						

		FUNDING ($000)					
		PRIOR	79	80	81	82	83
COMPONENT -- MISC COMPONENTS (CONTINUED)							
(7284)	TITLE = MMT-SUPERPLASTIC FORM OF TITANIUM FOR HELI COMPON	120	400				
	PROBLEM = CURRENT ENGINE COMPARTMENT STRUCTURES EMPLOY EITHER STEEL OR TITANIUM TO MEET THE HIGH TEMPERATURE REQUIREMENTS. AS SHEET METAL STRUCTURAL COMPONENTS, THESE ALLOYS ARE EXPENSIVE TO FABRICATE AND ASSEMBLE.						
	SOLUTION = DEVELOP A MANUFACTURING PROCESS THAT USES THE SUPERPLASTIC FORMING AND DIFFUSION BONDING (SPF/DB) PROPERTIES OF TITANIUM TO PRODUCE ENGINE COMPARTMENT STRUCTURES AND AIRFRAME PARTS.						
COMPONENT -- SECONDARY STRUCTURES							
(7202)	TITLE = APPL OF THERMOPLASTICS TO HELIC SEC STRUCTURES		225	225	50		
	PROBLEM = FULL-SCALE FLIGHTWORTHY SECONDARY STRUCTURES COMPOSED OF EPOXY COMPOSITE AND METALLIC COUNTERPART COMPONENTS ARE QUITE EXPENSIVE.						
	SOLUTION = DEVELOP THERMOPLASTIC MANUFACTURING TECHNOLOGY TO FABRICATE FULL-SCALE FLIGHTWORTHY SECONDARY STRUCTURES WITH A REDUCED COST.						
(7344)	TITLE = RIM MOLDING OF LOW COST SECONDARY STRUCTURES				150	190	
	PROBLEM = PRESENT METHODS OF FABRICATING AIRCRAFT SECONDARY STRUCTURES INVOLVE EXCESS LABOR, EXPENSIVE MATERIALS, AND COMPLEX ASSEMBLY.						
	SOLUTION = DEVELOP MANUFACTURING PROCESS TO PRODUCE SECONDARY STRUCTURES FROM REACTION INJECTION MOLDING.						
COMPONENT -- STRUCTURAL MEMBERS							
(7193)	TITLE = ADV FILAMENT WNDG FOR AIRCRAFT COMPONENTS						350
	PROBLEM = CURRENT COMMERCIAL PRACTICES ON FILAMENT WINDING ARE EXPENSIVE.						
	SOLUTION = A NUMBER OF RECENT DEVELOPMENT IN FILAMENT WINDIN G TECHNOLOGY ORIGINATING IN THE U.S., DENMARK, AND HUNGARY SHOW PROMISE OF EXPANDING THE FLEXIBILITY OF THE FILAMENT WINDING PROCESS.						
(7342)	TITLE = PULTRUSION OF HONEYCOMB SANDWICH STRUCTURES			115	200		
	PROBLEM = FABRICATION OF HONEYCOMB SANDWICH PANELS IS LABOR INTENSIVE AND FACE-TO-CORE BONDING OFTEN TAKES TWO CURE OPERATIONS.						
	SOLUTION = DEVELOP TECHNOLOGY FOR THE USE OF PULTRUSION IN THE CONTINUOUS PRODUCTION OF SANDWICH STRUCTURES.						

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* CATEGORY *
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*AVIONICS *
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MMT FIVE YEAR PLAN
RCS DRCMT 126

		FUNDING ($000)				
	PRIOR	79	80	81	82	83
COMPONENT -- DISPLAYS						
(7319) TITLE - MULTI-LEGEND DISPLAY SWITCH (MLD/S)					315	285
PROBLEM - EXPERIMENTAL VERSIONS ARE EXPENSIVE AND DIFFICULT TO MANUFACTURE BECAUSE THE MOUNTING OF THE COMMERCIALLY AVAILABLE ELECTRONICS DISPLAY CHIPS AND SWITCHES MUST BE DONE BY HAND TO OBTAIN PROPER RUGGEDNESS AND OPERATION OF THE STRUCTURE.						
SOLUTION - MAKE THE MLD/S A MANUFACTURABLE ITEM SO THAT IT CAN BE MADE ROUTINELY AVAILABLE FOR INCORPORATION IN AVIONIC SYSTEMS, ESTABLISH THE MANUFACTURING TECHNIQUES TO PROPERLY MOUNT, ALIGN, AND FABRICATE MILITARIZED DISPLAYS AND SWITCHES.						
COMPONENT -- GENERAL						
(7006) TITLE - MMT MAN TECHNOLOGY FOR AVIONICS					390	410
PROBLEM - MANUFACTURING PROBLEMS ARISING FROM INSUFFICIENTLY DEVELOPED STATE-OF-THE-ART TECHNOLOGY ARE RESPONSIBLE FOR VARIOUS FAILURES IN THE AVIONICS AREA.						
SOLUTION - DEVELOP TECHNOLOGO TO MANUFACTURE NEW O= +MPROVED TECHNIGUES THAT WILL INCREASE RELIABILITY AND RED UCE LIFE CYCLE COSTS IN THE AVIONICS FIELD.						
(7292) TITLE - MMT-FAULT DETECTION / ISOLATION TESTING OF MICROPR		250	150			
PROBLEM - TESTING OF CPU CARDS INTERMITTENT MICROPROCESSOR PART FAILURES ARE MOST DIFFICULT PROBLEMS TO SOLVE. STD AUTOMATIC TEST EQPT BECOMES INEFFICIENT,OR UNPREGNABLE,WHEN CMPLX INTEGRATED CKTS ARE PORTIONS OF THE PRINTED CKT CARD TESTED.						
SOLUTION - DEVELOP METHODS OF ISOLATING LARGE NUMBER OF LEADS ON SAME BUSS FOR TEST PURPOSES,USE PLUGGABLE CPU (REPLACING IT WITH A SIMULATOR WHENEVER THE PCB FAILS), AND DEVELOP PROGRAMMING TECHNIGUES.						
(7315) TITLE - MMT - POISE GIMBAL PRODUCIBILITY		147	100	50		
PROBLEM - THE PRESENT APPROACH TO FABRICATION OF THE SEVERAL GIMBALS AND BASE PLATE IS CASTING AND MACHINING MAGNESIUM . MAGNESIUM GIMBALS ARE EXPENSIVE AND HAVE A RATHER LOW STIFFNESS.						
SOLUTION - CONSIDER NEW MATERIALS (GRAPHITE-EPOXY OR KEVLAR-EPOXY) THAT OFFER THE PROBABILITY OF SUBSTANTIALLY HIGHER STIFFNESS AND LOWER PRODUCTION COST.						

CATEGORY
DRIVE SYSTEM

		FUNDING ($000)					
		PRIOR	79	80	81	82	83
COMPONENT -- BEARINGS							
(7334)	TITLE - ESTABLISH MANTECH FOR POWDER PROC ROLLING BEARINGS					140	140
	PROBLEM - LIFE IMPROVEMENTS CONDUCTED ON POWDER PROCESSED AISI M50 STEEL HAVE BEEN OBSERVED WHEN COMPARED TO WROUGHT CONSUMABLE VACUUM ARC REMELTED (CVM) AISI M50 STEEL.						
	SOLUTION - DEVELOP ECONOMICALLY SOUND PRODUCTION PROCEDURES FOR QUALITY ASSURANCE OF THE POWDER, PRESSING AND SINTERING, AND SUBSEQUENT OPERATIONS TO MANUFACTURE FINISHED COMPONENTS. THE COMPONENTS WILL BE PRESSED TO NEAR NET SHAPE.						
COMPONENT -- GEARS							
(7003)	TITLE - MANUFACTURING TECHNOLOGY FOR DRIVE PARTS AND COMP				470	440	835
	PROBLEM - MANUFACTURING PROBLEMS ARISING FROM INSUFFICIENTLY DEVELOPED STATE-OF-THE-ART TECHNOLOGY ARE RESPONSIBLE FOR FAILURE IN PRODUCTION BUY ITEMS.						
	SOLUTION - DEVELOP TECHNOLOGY TO MANUFACTURE METALLIC AND NON-METALLIC DRIVE PARTS FROM EXISTING OR NEW MATERIALS TO INCREASE RELIABILITY AND DECREASE LIFE CYCLE COSTS.						
(7155)	TITLE - COST EFFECTIVE MFG METHODS FOR HELICOPTER GEARS	461		200	300		
	PROBLEM - DEMAND IN HELICOPTER OPERATION OF GREATER RELIABILITY OF HIGH PERFORMANCE GEARS AT LOWER COST HAS REQUIRED THAT IMPROVED PROCESSING AND EVALUATION TECHNIQUES BE INSTITUTED.						
	SOLUTION - FABRICATE AND DEMONSTRATE A SEMI-AUTOMATED COMPOSITE MANUFACTURING SYSTEM FOR THE PRODUCTION OF COMPOSITE HELICOPTER FUSELAGE STRUCTURAL PARTS.						
(7187)	TITLE - POWDER MET GEARS FOR GAS TURBINE ENGINES					220	275
	PROBLEM - PRODUCE GEARS FOR TURBINE ENGINES AT A LOWER COST.						
	SOLUTION - DEVELOP THE MANUFACTURING AND QUALIFICATION FOR THE PRODUCTION OF LIGHTLY STRESSED, LOW TEMPERATURE POWDER METALLURGY GEARS FOR SELECTED NON-CRITICAL APPLICATIONS.						
(7198)	TITLE - COMPOSITE MATLS FOR ENG ASSESSORY GEARBOX HOUSING				200	440	
	PROBLEM - ENGINE GEARBOXES ARE MANUFACTURED FROM ALUMINUM SAND CASTINGS WHICH RESULT IN NUMEROUS FINISH MACHINING OPERATIONS AND A WEIGHT PENALTY.						
	SOLUTION - ESTABLISH MANUFACTURING PROCEDURES FOR PRODUCING GEARBOXES AND COVERS UTILIZING COMPOSITE TECHNOLOGY TO AVOID COST AND WEIGHT PENALTIES.						

		FUNDING ($000)				
	PRIOR	79	80	81	82	83
COMPONENT -- GEARS (CONTINUED)						
(7199) TITLE - MM&T-SURFACE HARD OF GEARS BY LASERS	200	200	250			
PROBLEM - CASE CARBURIZING IS EXPENSIVE, REQUIRING MUCH ENERGY, QUENCHING DIES, AND FINAL GRINDING.						
SOLUTION - THIS NEW METHOD WILL REDUCE COSTS BY REDUCING THE ENERGY REQUIRED TO HEAT TREAT, ELIMINATE THE QUENCHING PROCESS, AND PROVIDE THE POTENTIAL FOR ELIMINATING FINAL GRIND.						
(7267) TITLE - LOW COST GEARS FOR TURBINE ENGINES AND ACC GEARBOX				250	415	160
PROBLEM - CURRENT PRODUCTION METHODS FOR GEARS DO NOT TAKE AVAILABLE.						
SOLUTION - DEMONSTRATE THE ECONOMY OF USING ADVANCED TECHNOLOGICAL PROCESSES SUCH AS ORBITAL PRECISION FORGING, LASER OR ELECTRON BEAM HARDENING, ROLL-FORMED GEAR TEETH AND POT BROACHING IN THE MANUFACTURE OF AIRCRAFT GEARS.						
(7298) TITLE - MMT-EVALUATION OF HIGH TEMPERATURE CARBURIZING		125	150	250		
PROBLEM - PRESENT GEAR CARBURIZING IS PERFORMED AT 1700 DEG F (PER MIL-S-6090 WHICH REQUIRES PROCESSING TIMES OF 8-10 HOURS.						
SOLUTION - REDUCE PROCESSING TIME BY INCREASING THE OPERATING CAPACITY. ALSO INVESTIGATE VACUUM CARBURIZING AND HARDING OF VARIOUS GEAR CONFIGURATIONS IN ORDER TO PRODUCE A MORE UNIFORM CARBON PROFILE OF GEAR TEETH.						
(7325) TITLE - AUTO LASER INSPECTION OF SPIRAL BEVEL GEARS				150	275	
PROBLEM - THE CONTROL OF TOOTH GEOMETRY IN SPIRAL BEVEL GEARS REQUIRES EXTENSIVE MANUAL INSPECTION AND CHECKS RELATIVE TO MASTER GEARS.						
SOLUTION - THIS PROJECT WILL AUTOMATE THE INSPECTION TECHNIQUE AND PROVIDE BETTER QUALITY CONTROL WITH REDUCED INSPECTION TIME.						
(7367) TITLE - BEARING GRINDING AND HONING TECHNIQUES				975	225	
PROBLEM - CURRENT HELICOPTER OVERHAUL PROCEDURES CALL FOR BEARINGS TO BE REPLACED INSTEAD OF BEING OVERHAULED OR REPAIRED.						
SOLUTION - THIS PROJECT WILL DEVELOP THE MFG TECHNOLOGY FOR REPAIR / RESTORATION OF REJECTED BEARING SURFACES.						
COMPONENT -- SHAFTS						
(7326) TITLE - ADAPT OF ELECTRON BEAM WELDING FOR REPAIR SHAFTS					220	385
PROBLEM - DURING OVERHAUL OF HELICOPTER TRANSMISSIONS THE PERCENTAGE OF PART REJECTION FOR SPLINE WEAR IS HIGH FOR GEARS WITH SPLINE INTEGRAL SHAFTS.						
SOLUTION - DEVELOP THE TOOLING AND INSPECTION PROCEDURES FOR ELECTRON BEAM (EB) WELD COMPLEX GEAR SHAFT/SPLINE ELEMENTS.						

		FUNDING ($000)				
	PRIOR	79	80	81	82	83
COMPONENT -- SHAFTS						
(7108) TITLE - MFG TECHNIQUES FOR TRANSMISSION SHAFT SEALS	135			100		
PROBLEM - CURRENT HELICOPTER TRANSMISSION SEALS ARE SUSCEPTABLE TO WEAR AND THERMAL DEGRADATION RESULTING IN LEAKAGE OF TRANSMISSION OIL AND FREQUENT SEAL REPLACEMENT.						
SOLUTION - INTEGRAL MOLDING OF A HYBRID ELASTOMERIC SEGMENTED CARBON RING SEAL COMBINES THE COMPLIANCE OF ELASTOMERIC TIP SEALS WITH THE WEAR RESISTANCE AND TEMPERATURE TOLERANCE OF MECHANICAL CARBON SEALS.						
COMPONENT -- TRANSMISSION HOUSING						
(7354) TITLE - INTEGRALLY STIFFENED HELICOPTER TRANS CASE				650	950	600
PROBLEM - THE LOW STIFFNESS OF THE CURRENT CH-47 CAST MAGNESIUM ALLOY TRANSMISSION CASE CAUSES EXCESSIVE GEAR WEAR, EXCESSIVE NOISE AND EXCESSIVE VIBRATION.						
SOLUTION - THIS PROJECT WILL ESTABLISH THE MANUFACTURING PROCESS FOR CASTING FIBER REINFORCED, INTEGRALLY STIFFENED CH-47 TRANSMISSION CASES.						

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* CATEGORY *
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*GENERAL *
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COMPONENT -- ALL						
(7323) TITLE - AUTO PROP BLADE FAB PROCESS FOR MINI-RPV PROPELLER						100
PROBLEM - FABRICATION OF MINI-RPV PROPELLERS TO DATE HAS BEEN PRIMARILY BY HAND.						
SOLUTION - DEVELOP AN AUTOMATED FABRICATION PROCESS FOR PRODUCING PROPELLER BLADS OUT OF COMPOSITE MATERIALS, WHICH HAVE HIGH STRENGTH, LOW COST, AND ARE LIGHT IN WEIGHT.						
(7343) TITLE - CONTROLLED LEAK PRESSURE PROCESS				200		
PROBLEM - LIGHTWEIGHT COMPOSITE STRUCTURES ARE TYPICALLY COMPOSED OF A NOMEX CORE WITH BONDED FIBER REINFORCED SKINS. THE CORE MATERIAL AND ASSOCIATED MACHINING IS COSTLY AND SHOULD BE ELIMINATED.						
SOLUTION - THE CONTROLLED LEAK PRESSURE PROCESS PROVIDES A MEANS OF PRODUCING 'HOLLOW' STRUCTURES WITHOUT THE USE OF A PRESSURE BAG OR CORE MATERIAL. THE ULTIMATE RESULT IS A LIGHTWEIGHT, HOLLOW CORE, INTEGRALLY STIFFENED STRUCTURE.						

		FUNDING ($000)				
	PRIOR	79	80	81	82	83
COMPONENT -- ALL (CONTINUED)						
(7362) TITLE - ENG DESIGN HANDBOOK FOR TITANIUM CASTINGS				55	70	
PROBLEM - NO PROVISION HAS BEEN MADE FOR COLLECTING INFORMATION FROM THE ADVANCING STATE OF THE ART IN CAST TITATIUM ALLOYS.						
SOLUTION - THIS PROJECT WOULD COLLECT INFORMATION FROM PAST AND ONGOING PROJECTS DEALING WITH HIGH QUALITY TITANIUM CASTINGS, CREATE NEW DATA TO FILL TECHNICAL GAPS, AS REQUIRED, AND GENERATE AN ENGINEERING DESIGN HANDBOOK.						
COMPONENT -- SAFETY						
(7022) TITLE - PDN OF POLYPHOSPHAZENE FIRE RESIST HYDRAULC FLUIDS						220
PROBLEM - CURRENT HYDRAULIC FLUIDS THAT MEET REQUIRED PERFORMANCE SPECIFICATIONS ARE FLAMMABLE.						
SOLUTION - THE DEVELOPMENT OF PHOSPHAZENE FLUIDS DEMONSTRATE THERMAL STABILITY, VISCO-ELASTIC PROPERTIES, AND FIRE RESISTANCE. THIS WOULD INCREASE THE FIRE SAFETY OF ARMY AIRCRAFT.						

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* CATEGORY *
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*ROTOR SYSTEM *
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COMPONENT -- BLADE						
(7052) TITLE - ULTRASONICALLY ASSISTED NOSE CAP FORMING	718		200	50		
PROBLEM - NOSE CAPS USED ON LEADING EDGE OF ROTOR BLADES ARE CURRENTLY BEING HOT FORMED, A TECHNIQUE WHICH REQUIRES LONG PROCESSING TIMES, COSTLY TOOLING, AND EXPENSIVE CHEMICAL ETCHING.						
SOLUTION - DEVELOP AN ULTRASONICALLY ASSISTED COLD FORMING PROCESS TO FABRICATE LEADING EDGE EROSION STRIPS FROM SHEET MATERIAL.						
(7288) TITLE - DET OF OPTIMAL CURE COND FOR PROC FIBER REIN COMPO		125	200	175		
PROBLEM - CURRENT METHODS OF CURING COMPOSITES ARE BASED ON EMPIRICAL DETERMINATION OF REQUIRED PROCESSING CONDITIONS. A TRIAL AND ERROR PROCEDURE IS FOLLOWED UNTIL THE MANUFACTURER IS REASONABLY SATISFIED WITH MECHANICAL PROPERTIES.						
SOLUTION - BY DEVELOPING AND EMPLOYING IMPROVED METHODS OF DETERMINING REQUIRED PROCESSING CONDITIONS FOR COMPOSITES, TIME AND PRODUCTIVITY CAN BE IMPROVED IN THE MOLD.						

		FUNDING ($000)				
	PRIOR	79	80	81	82	83
COMPONENT -- BLADE (CONTINUED)						
(7339) TITLE = COMPOSITE TAIL ROTOR BLADE			525	1000	500	
PROBLEM = FILAMENT WINDING FROM A SOLID FLEXBEAM TO AN OPEN SPAR SECTION, WINDING TO NET SHAPE, IMPROVED RESIN CONTROL AND TOLERANCE CONTROL MUST BE OBTAINED TO ENHANCE THE COST EFFECTIVENESS OF FLEXBEAM TAIL ROTERS.						
SOLUTION = TECHNIQUES WILL BE DEVELOPED FOR CONTINUOUS FILAMENT WINDING FROM OPEN TO CLOSED SECTIONS, WINDING NET CONTOUR SHAPE, OPTIMIZING TOLERANCE CONTROL WITH IMPROVED TOOLING, AND IMPROVED RESIN CONTROL TO ENSURE MINIMUM WEIGHT COMPONENTS.						
(7340) TITLE = MM+T=COMPOSITE MAIN ROTOR BLADE		739	2950	500		
PROBLEM = CURRENT PRODUCTION COMPOSITE BLADE PROGRAMS HAVE NOT BEEN ORIENTED TOWARD OPTIMIZING MANUFACTURING TECHNIQUES/PROCESSES RELATED TO BLADE CONFIGURATIONS, FABRICATION METHODS, AND IMPROVED STRUCTURAL RELIABILITY.						
SOLUTION = IMPROVED METHODS WILL INCLUDE SOFT INFLATABLE MANDRELS, INCREASE IN FIBER BAND WIDTH, IMPROVED MATRIX CONTROL PROCEDURES, BALANCED SHELL TOOLING, AND NET SHAPE WINDING.						
COMPONENT -- BLADE/LEADING EDGE						
(7175) TITLE = AUTO BLADE CONTOUR INSP COM AIDED INSPECTION				275	300	
PROBLEM = CONTOUR INSPECTION OF PRODUCTION ROTOR BLADES IS TIME CONSUMING AND IS SUBJECT TO HUMAN ERROR.						
SOLUTION = DESIGN AND DEVELOP A COMPUTER AIDED GAUGING SYSTEM TO AUTOMATICALLY INSPECT CONTOURS OF SPARS AND AIRFOILS OF HELICOPTER ROTOR BLADES.						
(7297) TITLE = LOW COST URETHANE LE GUARDS		98				
PROBLEM = THE CURRENT AH-1G COMPOSITE IMPROVED MAIN ROTOR BLADE ULITIZES A THERMOPLASTIC POLYURETHANE LEADING EDGE EROSION GUARD. WHILE THIS DESIGN OFFERS SIGNIFICANT ADVANTAGES IN PERFORMANCE AND COST, SIGNIFICANT IMPROVEMENT CAN BE MADE IN MFG PROCESS						
SOLUTION = DEVELOP A MANUFACTURING TECHNOLOGY FOR IMPROVED FABRICATION METHODOLOGY FOR THE LEADING EDGE GUARD FOR ADVANCED AH-1G. IT IS PROPOSED TO SIMULTANEOUSLY COMPRESSION MOLD AND BOND THE LEADING EDGE GUARD IN PLACE ON THE FINISHED BLADE.						
COMPONENT -- HUB						
(7241) TITLE = MMT=HOT ISOSTATICALLY PRESSED TITANIUM CASTINGS	126	600	250	275		
PROBLEM = THE CURRENT METHOD OF MANUFACTURING ROTOR HUBS RESULTS IN EXCESSIVE USE OF MATERIALS AND MACHINING.						
SOLUTION = DEVELOP A PROCESS FOR HOT ISOSTATIC PRESSING OF A CAST TITANIUM ROTOR HUB.						

		FUNDING ($000)					
		PRIOR	79	80	81	82	83
COMPONENT -- HUB (CONTINUED)							
(8139)	TITLE - COMPOSITE MAIN ROTOR HUB						500
	PROBLEM - UNACCEPTABLE SIZE AND WEIGHT PENALTIES ARE INCURRED WHEN CONVENIONTAL METALLIC MATERIALS ARE USED FOR ADVANCED HUB DESIGNS.						
	SOLUTION - DEVELOP THE FABRICATION TECHNOLOGY, TOOLING AND AUTOMATED TECHNIQUES NECESSARY TO MANUFACTURE COMPOSITE ROTOR HUBS.						
COMPONENT -- MISC COMPONENTS							
(7004)	TITLE - MFG TECHNOLOGY FOR ROTOR ITEMS AND ASSOCIATE COMPS					190	1620
	PROBLEM - MANUFACTURING PROBLEMS ARISING FROM INSUFFCIENTLY DEVELOPED STATE-OF-THE-ART TECHNOLOGY ARE RESPONSBLE FOR VARIOUS FAILURES IN PRODUCTION BUY ITEMS.						
	SOLUTION - DEVELOP TECHNOLOGY TO MFG ROTOR ITEMS AND ASSOCIATED COMPONENTS FROM EXISTING OR NEW MATERIALS THAT WILL INCREASE RELIABILITY AND REDUCE LIFE CYCLE COSTS.						
(7119)	TITLE - MMT-NON-DESTRUCTIVE EVAL TECH FOR COMPOSITE STRUCT	96	400	400			
	PROBLEM - IMPLEMENTATION OF COMPOSITE STRUCTURES IN THE ARMY AIRCRAFT IS DEPENDANT UPON THE ABILITY TO DETECT AND EVALUATE DEFECTS.						
	SOLUTION - ESTABLISH A VIABLE AND COMPREHENSIVE IN-PROCESS INSPECTION PROGRAM FOR NON-DESTRUCTIVE INSPECTION OF COMPOSITE STRUCTURES.						
(7345)	TITLE - IN-PROCESS CONTROL OF RESIN MATRIX CURE				250		
	PROBLEM - CONVENTIONAL CONTROL OF THE CURE STAGE IS ATTAINED THROUGH MANUAL OPERATIONS WITH INCONSISTENT QUALITY.						
	SOLUTION - USE IN-PROCESS CONTROL TECHNIQUES CAPABLE OF MONITORING THE RESIN FLOW/CURE BEHAVIOR TO INSURE PRODUCTION OF COMPONENTS HAVING CONSISTENTLY HIGH QUALITY.						

CATEGORY

TURBINE ENGINE

COMPONENT -- CERAMIC COMPONENT							
(7268)	TITLE - CERAMIC TURBINE STATOR PARTS					1375	1510
	PROBLEM - EXPENSIVE ALLOYS WITH EXOTIC ELEMENTS ARE CURRENTLY REQUIRED TO EXTEND THE OPERATING TEMPERATURE OF METALLIC ENGINE COMPONENTS TO 2500 F.						
	SOLUTION - DEVELOP AND DEMONSTRATE THE ECONOMICAL OPERATION OF CERAMIC COMPONENTS FOR HIGH TURBINE TEMPERATURE APPLICATION.						

		FUNDING ($000)					
		PRIOR	79	80	81	82	83
COMPONENT -- COMBUSTOR							
(7322)	TITLE - LOW COST TRANSPIRATION COOLED COMBUSTOR LINER					125	275
	PROBLEM - COMBUSTOR LINERS OF ADVANCED GAS TURBINE ENGINES ARE REQUIRED TO SURVIVE USING LESS COOLING AIRFLOW THAN HERETOFORE AVAILABLE.						
	SOLUTION - DEVELOP A LOW COST MANUFACTURING TECHNIQUE TO FORM THE NECESSARY COMPLEX SHAPES AND COOLING PASSAGES SUITABLE FOR HIGH COOLING EFFECTIVENESS.						
COMPONENT -- COMPRESSOR							
(7036)	TITLE - MM&T-ISOTHERMAL ROLL FORGING OF COMP BLADES	505	275	310			
	PROBLEM - TECHNOLOGY FOR FABRICATING ADVANCED ENGINE MATERIALS INTO COMPRESSOR BLADE CONFIGURATIONS IS EITHER UNAVAILABLE OR EXCESSIVE IN COST.						
	SOLUTION - ISOTHERMAL ROLL FORGING IS A UNIQUE FABRICATION PROCESS CAPABLE OF PRODUCING SHAPES FREE FROM SURFACE CONTAMINATION WITH SURFACE FINISHES EQUAL TO COLD FORGING AT REDUCED COSTS.						
(7143)	TITLE - MFG OF SPRAY ABRADABLE GAS PATH SEAL SYSTEM				300	435	
	PROBLEM - MANUFACTURING AND REPLACEMENT COSTS OF ABRADABLE SHROUD MATERIALS ARE EXCESSIVE.						
	SOLUTION - DEVELOP RELIABLE SPRAY TECHNIQUES, EQUIPMENT AND CONTROL THAT WILL PRODUCE A CONSISTENT AND COST EFFECTIVE ABRADABLE SEAL.						
(7235)	TITLE - REPAIR PROCEDURE FOR REPLACING DAMAGED BLADES					250	440
	PROBLEM - BLISKS USED IN THE T700 ENGINE ARE INTEGRAL BLADES AND DISKS, DAMAGE TO ANY ONE BLADE DURING MANUFACTURE OR OPERATION RESULTS IN SCRAPPING THE WHOLE BLISK.						
	SOLUTION - DEVELOP AN ECONOMICAL REPAIR PROCEDURE TO SALVAGE THE BLISKS UTILIZING A JOINING PROCESS THAT PROVIDES PROPERTIES EQUAL TO THE PARENT MATERIAL.						
(7285)	TITLE - MMT-CAST TITANIUM IMPELLER FOR TURBINE ENGINE	150	300	300	200		
	PROBLEM - LARGE AMOUNTS OF MATERIAL WASTAGE AND EXTENSIVE MACHINING TIMES ARE REQUIRED WHEN TITANIUM IMPELLERS ARE MACHINED FROM OVERSIZED FORGINGS.						
	SOLUTION - PRODUCTIONIZE THE PROCESSING TECHNIQUES REQUIRED FOR THE MANUFACTURE OF HIGH PERFORMANCE LOW COST IMPELLER CASTINGS.						
(7291)	TITLE - MMT-TITANIUM POWDER METAL COMPRESSOR IMPELLER		240	240			
	PROBLEM - WHEN COMPLEX CONFIGURATIONS, SUCH AS CENTRIFUGAL IMPELLERS AND COMPRESSOR ROTORS ARE UTILIZED IN GAS TURBINE ENGINES, TYPICALLY HIGH MANUFACTURING COST ARE ENCOUNTERED.						
	SOLUTION - DEVELOP OVERALL PROCESS CONTROLS CAPABLE OF REPRODUCIBLY PRODUCING 100 % DENSE PARTS WITH TENSILE , AND FATIGUE STRENGTHS EQUAL TO THOSE OF HIGH QUALITY TITANIUM FORGINGS.						

		FUNDING ($000)				
	PRIOR	79	80	81	82	83
COMPONENT -- GENERAL						
(7200) TITLE - MMT-COMPOSITE ENGINE PARTICLE SEPARATOR		400	100	250		
PROBLEM - THE INLET PARTICLE SEPARATOR STRUCTURE IS COSTLY AND HEAVY.						
SOLUTION - DEVELOP AND DEMONSTRATE A COMPOSITE INLET PARTICLE SEPARATOR SWIRL FRAME WHICH SATISFACTORILY REPLACES THE MORE COSTLY AND THE HEAVIER CONVENTIONALLY FABRICATED THIN SHEET METAL PRODUCTION DESIGN.						
(7248) TITLE - CLOSED LOOP MACHINING, MID-FRAME				716	270	
PROBLEM - THE ENGINE MID-FRAME HAS 22 DIAMETERS WITH TOLERANCES RANGING FROM .001 IN. THESE TOLERANCES RESULT IN HIGH MACHINING, REWORK AND INSPECTION COSTS.						
SOLUTION - DEVELOP CLOSED LOOP MACHINING THAT WILL AUTOMATICALLY COMPENSATE FOR ANY DEVIATION IN NUMERICAL CONTROLLED PROGRAMMED PLAN THEREBY REDUCING PRODUCTION COSTS.						
COMPONENT -- MISC COMPONENTS						
(7286) TITLE - MMT-HIGH QLTY SUPERALLOY POWDER FOR TURBINE COMPNT	220	358	120			
PROBLEM - VENDORS HAVE EXPERIENCED DIFFICULTY IN CLEANLINESS OF SUPERALLOY POWDERS.						
SOLUTION - REDUCE THE COST OF SUPERALLOY AND IMPROVE THE PERFORMANCE OF AS-HIP MATERIALS BY IMPROVING THE POWER CLEANLINESS LEVEL.						
COMPONENT -- TURBINE BLADES						
(7071) TITLE - PRESS DIE CASTING SUPERALLOY TURBINE BLADES/VANES					1100	1650
PROBLEM - THE INVESTMENT CAST PROCESS USED TO PRODUCE ALL COBALT AND NICKEL BASE SUPERALLOY BLADES REQUIRES MACHINING AWAY EXCESS MATERIAL WHICH BECOMES SCRAP.						
SOLUTION - PRESSURE DIE CASTING OF SUPERALLOY BLADES AND VANES TO NEAR NET SHAPES WILL BE DEVELOPED AS A COMMERCIAL PROCESS.						
(7086) TITLE - ABRADABLE SEALS FOR TURBINE BLADES	100	100				
PROBLEM - EXTRA BLADE TIP CLEARANCE IS ALLOWED IN HELICOPTER ENGINES TO PREVENT TIP RUBBING! AND THIS DEGRADES PERFORMANCE.						
SOLUTION - DEVELOP THE MANUFACTURING PROCESS TO OBTAIN REPLACEABLE ABRADABLE SEALS BUILT INTO THE TURBINE SHROUDS.						

		FUNDING ($000)					
		PRIOR	79	80	81	82	83
COMPONENT -- TURBINE ROTORS							
(7191)	TITLE - COST EFFECTIVE PRODUCTION OF COOLED TURBINE ROTORS						440
	PROBLEM - PRODUCTION PROCESSES AND QUALITY CONTROL PROCEDURES DO NOT CURRENTLY EXIST FOR AIR-COOLED TURBINE ROTORS.						
	SOLUTION - DEVELOP A COST EFFECTIVE PROCEDURE FOR PRODUCING AND ASSURING THE QUALITY OF SINGLE AIR-COOLED ROTORS WHICH CAN DO THE WORK OF TWO STAGES UNDER PRESENT TECHNOLOGY.						
(7197)	TITLE - FABRICATION OF INTEGRAL ROTORS BY JOINING	300	100	100	350		
	PROBLEM - CURRENT GAS TURBINE ROTORS ARE EITHER INTEGRALLY CAST OR THE BLADES AND DISKS ARE SEPARATE UNITS. THE BLISK CONCEPT DOES NOT PERMIT OPTIMUM MECHANICAL PROPERTIES OF THE UNIT AND THE OTHER METHOD REQUIRES COMPLEX AND EXPENSIVE MACHINING.						
	SOLUTION - A BONDED BLADE AND DISK ELIMINATES THE EXPENSIVE MACHINING REQUIRED FOR MECHANICAL ATTACHMENTS AND PERMITS OPTIMUM MECHANICAL PROPERTIES.						
(7300)	TITLE - IMPROVED LOW CYCLE FATIGUE CAST ROTORS				250	330	330
	PROBLEM - INTEGRALLY CAST TURBINE ENGINE ROTORS HAVE BEEN SHOWN TO BE COST EFFECTIVE, HOWEVER, INVESTMENT CASTING RESULTS IN LARGE GRAIN SIZES IN THE DISK REGION AND THIS REDUCES FATIGUE LIFE COMPARED TO WROUGHT MATERIAL.						
	SOLUTION - DEFINE CASTING AND HEAT TREAT PARAMETERS, AND FINALIZE THE MANUFACTURING TECHNOLOGY FOR ESTABLISHING FINE-GRAINED CAST ROTOR PRODUCTION UTILIZING GRAIN-REFINEMENT TECHNIQUES.						
(7351)	TITLE - COMPOSITE SHAFTING FOR TURBINE ENGINES				300	300	
	PROBLEM - CURRENT MATERIAL CAPABILITIES ASSOCIATED WITH HIGH SPEED GAS TURBINE ENGINE SHAFTING REQUIRE EXCESS BEARINGS AND CAREFUL DESIGN REGARDING SHAFT DYNAMICS.						
	SOLUTION - RECENT DEVELOPMENTS IN FABRICATING METAL MATRIX COMPOSITE SHAFTING OFFER INCREASED STIFFNESS AND CRITICAL SPEEDS BY 30-40 PERCENT AND CAN REDUCE THE DIAMETER.						

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MANUFACTURING METHODS AND TECHNOLOGY PROGRAM PLAN, CY 1979.(U)
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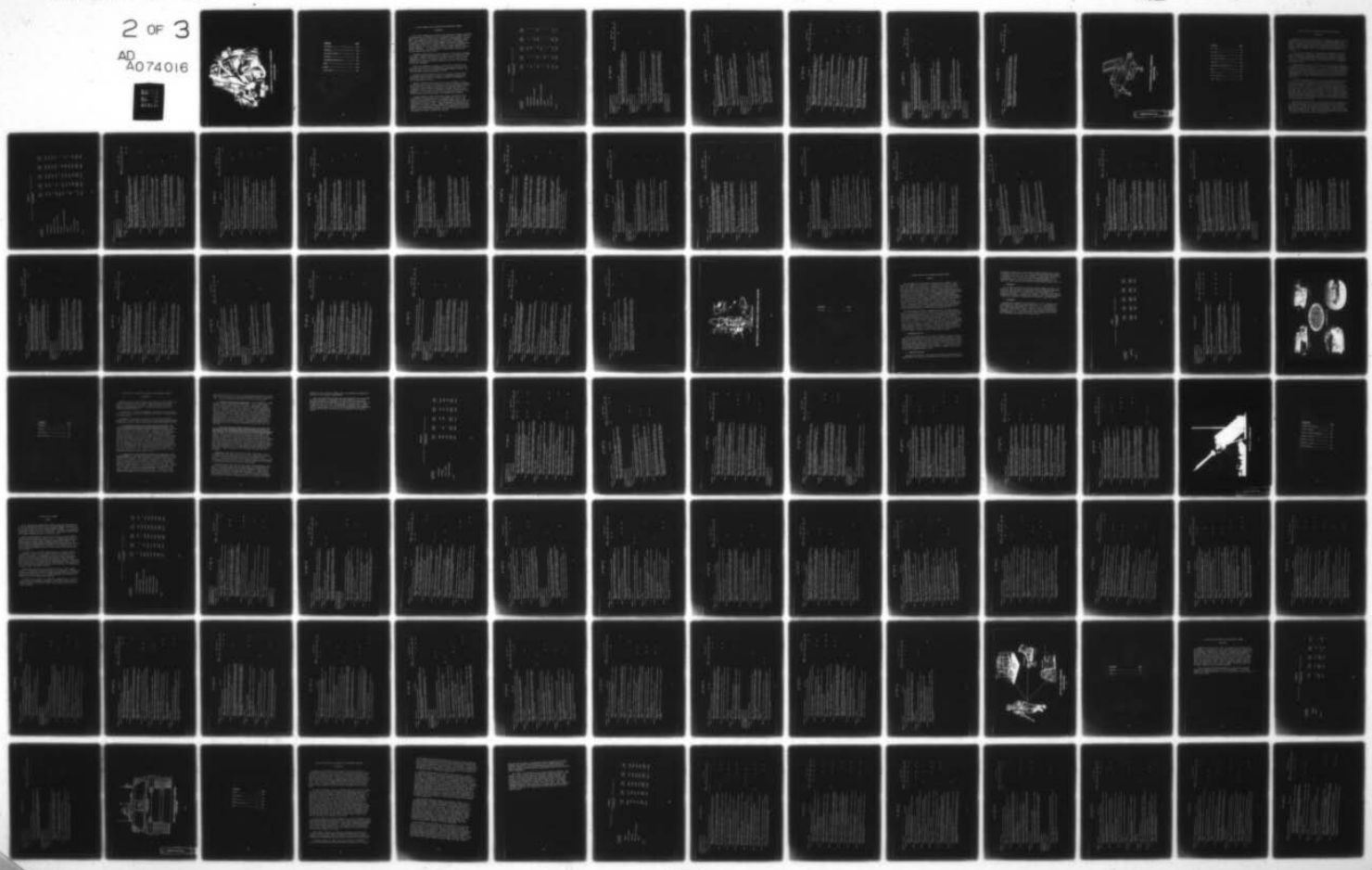

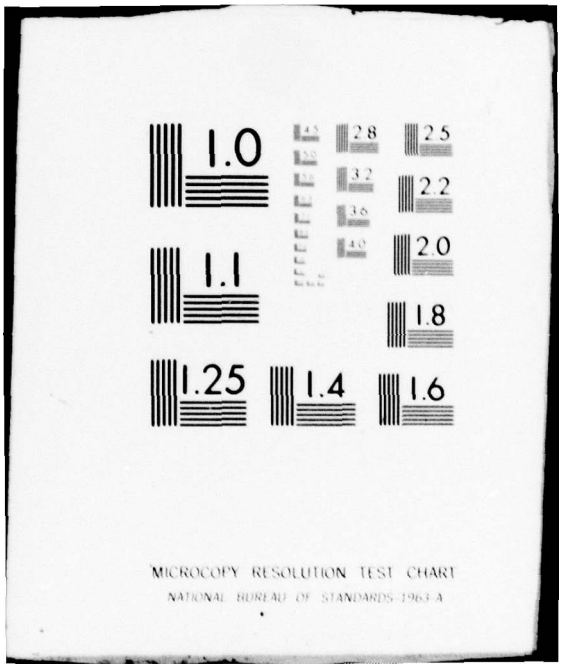
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COMMUNICATIONS R&D COMMAND

(CORADCOM)

US ARMY COMMUNICATIONS RESEARCH AND DEVELOPMENT COMMAND

(CORADCOM)

The US Army Communications Research and Development Command (CORADCOM), headquartered at Ft. Monmouth, NJ, is responsible for research, development, first production, and initial fielding of communications, tactical data, and command and control systems for the Army. CORADCOM consists of laboratory and technical support segments and Project Managers of Multi-Service Communications System (MSCS), Army Tactical Communications System (ATACS), and project managed elements of Army Tactical Data Systems (ARTADS), i.e., Tactical Fire Control System (TACFIRE), Missile Minder (AN/TSQ-37), Tactical Operations System (TOS), and Position Location Reporting System (PLRS).

CORADCOM's planned projects cover a variety of electronics problems with special emphasis being placed on computer applications and circuit technology. Project 3036 supports efficient manufacturing of custom components for use in future tactical radios. Project 3024 will establish the technology to produce compact solid state circuit devices and retrofit adaptors.

Video disc information storage is a possible technology for an electronic system for the dissemination of training, technical, and doctrinal data. Project 3042 will investigate methods to reduce the cost of mastering and duplicating the discs.

Projects 3047 and 3048 will supply the necessary manufacturing technology for the precision crystals and temperature compensated oscillators needed to meet the frequency stability requirements of future Army tactical radios.

Emphasis continues to be placed on the use of computers in the collection, analysis and utilization of production related information. Project 3005 will evaluate the capability of existing software systems to produce NC tapes and part geometries using past MMT studies as background. Project 3004 will implement a computer based system for evaluation of the production costs and processes associated with the electrical and electronic assembly of communications equipment.

Program funding in FY83 through FY85 largely anticipates microelectronics as the driving force in componentry and built-in test capability for command, control, and communications systems. The accelerating pace of this order of technology permits only broad-brush description of probable needs. Computer-dominated methodologies are inherent in such areas as design, manufacture, and manufacturing documentation for communications systems and are expected to be of particular worth for the short lead time, relatively low volume production anticipated for future equipment and systems.

CORADCOM

COMMAND FUNDING SUMMARY
(THOUSANDS)

CATEGORY	FY79	FY80	FY81	FY82	FY83
DETECTORS	0	0	550	0	0
DISPLAYS	510	0	400	0	0
FREQUENCY CONTROL	0	0	0	800	0
GENERAL	400	900	95	1490	700
INTEGRATED ELECTRONICS	0	0	2000	0	0
LASER	0	400	0	0	0
OPTICS	600	0	0	0	0
SOLID STATE	0	0	0	200	0
TOTAL	1510	1300	3045	2490	700

CATEGORY		FUNDING ($000)					
		PRIOR	79	80	81	82	83
DETECTORS							
COMPONENT -- PHOTO/OPTICAL							
(3050)	TITLE - III-V SEMICONDUCTOR PHOTODETECTORS						550
	PROBLEM - INTRINSIC AND INDUCED LOSSES LIMIT RANGE OF FIBER OPTIC TRANSMISSION. PRODUCTION MEANS WILL BE NEEDED FOR PHOTODETECTOR CAPABLE OF OPERATION IN SPECTRAL REGION INTRINSICALLY LESS SUSCEPTIBLE TO SUCH LOSSES.						
	SOLUTION - OPTIMIZE METHODS AND TECHNIQUES FOR USE IN VOLUME PRODUCTION AND TESTING.						
CATEGORY							
DISPLAYS							
COMPONENT -- LED							
(9938)	TITLE - LED MATRIX MODULE			510			
	PROBLEM - PRESENT MANUFACTURING METHODS ARE TOO COSTLY AND COMPLICATED SINCE MANY COMPONENTS HAVE TO BE INTERCONNECTED AND MOUNTED BY HAND.						
	SOLUTION - ESTABLISH NEW FABRICATION AND HANDLING TECHNIQUES TO REDUCE COSTS AND STILL PROVIDE A RELIABLE MODULE.						
COMPONENT -- MISCELLANEOUS							
(3056)	TITLE - ELECTROLUMINESCENT NUMERIC MODULE						600
	PROBLEM - HIGH CONTRAST NUMERIC READOUTS ARE REQUIRED FOR SUNLIGHT LEGIBILITY AND FULL ENVIRONMENTAL OPERATION IN TACTICAL EQUIP. ELECTROLUMINESCENT MODULES NEEDED TO FULFILL THIS REQUIREMENT ARE AVAILABLE ONLY AS SMALL QTY, HIGH COST, LAB BUILT SAMPLES.						
	SOLUTION - THIN FILM CIRCUITRY TECHNIQUES AND HYBRID ASSEMBLY PROCEDURES WILL BE USED TO ACHIEVE AN EFFICIENT HIGH YIELD MFG TECHNOLOGY CAPABLE OF PRODUCING RELIABLE FULLY MILITARIZED NUMERIC DISPLAY DEVICES AT REASONABLE COST FOR LARGE VOLUME USAGE.						
CATEGORY							
FREQUENCY CONTROL							

FUNDING ($000)

	PRIOR	79	80	81	82	83
COMPONENT -- CRYSTALS					400	
(3047) TITLE - LOW COST HIGH STABILITY QUARTZ RESONATORS						

PROBLEM - SINCGARS FREQUENCY STABILITY REQUIREMENTS CANNOT BE MET WITH PRESENTLY AVAILABLE MASS PRODUCED CRYSTALS.HAND PICKED,LOW YIELD CRYSTALS ARE REQUIRED AND EQUIP, PRODUCTION PROBLEMS WILL ARISE DUE TO A SHORTAGE OF PRECISION CRYSTALS.

SOLUTION - ACHIEVE THE TECHNOLOGY NECESSARY TO PRODUCE LARGE QUANTITIES OF HIGH STABILITY,LOW COST CRYSTALS.

COMPONENT -- OSCILLATORS					400	
(3048) TITLE - MICROPROCESSOR COMPENSATED CRYSTAL OSCILLATOR						

PROBLEM - LOW POWER TEMPERATURE COMPENSATED CRYSTAL OSCILLATORS WITH STABILITY (1-5X10E-7) SUITABLE FOR USE IN JAM PROOF ARMY RADIOS (SPH SINCGARS) ARE NOT AVAILABLE IN PRODUCTION QUANTITIES.

SOLUTION - ESTABLISH PRODUCTION CAPABILITY FOR COST EFFECTIVELONG LIFE, STABLE TCXO'S WHICH UTILIZE MICROPROCESSOR FOR TEMPERATURE COMPENSATION FUNCTION.

****
* CATEGORY *
****
*GENERAL *
****

COMPONENT -- MATERIALS					400	
(9891) TITLE - MMT FOR -55 DEGREES C ELECTRICAL CABLE JACKETING						

PROBLEM - INSUFFICIENT DEMAND FOR LOW TEMPERATURE ELECTRICAL CABLE HAS CAUSED THE SOLE PRODUCER TO HALT PRODUCTION.

SOLUTION - SUBSTITUTE A COMMERCIALLY AVAILABLE STYRENE BUTADIENE RUBBER, DEVELOP A PROCESS TO CONVERT THIS FORMULATION INTO CABLE JACKET.

COMPONENT -- MISCELLANEOUS					400	
(3004) TITLE - COMPUTER ANALYSIS OF ELECTRONICS FABRICATION AND ASSEMBLY						

PROBLEM - SYSTEMATIZED DATA ON COMMUNICATIONS/ELECTRONICS EQUIPMENT MANUFACTURING PROCEDURES, EVALUATION, SELECTION, LAYOUT, LABOR USAGE, AND COSTS AND ON CIRCUIT INTERCONNECTION SCHEMES IS NEEDED TO PERMIT RELIABLE ASSESSMENT OF PRODUCTION METHODS.

SOLUTION - IMPLEMENT COMPUTER AIDED TOOL TO BE USED FOR THE EVALUATION OF PRODUCTION COSTS AND PROCESSES ASSOCIATED WITH THE ELECTRICAL AND ELECTRONIC ASSEMBLY OF COMMUNICATIONS EQUIPMENT.

COMPONENT -- MISCELLANEOUS (CONTINUED)

	PRIOR	79	80	81	82	83
	FUNDING ($000)					
(3005) TITLE - GRAPHICAL PART PROGRAMMING EVALUATION				95		
PROBLEM - POTENTIAL EXISTS TO EXTEND THE EXISTING COMPUTER-AIDED INTERACTIVE DESIGN SYSTEMS FOR THE CREATION OF NUMERICAL CONTROL TAPES AND THREE-DIMENSIONAL PARTS GEOMETRIES TO A BROAD RANGE OF DOD EQUIPMENT REQUIREMENTS.						
SOLUTION - THIS PROJECT WILL EVALUATE THE CAPABILITY OF EXISTING COMPUTER AIDED INTERACTIVE DESIGN SYSTEMS TO PRODUCE NUMERICAL CONTROL PART PROGRAMS AND PART GEOMETRIES FOR DOD PRODUCTION REQUIREMENTS.						
(3041) TITLE - TOOL FOR PRODUCTION OF TRAINING DOCUMENTATION			900			
PROBLEM - TO ELIMINATE NEED FOR HARD COPY DOCUMENTATION IN COMMAND COMMUNICATIONS AND CONTROL, COMBAT SERVICE SUPPORT AND TRAINING ENVIRONMENTS.						
SOLUTION - PROVIDE AN ALL ELECTRONIC PREPARATION-DISTRIBUTION-PRESENTATION SYSTEM FOR DISSEMINATION OF INTEGRATED TECHNICAL DOCUMENTATION AND TRAINING (ITDT), DOCTRINAL, AND TECHNICAL INFORMATION.						
(3042) TITLE - MASTERING AND DUPLICATION OF VIDEO DISCS				450		
PROBLEM - THE HIGH COST OF MASTERING AND DUPLICATING OF VIDEO DISCS HAS RESTRICTED THE USE OF THE TECHNOLOGY IN HIGH PAYOFF TRAINING AND MAINTENANCE OPERATIONS.						
SOLUTION - THIS PROJECT WILL PROVIDE METHODS AND TECHNIQUES FOR LOW-COST MASTERING AND DUPLICATION OF VIDEO DISCS.						
(3045) TITLE - AUTOMATED ARTWORK ALIGNMENT AND INSPECTION				400	500	
PROBLEM - THE ALIGNMENT AND CLEANLINESS OF ARTWORK AND MASKS USED FOR PRODUCTION OF THIN FILM DISPLAY DEVICES MUST BE AUTOMATED TO IMPROVE YIELD.						
SOLUTION - THIS PROJECT WILL PROVIDE AUTOMATED METHODS AND PROCEDURES TO VALIDATE CORRECT ALIGNMENT AND CLEANLINESS OF PATTERN MASKS PRIOR TO DEPOSITION OF FILMS.						
(3051) TITLE - ACCELERATED/OVERSTRESS TESTING				150	200	
PROBLEM - NEW DOD POLICY DICTATES A SHORTENED PROCUREMENT CYCLE, THEREFORE, WHAT IS NEEDED IS A TECHNIQUE FOR THE DEMONSTRATION OF REQUIRED LEVELS OF RELIABILITY IN A SIGNIFICANTLY REDUCED PERIOD OF TIME WITH A RESULTANT TEST COST SAVINGS.						
SOLUTION - THE OBJECTIVE OF THIS PROGRAM IS TO DEVELOP CORRELATION FACTORS WHICH RELATE LABORATORY ACCELERATED / OVERSTRESS TEST CONDITIONS TO FIELD ENVIRONMENTAL FACTORS.						

CATEGORY	FUNDING ($000) PRIOR	79	80	81	82	83
INTEGRATED ELECTRONICS						
COMPONENT -- CIRCUITRY						
(3036) TITLE - SPECIAL COMPONENTS MFG TECHNIQUES FOR SINGLE CHANNEL RADIOS				2000		
PROBLEM - FUTURE SINGLE CHANNEL RADIOS WILL BE PROCURED IN VERY LARGE QUANTITIES. SPECIAL COMPONENTS FOR THESE RADIOS WILL BE VERY HIGH COST ITEMS UNLESS LOWER COST MANUFACTURING PROCEDURES ARE DEVELOPED.						
SOLUTION - PROVIDE MANUFACTURING TECHNIQUES WHICH WILL REDUCE COST OF SPECIALIZED COMPONENTS AND IMPROVE RELIABILITY.						
CATEGORY						
LASER						
COMPONENT -- MODULES						
(3032) TITLE - CONNECTOR TERMINATED STRIPE GEOMETRY INJECTION LASERS			400			
PROBLEM - NO PRODUCTION CAPABILITY EXISTS FOR PRODUCING THESE LASERS INTO CONNECTOR TERMINATED HERMETICALLY SEALED PACKAGES.						
SOLUTION - SINGLE STRIPE INJECTION LASER DIODES WITH A PIGTAIL WILL BE ASSEMBLED IN A HERMETICALLY SEALED PACKAGE. THIS SUBASSEMBLY IS THEN MATED WITH A FIBER OPTIC CONNECTOR TO FORM AN INTEGRAL REPAIRABLE PACKAGE.						
CATEGORY						
OPTICS						
COMPONENT -- FIBER						
(9784) TITLE - RUGGEDIZED TACTICAL FIBER OPTIC CABLE ASSEMBLY			600			
PROBLEM - APPLYING A PROTECTIVE COATING ONTO EACH FIBER HAS NOT BEEN DONE IN PRODUCTION QUANTITIES, BUNDLING THE FIBERS AND APPLYING A PLASTIC SHEATH MUST BE WORKED OUT.						
SOLUTION - DEVELOP EQUIPMENT TO EXTRUDE A PLASTIC KYNAR COVERING ONTO EACH OPTIC FIBER AND EXTRUDE A PROTECTIVE PLASTIC SHEATH OVER THE CABLE. ESTABLISH TERMINATION METHODS.						
CATEGORY						
SOLID STATE						

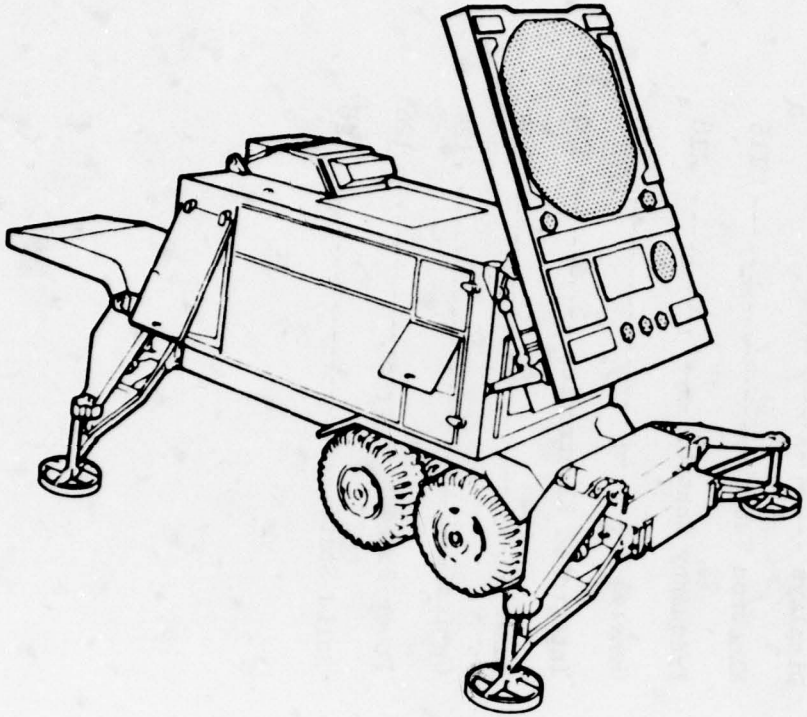
COMPONENT -- SWITCHES

FUNDING ($000)

	PRIOR	79	80	81	82	83
(3026) TITLE - METAL OXIDE THRESHOLD SWITCHES (MOTS) FOR NEMP PROTECTION					200	

PROBLEM - TECHNOLOGY IS NEEDED FOR MANUFACTURE OF MOTS DEVICE TO SUPPLANT PRESENTLY AVAILABLE DEVICES WHICH SUFFER SLOW RESPONSE AND HIGH INSERTION LOSS IN PROTECTION OF EQUIPMENT AGAINST NUCLEAR ELECTROMAGNETIC PULSE AND LIGHTNING DAMAGE.

SOLUTION - PROVIDE MANUFACTURING TECHNIQUES FOR MOTS DEVICES AND ADAPTORS FOR INCORPORATION OR RETROFIT INTO CABLES, CONNECTORS, AT ANTENNA FOOTPRINTS AND IN CRITICAL CIRCUITS.



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ELECTRONICS R&D COMMAND
(ERADCOM)

US ARMY ELECTRONICS RESEARCH AND DEVELOPMENT COMMAND

(ERADCOM)

ERADCOM is the Army's focal point for electronics research, development and acquisition (RDA) activities, and maintains programs in such areas as electronics signal intelligence, electronic warfare, atmospheric sciences, target acquisition and combat surveillance, electronic fuzing, radars, sensors, night vision, radar frequency and optical devices, nuclear weapons effects, instrumentation and simulation, and fluidics.

There are seven laboratories integrated into ERADCOM's structure. These laboratories are product oriented and as a result can identify major problem areas where applied MMT efforts can realize important benefits. Although ERADCOM and its laboratories identify and manage projects, the bulk of the actual work is contracted out to non-Government organizations.

A major area of interest is developing legible tactical displays which are suitable for military use. Because of operational limitations in legibility, power requirements, and weight and poor RAM (reliability, availability and maintainability) characteristics conventional displays are unacceptable. New technologies, such as flat panel displays and ruggedization techniques, which can satisfy these requirements are now in development but need improved manufacturing methods for effective production.

Improving sighting capabilities is an area of prime concern to all the services. Several projects for significant improvements in production techniques for image intensifiers for night vision aids are included in ERADCOM's submission. The development of millimeter wave and infrared laser systems for all-weather and smoke fighting is being pursued. This will require the development of new control systems and subsystems. New or improved techniques will be needed to insure the necessary quality and quantity of systems. Projects are also included dealing with thermal electro-optical systems. These systems include the present generation Common Modules and future second generation systems such as the ATAC and MISTAF FLIRS (Forward Looking Infrared Systems) and the Thermal Weapon Sight (TWS).

Emphasis is also being placed in high energy pulser systems for use in future defense systems. Pulsers using state-of-the-art components are excessively large, costly, and are not usable for mobile field applications. Results of research and development promise an order of magnitude decrease in size which would allow production of mobile units. Since applications of this system are exclusively military, MMT funding is necessary to establish economical production.

ERADCOM

COMMAND FUNDING SUMMARY
(THOUSANDS)

CATEGORY	FY79	FY80	FY81	FY82	FY83
DETECTORS	990	1180	2100	6730	3600
DISPLAYS	550	850	1650	1630	800
ELECTRON TUBES	0	0	1450	1700	1050
FREQUENCY CONTROL	1169	300	1810	1300	800
GENERAL	1276	0	0	0	0
INTEGRATED ELECTRONICS	700	2375	1900	950	0
LASER	0	1150	1940	525	480
OPTICS	623	945	2400	3750	0
POWER SOURCES	0	885	1150	1300	650
SOLID STATE	0	3250	1000	1800	1200
TOTAL	5308	10935	15400	19685	8580

CATEGORY	FUNDING ($000)					
DETECTORS	PRIOR	79	80	81	82	83

COMPONENT -- ARRAYS

(5057) TITLE - 3-5 MICRON TE COOLED FOCAL PLANE MODULES — 82: 1000, 83: 1250

PROBLEM - IMPROVED THERMAL IMAGING EQUIPMENT OPERATING AT 3-5 MICRONS REQUIRE USE OF HIGH DENSITY MATRIX DETECTOR ARRAY IN THE ORDER OF 2000 ELEMENTS. THIS EQUIPMENT CAN'T BE PRODUCED WITH TODAY'S THERMAL IMAGING OFF-FOCAL-PLANE ARRAY TECHNOLOGY.

SOLUTION - INITIATE A PHASED PROGRAM TO ESTABLISH CONTROLLED MANUFACTURING PROCESSES AND TEST METHODS TO PRODUCE INTEGRATED FOCAL PLANE ARRAY COOLER/DEWAR MODULES TO OPERATE AT 195 K. ESTABLISH AND VALIDATE PRODUCTION AND TEST METHODS FOR COMPLETED MODULE.

(5063) TITLE - VACUUM DEWARS FOR MOSAIC ARRAYS FOR 2ND GEN. FLIR — 82: 750

PROBLEM - NEW DEWAR CONCEPTS MUST BE ESTABLISHED TO HOUSE THE NEW GENERATION FOCAL PLANE ARRAYS SUCH THAT VACUUM INTEGRITY AND MECHANICAL STABILITY ARE MAINTAINED.

SOLUTION - DEVELOP PRODUCTION TECHNIQUES FOR LOW OUT-GASSING DEWAR COMPONENTS.

(9853) TITLE - LEAD TIN TELLURIDE DETECTOR/DEWAR MODULES — PRIOR: 900

PROBLEM - TIN LEAD TELLURIDE DETECTOR ARRAYS ARE DIFFICULT TO MAKE BECAUSE CONDUCTING PATHS MUST BE FORMED INTO THE SUBSTRATE ALONG WITH REQUIRED CIRCUITRY. YIELDS ARE LOW.

SOLUTION - DEVELOP PHOTO LIGHOGRAPHIC PROCESSES TO IMPROVE YIELD, UNIFORMITY, AND SIMPLICITY. REDUCE TESTING TIME AND COST THRU NEW TESTING METHODS.

COMPONENT -- INFRARED/UV

(3502) TITLE - IMPROVED FIBER OPTIC INVERTER FOR 3RD GEN. IMAGE INTENSIFIER — 80: 280

PROBLEM - AVIATION GOGGLES REQUIRE 3RD GEN. WAFER TUBES WITH HIGH PERFORMANCE AND LIGHTWEIGHT DESIGN. IMPROVEMENT IN THE RESOLUTION OF MICROCHANNEL PLATES REQUIRES ATTENDANT HIGH RESOLUTION IN THE INVERTER ALONG WITH REDUCED FIXED PATTERN NOISE AND MIN LGTH.

SOLUTION - PROVIDE A PDN PROCESS FOR SIX MICRON SIZE FIBER OPTIC INVERTERS HAVING VERY LOW BLEMISH COUNT AND FIXED PATTERN NOISE, AND HAVING A MINIMUM LENGTH. APPLY LEARNING FROM MCP FABR. TO FIBER OPTIC TWIST TO REDUCE FIXED PATTERN NOISE AND BLEMISHES.

(5045) TITLE - THERMOELECTRIC COOLER MATERIALS — 81: 300

PROBLEM - SUPERIOR HIGH PERF. MATERIALS REQUIRED FOR 2 GEN. FLIR TE COOLERS ARE AVAILABLE ONLY IN RESEARCH QUANTITIES + QUALITIES. TRANSITION FROM RESEARCH TO PRODUCTION WILL INTRODUCE VARIOUS DEGRADATION FACTORS.

SOLUTION - ESTABLISH PRE-PRODUCTION METHODS + TECHNIQUES FOR HIGH QUALITY CONTROL NECESSARY TO MEET 2 GEN. FLIR DEMANDS.

		FUNDING ($000)				
	PRIOR	79	80	81	82	83
COMPONENT -- INFRARED/UV (CONTINUED)						
(5049) TITLE - EBS-CCD ARRAYS (800X800)						1500
PROBLEM - 800 X 800 ELEMENT CCD ARRAYS ARE CURRENTLY BEING FABRICATED IN THE RESEARCH LAB WITH LOW YIELD AND HIGH COST.						
SOLUTION - DEVELOP MANUFACTURING METHODS TO IDENTIFY AND MAXIMIZE YIELD AND MINIMIZE COST.						
(5049) TITLE - EBS-CCD ARRAYS (800X800)			1200			
PROBLEM - 800 X 800 ELEMENT CCD ARRAYS ARE CURRENTLY BEING FABRICATED IN THE RESEARCH LAB WITH LOW YIELD AND HIGH COST.						
SOLUTION - DEVELOP MANUFACTURING METHODS TO IDENTIFY AND MAXIMIZE YIELD AND MINIMIZE COST.						
(5059) TITLE - MAGNETIC SUSPENSION COOLERS				300		
PROBLEM - SECOND GENERATION FLIR'S WILL EMPLOY MAGNETIC SUSPENSIONS IN THE CRYOGENIC COOLERS, MAINTAINING CRITICAL SUSPENSION TOLERANCES IN PRODUCTION WILL REQUIRE DEVELOPING EXTENSIVE QUALITY CONTROL PROCEDURES.						
SOLUTION - DEVELOP MANUFACTURING METHODS FOR MAINTAINING CRITICAL TOLERANCES.						
(5062) TITLE - EBS-CCD CAMERA TUBES (GALLIUM ARSENIDE)				1100		
PROBLEM - TECHNIQUES FOR MANUF. LOW COST CCD IMAGE TUBES WITH GALLIUM ARSENIDE PHOTOCATHODES PERMIT ONLY ONE TUBE START EVERY TWO WEEKS.						
SOLUTION - ESTABLISH TECHNIQUES FOR MANUF, LOW COST, HIGH PERFORMANCE CCD IMAGE TUBES WITH GALLIUM ARSENIDE PHOSPHORS, ON A PRODUCTION BASIS.						
(5064) TITLE - MICRO-CIRCUITRY FOR CCD CAMERAS				1000		
PROBLEM - PRESENT DISCRETE COMPONENT AND HYBRID APPROACH WILL LIMIT THE REDUCTION IN PRODUCTION COSTS, SIZE AND POWER OF THESE CAMERAS.						
SOLUTION - IC PRODUCTION TECHNIQUES APPLIED TO THE CLOCK DRIVERS, VIDEO AMPLIFIERS AND LOGIC CIRCUITRY IS NEEDED.						
(5073) TITLE - ADVANCED MECHANICAL COOLERS FOR 2ND GEN. FLIR'S						850
PROBLEM - SECOND GEN IR SENSORS ARE NOW VERY SUSCEPTIBLE TO VIBRATIONS AND THERMAL FLUCTUATIONS TO A LARGER DEGREE THAN CONVENTIONAL FIRST GEN SYSTEMS.						
SOLUTION - DEVELOP MANUF. TECHNIQUES FOR REDUCING THERMAL FLUCTIONS AND VIBRATIONS.						

FUNDING ($000)

	PRIOR	79	80	81	82	83
COMPONENT -- INFRARED/UV (CONTINUED)						
(9508) TITLE - THIRD GENERATION LOW COST GOGGLE TUBE			900			
PROBLEM - TYPICAL MANUFACTURING METHODS REQUIRE THE USE OF AN EXCESSIVE AMOUNT OF HAND LABOR WHICH CONTRIBUTES TO HIGH UNIT COSTS FOR THE INTENSIFIER TUBE.						
SOLUTION - DETERMINE THE MOST ECONOMICAL METHOD FOR PRODUCING A LOW COST 3RD GEN. IMAGE INTENSIFIER TUBE - METHOD TO BE PROVED BY PRODUCING A SAMPLE TUBE LOT.						
COMPONENT -- LASER						
(5048) TITLE - LARGE AREA 10 MICRON DETECTOR MODULE				600		
PROBLEM - PRESENT SINGLE UNIT MANUFACTURE OF LARGE AREA 5X5 MM QUADRANT PHOTOVOLTAIC 10 MICRON DETECTOR MODULES ARE FABRICATED WITHOUT BENEFIT OF LARGE VOLUME / LOW COST PRODUCTION TECHNIQUES.						
SOLUTION - DEVELOP MANUF. TECHNIQUES FOR VOLUME PRODUCTION OF FLIR INTEGRATED BEAMRIDER AND DESIGNATION MISSION HARDENED LARGE AREA 10 MICRON DETECTOR MODULES UTILIZING OPTIMIZED MERC CAD TELLURIDE DETECTORS INTEGRATED WITH PREAMPLIFIER / COOLER ASSEMBLY.						
(5066) TITLE - 1 TO 3 MICRON AVALANCHE DETECTORS					450	
PROBLEM - MANUF. COSTS, VOLUME PROD. TECHNIQUES AND RELIABILITY HAVE TO BE ADDRESSED.						
SOLUTION - ESTABLISH MANUF. CAPABILITY FOR VOLUME PRODUCTION OF RELIABLE, LOW COST 1-3 MICRON AVALANCHE DETECTORS.						
COMPONENT -- NUCLEAR						
(5021) TITLE - NUCLEAR REMBASS SENSOR					850	
PROBLEM - REMOTE MONITORING OF THE ENEMY AREA NUCLEAR ENVIRONMENT REQUIRES A SENSOR THAT CAN WITHSTAND EMPLACEMENT BY AN ARTILLERY ROUND AND YET BE INEXPENSIVE, RELIABLE AND LONG-LIVED.						
SOLUTION - USE AN EXSISTING GEIGER-MUELLER TUBE COUPLED WITH AN LSI RADIAC CIRCUIT. THE RESULTING PACKAGE WOULD MEET MILITARY NEEDS AT A PRICE WHICH WOULD MAKE SATURATION OF THE ENEMY AREA PRACTICABLE.						

FUNDING ($000)

	PRIOR	79	80	81	82	83
COMPONENT -- PHOTO/OPTICAL						
(5065) TITLE - LOW COST CURVED CHANNEL MCP'S					600	
PROBLEM - CURVED CHANNEL MCP'S PREVENT ION FEEDBACK TO THE PHOTOCATHODES, THEREBY ELIMINATING THE NEED FOR AN ION BARRIER FILM. CURVED CHANNEL MCP'S HAVE ONLY BEEN MADE WITH CRUDE AND EXPENSIVE LAB TECHNIQUES. LOW COST, HIGH VOLUME METHODS ARE NEEDED FOR MANUF						
SOLUTION - ESTABLISH MANUF. METHODS FOR LOW COST FABRICATION.						
(5067) TITLE - UNIVERSAL INTEGRATED OPTICS MODULE					680	
PROBLEM - PRESENT INTEGRATED OPTICS DEVICES ARE COMPOSED OF SEPARATE LIGHT SOURCE, PROCESSOR AND DETECTOR. IT IS POSSIBLE TO COMBINE THESE COMPONENTS ON A SINGLE CHIP. FABR. METHODS AND RELIABILITY HAVE TO BE DEVLOPED.						
SOLUTION - DEV. FABR. METHODS FOR OPTIMUM INTERFACE OF LIGHT SOURCE AND DETECTOR WITH ACOUSTO-OPTIC DEVICES.						

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* CATEGORY *
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*DISPLAYS *
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COMPONENT -- CRT						
(5071) TITLE - TACTICAL COLOR CRT						800
PROBLEM - PRESENTATION OF HIGH DENSITY INFORMATION UNDER TACTICAL CONDITIONS REQUIRES CODING THAT CAN BE PROVIDED BY COLOR. AVAILABLE COLOR CRTS CANNOT SURVIVE TACTICAL CONDITIONS WITHOUT EXPENSIVE AND MARGINALLY EFFECTIVE MODIFICATIONS.						
SOLUTION - CRT DISPLAYS CAN BE DESIGNED TO OPERATE UNDER THE VIBRATION, TEMPERATURE AND MAGNETIC ENVIRONMENT OF THE TACTICAL BATTLEFIELD IF THE TOTAL SYSTEM IS DESIGNED FOR THESE CONDITIONS. ECONOMICAL FABRICATION PROCESSES FOR SUCH DISPLAYS MUST BE DEVELOPED.						
(9838) TITLE - MINIATURE CATHODE RAY TUBES			300			
PROBLEM - PRESENT MINIATURE CRT'S ARE TOO EXPENSIVE AND DO NOT HAVE IMAGE QUALITY TO ALLOW FOR MISSION REQUIREMENTS. THERE ARE NO SOURCES FOR THE REQUIRED TUBES IN DESIRED QUANTITIES.						
SOLUTION - ESTABLISH A SOURCE AND MANUFACTURING PROCESS TOWARD BETTER CONTROL AND SIMPLIER PROCEDURES TO ELIMINATE PRODUCTION VARIABLES AND HAND MANUFACTURING STEPS.						

		FUNDING ($000)				
	PRIOR	79	80	81	82	83
COMPONENT -- LED						
(9877) TITLE - LIGHT EMITTING DIODE ARRAY COMMON MODULES		550				
PROBLEM - A LOT OF HAND ASSEMBLY, WIRING, TESTING, AND RESISTOR TRIMMING IS USED IN BUILDING LED MODULES.						
SOLUTION - ESTABLISH METHODS FOR PRODUCING A LED CHIP WITH 180 RESISTORS TO BALANCE EACH DIODES OUTPUT.						
COMPONENT -- MISCELLANEOUS						
(3023) TITLE - TUBULAR PLASMA PANEL			550			
PROBLEM - PRESENT DISPLAY DEVICE FOR TACFIRE AND TOS HAS TOO SMALL AN ACTIVE AREA, INSUFFICIENT INTERACTIVE AND MAP CAPABILITY. TUBULAR PLASMA PANEL CAN BE USED BUT IS HIGH IN COST DUE TO EXTENSIVE LABOR IN PARTS, INSP, ASSEMBLY, AND FINAL INSPECTION.						
SOLUTION - HIGH LABOR COSTS WILL BE REDUCED BY DECREASING MANUAL LABOR AND USING A MAXIMUM OF FULLY AUTOMATED PROCESSING AND INSPECTION TECHNIQUES AND EQUIPMENT.						
(5007) TITLE - ELECTROLUMINESCENT DISPLAYS				650		
PROBLEM - TACTICAL EQUIP REQUIRE RUGGED HIGH CONTRAST DISPLAY DEVICES WITH HIGH INFORMATION DENSITY CAPABILITIES. ELECTROLUMINESCENT DISPLAYS NEEDED TO PERFORM THIS FUNCTION REQUIRE DEPOSITION OF HIGH INTEGRETY THIN FILMS OVER HUNDREDS OF SQUARE CENTIMETERS.						
SOLUTION - VOLUME MANU PROCESSES TO FABRICATE UNIFORM ELECTROLUMINESCENT THIN FILM STRUCTURES WILL BE DEVELOPED. REQUIREMENTS WILL BE ESTABLISHED FOR MATERIALS PURITY AND PROCESS CONTROL TO OBTAIN HIGH YIELD THEREBY LOWERING COST AND INSURING AVAILABILITY.						
(5020) TITLE - TACTICAL GRAPHIC DISPLAY PANEL					630	
PROBLEM - TACTICAL MANPACK COMMUNICATIONS TERMINALS REQUIRE A LIGHTWEIGHT LOW POWER DISPLAY WHICH IS CAPABLE OF GRAPHICS AND IS LEGIBLE IN DIRECT SUNLIGHT. SUCH DISPLAYS ARE PRESENTLY AVAILABLE ONLY AS LABORATORY EVALUATION MODELS AT PROHIBITIVE EXPENSE.						
SOLUTION - A MANUFACTURING METHODS PROGRAM MUST BE CONDUCTED SO THAT THESE DISPLAYS CAN BE MANUFACTURED IN LARGE QUANTITIES AT A PRICE WHICH WILL MAKE THEM FEASIBLE FOR TACTICAL USE WHERE THEY ARE BADLY NEEDED.						
(5050) TITLE - MEMORY THIN FILM ELECTROLUMINESCENT PHOSPHOR				1000		
PROBLEM - MEMORY EFFECT NOT SUFFICIENTLY REPRODUCIBLE.						
SOLUTION - DEVELOP BETTER FABRICATION TECHNIQUE AND CONTROL.						

	FUNDING ($000)				
PRIOR	79	80	81	82	83

COMPONENT -- MISCELLANEOUS (CONTINUED)

(5058) TITLE - MINIATURE FLAT PANEL 525-LINE DISPLAY 1000

PROBLEM - THIS DISPLAY FOR THE THERMOVIEWER, NOW IN R AND D, IS BASED ON ONE OF TWO TECHNOLOGIES WHICH HAS NEVER BEEN PRODUCED IN QUANTITY WITH THE HIGH PIXEL DENSITY REQUIRED FOR 500 LINES / INCH.

SOLUTION - CUSTOMIZE AND MINIATURIZE ELECTRONICS, DEVELOP LOW COST PRODUCTION METHODS, INCORPORATE HIGH BRIGHTNESS MEMORY TFEL PHOSPHORS.

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- CATEGORY *
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*ELECTRON TUBES *
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COMPONENT -- BEAM

(5006) TITLE - STANDARD CAVITY FOR WIDEBAND TWT 450

PROBLEM - HAND MACHINING AND CLOSE TOLERANCES PREVENT COST REDUCTION, EXCESSIVE PARTS HANDLING AND CIRCUIT READJUSTMENT RESULT IN HIGH COST, LOW YIELD TRAVELING WAVE TUBE. EW SYSTEMS REQUIRE RELIABLE LOW COST WIDE BAND JAMMER TUBES FOR AIRCRAFT SURVIVABILITY.

SOLUTION - NUMERICAL CONTROLLED MACHINING MAINTAIN DESIRED TOLERANCES FOR ONE TIME STACKING AND HIGH YIELD PRIOR TO FINAL ASSEMBLY. LOW COST CAVITY PROVIDES COST EFFECTIVE WIDEBAND JAMMER TUBE FOR EW PROTECTION OF ARMY AIRCRAFT.

(5010) TITLE - BONDED GRID ELECTRON GUN 500

PROBLEM - PRESENT TECHNOLOGY CAN NOT BE USED TO BUILD GRIDED MILLIMETER WAVE TUBES, MUST USE HIGH VOLTAGE MODULATOR FOR PULSED OPERATION.

SOLUTION - DEVELOP TECHNIQUES FOR MANUFACTURING LINEAR BEAM TUBES USING BONDED GRID ELECTRON GUNS.

(5011) TITLE - EBS AMPLIFIER FOR JAMMERS 500

PROBLEM - BROAD BANDWIDTH TRANSISTOR AMPLIFIERS LIMITED IN POWER, MUST COMBINE MANY TRANSISTORS TO ACHIEVE HIGH POWER, RESULTING AMPLIFIER IS INEFFICIENT, LARGE AND COSTLY.

SOLUTION - DEVELOP MANUFACTURING PROCESS TO BUILD HIGH POWER ELECTRON BEAM AMPLIFIER TO REDUCE SIZE AND COST BY FACTOR OF TWO AND ACHIEVE AND IMPROVE EFFICIENCY.

		FUNDING ($000)				
	PRIOR	79	80	81	82	83
COMPONENT -- BEAM (CONTINUED)						
(5019) TITLE - LASER-CUT SUBSTRATES FOR MM TUBES					600	
PROBLEM - PRESENT CFA JAMMER TUBES EMPLOY HIGH COST, PRECISION ANODE CIRCUITS LIMITING UTILIZATION IN OPTIMIZED EW SYSTEMS. HIGH PERFORMANCE AND LOW WEIGHT AT MINIMUM COST IS REQUIRED TO FIELD DESIRED EW SYSTEMS.						
SOLUTION - UTILIZE LASER-CUT ANODE CIRCUIT SUBSTRATES TO ACHIEVE DESIRED RF PERFORMANCE AND MINIMIZE PARTS AND OVERALL DEVICE COST. ALSO EMPLOY PHOTOLITHOGRAPHIC TECHNIQUES TO FORM MEANDERLINE CIRCUIT. USE BERYLLIA SUBSTRATE MATERIAL FOR DIELECTRIC SUPPORTS.						
(5029) TITLE - NON-FERRULE CAVITIES FOR MM WAVE AMPLIFIER TUBES						400
PROBLEM - MILLIMETER RADARS REQUIRE LIGHT WEIGHT LOW COST TRANSMITTER TUBES TO PROVIDE SYSTEMS TO PENETRATE SMOKE AND FOG. PRESENT HAND MACHINING IS EXPENSIVE AND POOR TOLERANCE CONTROL AT MM DIMENSIONS RESULT IN HIGH COST TRANSMITTER TUBES EVEN IN LARGE QTY.						
SOLUTION - COMPUTER CONTROLLED ZERO BLANK COINING AND LAPPING METHODS WOULD ELIMINATE COSTLY HAND MACH AND HAND STACKING OF CAVITIES SUITABLE FOR MILLIMETER WAVE TUBES. ADAPTING PRESENT TECH AND ASSEMBLY PROC TO ACHIEVE HIGH YIELD WILL PROVIDE A LOW COST TUBE.						
COMPONENT -- CATHODE						
(3027) TITLE - PLASMA CATHODE THYRATRON					800	
PROBLEM - STANDBY FILAMENT AND RESERVOIR POWER REQUIRED BY CONVENTIONAL PLASMA SWITCHES MAKE THEM UNSUITABLE FOR MILITARY APPLICATIONS REQUIRING LOW POWER DRAIN AND INSTANTANEOUS START.						
SOLUTION - ESTABLISH PRODUCTION FACILITIES FOR FABRICATING PLASMA CATHODE HYDROGEN THYRATRONS THAT WILL NOT REQUIRE STANDBY POWER.						
(9879) TITLE - HIGH CURRENT DENSITY CATHODE					300	
PROBLEM - CURRENT DENSITY REQUIRED FOR MILLIMETER WAVE TUBES RESULTS IN VERY SHORT LIFE AND POOR RELIABILITY WITH ANY PRESENTLY AVAILABLE CATHODES.						
SOLUTION - PROVIDE MANUFACTURING PROCESS FOR TUNGSTATE CATHODE WHICH AT THE REQUIRED CURRENT DENSITY HAS OVER TEN TIMES THE LIFE PRESENTLY AVAILABLE CATHODES.						

	FUNDING ($000)					
	PRIOR	79	80	81	82	83
COMPONENT -- SWITCHES						
(5030) TITLE = REPETITIVE SERIES INTERRUPTER						650
PROBLEM = WHEN A FAULT OCCURS IN PRESENT PHASED ARRAY RADARS THE ENTIRE SYSTEM MUST BE SHUT DOWN FOR CRITICAL SECONDS, IF SHUT DOWN OCCURS WHILE MONITORING AN INCOMING MISSLE THE RESULT COULD BE DISASTROUS.						
SOLUTION = PRODUCTION AND INSTALLATION OF REPETITIVE SERIES INTERRUPTER IN THE RADAR TRANSMITTER HIGH VOLTAGE LINE WOULD PREVENT DAMAGE DURING FAULTED PULSE. SYSTEM WOULD IMMEDIATELY RECOVER WITH NO LOSS IN INFORMATION.						

CATEGORY

FREQUENCY CONTROL

COMPONENT -- CRYSTALS						
(5055) TITLE = HI RELIABILITY GENERAL PURPOSE CRYSTALS					400	
PROBLEM = CRYSTALS USED IN HIGH RELIABILITY TACTICAL RADIOS HAVE A HIGH FAILURE RATE DUE TO FREQUENCY VARIATIONS WITH TIME, TEMPERATURE, SHOCK, AND VIBRATION. LEAKS INTO THE ENCLOSURE ARE A MAJOR PROBLEM.						
SOLUTION = PRODUCTION ENGINEERING WILL CLOSELY CONTROL CRYSTAL PLATE GEOMETRY, ORIENTATION, MOUNTING, HERMETIC SEALING AND TESTING OF AT-CUT CRYSTALS.						
(5056) TITLE = ACCELERATION RESISTANT QUARTZ CRYSTAL UNITS					500	
PROBLEM = CRYSTAL UNITS FREQUENCY CHANGES UNDER STATIC AND DYNAMIC ACCELERATION. THIS EFFECT LIMITS THE ANTIJAM CAPABILITY OF TACTICAL SYSTEMS.						
SOLUTION = DEVELOP LOW COST TECHNIQUES OF MANUFACTURING, ACCELERATION RESISTANT DOUBLY ROTATED CRYSTALS THROUGH PRECISE CONTROL OF BLANK GEOMETRY, ORIENTATION, MOUNTING AND BONDING.						
(5069) TITLE = FABRIC OF OVERTONE MINIATURE PRECISION CRYSTALS						400
PROBLEM = MINIATURIZED PRECISION QUARTZ CRYSTALS IN MICROCIRCUIT PACKAGES ARE FRAGILE AND DIFFICULT TO FABRICATE.						
SOLUTION = IMPROVE PRODUCTION TECHNIQUES FOR MINIATURE OVERTONE QUARTZ CRYSTALS THROUGH BETTER POLISHING, HANDLING, MOUNTING/BONDING AND PACKAGING TECHNIQUES.						
(9754) TITLE = CONT CYCLE PROCESSING OF QUARTZ CRYSTAL UNITS	2200		500			
PROBLEM = HIGH STABILITY RUGGEDIZED CRYSTALS ARE NOT AVAILABLE AT LOW COST DUE TO THE UNAVAILABILITY OF THE REQUIRED PROCESSES AND EQUIPMENTS AT COMMERCIAL SOURCES OF QUARTZ CRYSTAL UNITS.						
SOLUTION = ESTABLISH THE CONTINUOUS CYCLE VACUUM PROCESSING AND ASSOCIATED TECHNOLOGIES AT A COMMERCIAL CRYSTAL COMPANY.						

		FUNDING ($000)					
		PRIOR	79	80	81	82	83
COMPONENT -- CRYSTALS (CONTINUED)							
(9805)	TITLE - AUTO MICROCIRCUIT BRIDGE PDN MEASURE OF QUARTZ CRYSTALS	680	400				
	PROBLEM - THE CRYSTAL IMPEDANCE METER REQUIRES UPDATING TO ALLOW ACCURATE MEASUREMENT OF CRYSTAL CHARACTERISTICS, REGARDLESS OF TEMPERATURE AND FREQUENCY.						
	SOLUTION - BUILD A TEMPERATURE TEST CHAMBER, AUTOMATIC CRYSTAL TRANSPORT, AND FREQUENCY MEASURING AND DATA COLLECTION EQUIPMENT.						
(9807)	TITLE - PROCESSING HIGH STABILITY QUARTZ CRYSTAL UNITS		760		760		
	PROBLEM - STRESSES DUE TO THERMAL SHOCK, MOUNTING, BONDING, ELECTRODES AND ACCELERATION PREVENT CRYSTALS FROM ACHIEVING THE STABILITIES REQUIRED BY SECURE COMMUNICATIONS AND NAVIGATION SYSTEMS.						
	SOLUTION - DEVELOP COST EFFECTIVE TECHNIQUES OF MANUFACTURING DOUBLY ROTATED RESONATORS. EMPHASIS WILL BE ON AUTOMATION TECHNIQUES FOR CUTTING, X-RAY ORIENTING, AND ANGLE CORRECTING DOUBLY ROTATED PLATES.						
COMPONENT -- MISCELLANEOUS							
(9897)	TITLE - SURFACE ACOUSTIC WAVE RESONATOR AND REFLECTIVE ARRAY DEVICES			300			
	PROBLEM - PRODUCTION TECHNIQUES FOR ACHIEVING DEVICE REPRODUCIBILITY, FREQUENCY TUNABILITY AND LOW COST FOR SAW RESONATORS AND REFLECTIVE ARRAY DEVICES ARE NOT AVAILABLE.						
	SOLUTION - ESTABLISH PRODUCTION TECHNIQUES AND PROCESS CONTROLS TO PROVIDE SAW RESONATORS AND REFLECTIVE ARRAY DEVICES AT PRECISE FREQUENCIES.						
COMPONENT -- OSCILLATOR							
(9767)	TITLE - HIGH DENSITY THICK FILM CIRCUIT FOR CRYSTAL OSCILL	300				400	
	PROBLEM - HIGH COST OF HIGH TECHNOLOGY TEMPERATURE COMPENSATED VOLTAGE CONTROLLED CRYSTAL OSCILLATORS REQUIRED IN 100,000 UNIT QUANTITY (REMBASS). ONLY ONE SOURCE AVAILABLE.						
	SOLUTION - ESTABLISH SECOND SOURCE FOR PRICE COMPETITION AND PRODUCTION BACK UP.						
COMPONENT -- OSCILLATORS							
(5070)	TITLE - MICROPOWER TIME OF DAY SOURCE		9				400
	PROBLEM - MICROPOWER PRECISION TIME OF DAY SIGNAL SOURCES FOR OPERATOR INITIATED SECURE NET ENTRY PROCEDURES ARE NOT AVAILABLE.						
	SOLUTION - ESTABLISH PRODUCTION CAPABILITY FOR A MICROPOWER PRECISION TIME BASE REFERENCE OSCILLATOR TO BE USED IN ECCM COMMUNICATION RADIO SETS.						

FUNDING ($000)

PRIOR	79	80	81	82	83

(CONTINUED)

550

COMPONENT -- OSCILLATORS

(9851) TITLE - TACTICAL MINIATURE PRECISION CRYSTAL OSCILLATOR

PROBLEM - AVAILABLE PRECISION OSCILLATORS FOR USE AS SYNTHESIZER REFERENCE AND TIME BASE GENERATORS ARE UNSUITABLE FOR MANPACK USE (GPS,FFH SINCGARS) BECAUSE OF SIZE AND POWER CONSUMPTION.

SOLUTION - ESTABLISH PRODUCTION CAPABILITY FOR ONE CU INCH,250MW 2X10 MINUS 8 FAST WARMUP OVEN CONTROLLED CRYSTAL OSCILLATOR NOW IN ENGINEERING DEVELOPMENT.

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* CATEGORY *
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*GENERAL *
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1034

COMPONENT -- COMPONENTS

(9963) TITLE - LOW COST E-BEAM EQUIPMENT

PROBLEM - ELECTRON BEAM PHOTOLITHOGRAPHY IS NEEDED FOR DEFINING ARTWORK, PHOTO-MASKS, OR DIRECT EXPOSURE ON A WAFER WHERE CLOSE DEFINITION IS ESSENTIAL. IT IS COSTLY BECAUSE PRESENT EQUIPMENT IS DESIGNED FOR LARGE AREA EXPOSURE AND HIGH THROUGHPUT.

SOLUTION - DEVELOP A LOWER COST E-BEAM EXPOSURE MACHINE SUITED TO LOW VOLUME MILITARY APPLICATIONS. RETAIN THE 1/4 MICROMETER RESOLUTION AND HIGH REGISTRATION CAPABILITY.

242

COMPONENT -- PRINTED CIRCUIT BOARD

(9869) TITLE - RAPID REMOVAL OF PLASTIC ENCAPSULANTS

PROBLEM - DEFECTIVE ELECTRONIC MODULES AND POTTED CIRCUIT BOARDS MUST HAVE THE COMPOUNDS REMOVED TO GET AT THE DEFECTIVE COMPONENT. THIS IS A SLOW, TEDIOUS PROCESS.

SOLUTION - APPLY A VACUUM FORMED FILM OF POLYETHYLENE OR OTHER MATERIAL ONTO BOTH SIDES OF THE BOARD OR MODULE PRIOR TO ENCAPSULATION. SEPARATING THE FOAM FROM THE FILM IS NO PROBLEM.

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* CATEGORY *
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*INTEGRATED ELECTRONICS *
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		FUNDING ($000)					
		PRIOR	79	80	81	82	83
COMPONENT -- AMPLIFIERS							
(9543)	TITLE - LOW NOISE BROADBAND MICROWAVE IC AMPLIFIER	143			400		
	PROBLEM - TRAVELING WAVE TUBES (TWT) ARE BULKY AND HEAVY. PRESENT IC'S ARE NOT COMMERCIALLY AVAILABLE FOR OPERATION AT THE FREQUENCY BANDWIDTH AND LOW NOISE FIGURE REQUIRED.						
	SOLUTION - PERFORM PRODUCTION ENGINEERING TO PRODUCE HIGH FREQUENCY IC'S AND TRANSISTORS. CONTROL GEOMETRY, PHOTOMASKING, ION IMPLANTATION, ELECTRON BEAM TECHNIQUES, AND DIFFUSION.						
(9844)	TITLE - PDN OF SILICON ON SAPPHIRE HI SPD ANLOG MULTIPLXER CIRCUITS		700				
	PROBLEM - THERMAL IMAGING SYSTEMS NOW REQUIRE A LEAD FROM EACH DETECTOR ELEMENT TO AN AMPLIFIER LOCATED OUTSIDE THE COOLED DETECTOR DEWAR.						
	SOLUTION - PRODUCE LOW POWER SILICON ON SAPHIRE ELECTRONICS AND LOCATE THEM NEAR THE DETECTOR ELEMENTS IN THE COOLED AREA. USE A MULTIPLEXER TO GET THE DATA OUT OF THEDEWAR ON FEWER CONDUCTORS.						
COMPONENT -- CIRCUITRY							
(3026)	TITLE - HIGH PRESSURE OXIDE INTEGRATED CIRCUIT PROCESS			1100			
	PROBLEM - CONVENTIONAL OXIDATION OF THICK SILICON DIOXIDE LAYERS REQUIRES EXCESSIVE TIME OR TEMPERATURE. FOR OXIDE-ISOLATED BIPOLAR CIRCUITS, 1200 DEGREES FOR OVER 12 HOURS IS REQUIRED. FOR MOS/SOS, THE TEMPERATURES ARE EXCESSIVE.						
	SOLUTION - ESTABLISH PRODUCTION TECHNIQUES FOR HIGH PRESSURE OXIDATION OF SILICON LAYERS. RAPID OXIDATION RATES OBTAINABLE PERMIT EITHER REDUCTION OF TIME REQUIRED TO ONE-FOURTH OR A TEMPERATURE DECREASE TO LESS THAN 900 DEGREES.						
(3028)	TITLE - HIGH POWER X-RAY SOURCE FOR FINE LINE LITHOGRAPHY			500			
	PROBLEM - HIGHER SPEED REQUIRED FOR MILITARY INTEGRATED CIRCUITS REQUIRES FINE LINE FABRICATION TECHNOLOGY OF BELOW TWO MICROMETER PATTERN SIZE. X-RAY LITHOGRAPHY CAN MEET THIS REQUIREMENT IF HIGHER POWER SOURCES ARE USED.						
	SOLUTION - ESTABLISH PRODUCTION METHODS FOR UTILIZING HIGHER POWER X-RAY SOURCES THAN CURRENTLY USED TO PROVIDE NECESSARY FINE LINE CAPABILITY. AND ADAPT HIGH POWER X-RAY SOURCES TO PROVIDE POWER REQUIRED IN PRODUCTION ENVIRONMENT.						
(3511)	TITLE - SUBMICRON PHOTOMASKS FOR INTEGRATED CIRCUITS			525			
	PROBLEM - EXISTING TECHNOLOGY LIMITS LINE WIDTHS TO 0.8U. INTEGRATED CIRCUITS AND SPECIAL SYSTEMS REQUIRE A 0.5U LINE WIDTH TO INCREASE YIELD AND ALLOW HIGHER FREQUENCIES						
	SOLUTION - MODIFY EXISTING TECHNOLOGY AND APPARATUS TO ACHIEVE SUBMICRON GEOMETRIES. BY USING SHORT WAVELENGTH OPTICS AND MECHANICAL CHANGES TO THE EQUIPMENT THE REQUIRED GEOMETRYS CAN BE ACHIEVED.						

		FUNDING ($000)				
	PRIOR	79	80	81	82	83
COMPONENT -- CIRCUITRY (CONTINUED)						
(5001) TITLE = SOLID ST. SCAN CONVERTER COPLANAR MICROELECTRONICS					950	
(9905) TITLE = LOW COST MONOLITHIC GALLIUM ARSENIDE MW INTEG CKTS				1000		
(9909) TITLE = REDUCTION OF THERM RES OF PACKAGES FOR MW ICS				900		
COMPONENT -- FUZES						
(3510) TITLE = TRANSDUCER PROCESS TECHNOLOGY FOR MW DELAY LINES			250			

PROBLEM = HIGH PERFORMANCE FLIR'S WITH REMOTE TV COMPATIBLE DISPLAYS REQUIRE SOLID STATE SCAN CONVERTERS FOR SIGNAL PROCESSING. CURRENT PRINTED CIRCUIT BOARD TECHNOLOGY PREVENTS IMPLEMENTATION OF THESE ELECTRONICS INTO HIGH DENSITY PACKAGES.

SOLUTION = UTILIZE A 3 DIMENSIONAL MICROELECTRONIC INTERCONNECTION TECHNOLOGY AIMED AT HIGH PRODUCTION VOLUME WHERE LOW UNIT COST, HIGH DEVICE DENSITY, GOOD POWER DISSIPATION, HIGH LOGIC SPEED AND LOW EMI SUSCEPTIBILITY ARE DRIVING REQUIREMENTS.

PROBLEM = SIZE WEIGHT COST CONSTRAINTS LIMIT APPLICATION OF MICROWAVE ICS FOR MANY SYSTEMS APPLICATIONS. DRAMATIC REDUCTIONS PARTICULARLY COST ARE POTENTIALLY AVAILABLE ALONG WITH ORDER OF MAGNITUDE RELIABILITY IMPROVEMENT.

SOLUTION = ESTABLISH PRODUCTION CONTROLS FOR BATCH FABRICATION OF GALLIUM ARSENIDE MONOLITHIC CIRCUIT FUNCTIONS DRAW ON PRIOR R+D AND MMT EFFORTS IN E-BEAM, ION IMPLANT, AND VAPOR EPI TO FULLY AUTOMATE PRODUCTION OF AMPLIFIER AND RECEIVER FUNCTIONS.

PROBLEM = AS THE CONCENTRATION OF INTEGRATED CIRCUITS INCREASES THE HEAT DENSITY IS REACHING THE POINT WHERE IT WILL DESTROY THE SEMICONDUCTOR DEVICES.

SOLUTION = REPLACE THE PRESENT PACKAGING DEVICES WITH UNITS HAVING A HIGH PERCENTAGE OF DIAMOND MATERIAL SO AS TO ACHIEVE A GREATER THERMAL TRANSMISSION.

PROBLEM = THE PARAMETERS FOR DESCRIBING THE ACTUAL PROCESSES REQUIRED FOR HIGH-QUALITY TRANSDUCERS HAVE NOT BEEN DOCUMENTED. THIS RESULTS IN PRODUCTION HALTS AND LOW YIELD.

SOLUTION = DOCUMENT THE MATERIALS, PROCESSES, CONTROLS AND TECHNIQUES NECESSARY TO FABRICATE HIGH-QUALITY THIN FILM PIEZOELECTRIC TRANSDUCERS. THE PARAMETERS WILL BE INCREMENTALLY SHIFTED SO THAT A NON-CRITICAL STABLE PLATEAU REGION IS DEFINED.

* CATEGORY *
*LASER *

		FUNDING ($000)				
	PRIOR	79	80	81	82	83
COMPONENT -- GENERAL						
(3009) TITLE - 10 MICRON WAVEGUIDE LASERS			600			
PROBLEM - LASERS CONSTRUCTED IN UNIT QUANTITIES ARE EXPENSIVE AND VARY IN CHARACTERISTICS. LASERS IN THE FUTURE WILL NEED PULSED AND CW CAPABILITIES						
SOLUTION - DEVELOP GRINDING AND DRILLING METHODS, VACUUM PROCESSING, AND POWER SUPPLIES TO REDUCE OVERALL COSTS BY A FACTOR OF 10.						
(3031) TITLE - 10.6 MICRON CO2 LASERS			550			
PROBLEM - LASERS CONSTRUCTED IN UNIT QUANTITIES ARE EXPENSIVE AND VARY IN SPECIFICATIONS. PRESENT RANGEFINGER LASERS HAVE REDUCED ALL WEATHER CAPABILITIESAND ARE INEFFECTIVE AGAINST COUNTERMEASURE SMOKES.						
SOLUTION - ESTABLISH LARGE SCALE PRODUCTION OF LASER COMPONENTS INCLUDING MIRRORS,ELECTRODES,AND LASER ENVELOPES TO REDUCE COSTS,DEVELOP UNITS THAT ARE RESISTANT TO THE SHOCK AND VIBRATION OF A TANK ENVIRONMENT.						
(5009) TITLE - MIN HIGH VOLT PULSED PWR SUPPLY FOR GAS LASERS				500		
PROBLEM - POWER SUPPLY WITH PULSE FORMING NETWORK HAS TO DELIVER HIGH VOLTAGE PULSES. PACKAGE MUST BE SMALL AND ELECTRODES CURRENT BE EXPOSED TO AIR.						
SOLUTION - APPLY TECHNOLOGY AS DEVELOPED FOR HIGH VOLTAGE GAS TO THE PRODUCTION OF COMPACT POWER SUPPLY.						
COMPONENT -- MODULES						
(5043) TITLE - SEALED BURST MODE CO2 TEA LASERS				640		
PROBLEM - NO RELIABLE FABR. METHOD TO PRODUCE LARGE NUMBERS OF TEA LASERS FOR HIGH REPETITION RATE APPLICATIONS. PROBLEMS INCL. PRODUCTION OF HIGH VACUUM GAS ENVELOPES WITH INTEGRATED RECIRCULATORS AND CATALYTIC CONVERTERS.						
SOLUTION - DEVELOP PRODUCTION CAPABILITY FOR COMPACT TEA LASER FOR BURST MODE APPLICATIONS BY COMBINING EXISTING TECHNOLOGIES OF VACUUM TUBE INDUSTRY, GAS FLOW DESIGN AND CATALYTIC PROCESSORS AS WELL AS EXP. DESIGN OF PRESENT SEALED-OFF TEA LASERS.						
(5051) TITLE - 10 MICRON INJECTION LASER				800		
PROBLEM - PROBLEMS WITH PRODUCTION OF RELIABLE (COOLING CYCLE INDEPENDENT) LASER DIODES INTERFACING WITH A RELIABLE PRECISION TEMP. REGULATED COOLER. LONG TERM STABILITY BETWEEN LASER DIODE AND HEAT SINK PKG. REQUIRES PRODUCTION TYPE RELIABILITY APPLICATION.						
SOLUTION - PRODUCE HIGH TEMP. LEAD SALT DIODES BY USING IMPROVED FABR. AND PKG. TECHNIQUES USING OPTIMUM DIFFUSION MARKS AND BEST AVAILABLE INTERFACE TECHNIQUES BETWEEN COOLER AND DIODE.						

	FUNDING ($000)				
	PRIOR	79	80	81	82	83
COMPONENT -- MODULES (CONTINUED)						
(5060) TITLE = LOW COST 10 MICRON LASER COMPONENTS					525	
PROBLEM = MODULATORS / FREQUENCY OFFSET DEVICES FOR COHERENT CO2 LASERS HAVE BEEN SHOWN TO BE FEASIBLE AS MODULES FOR MODULES FOR LASER SYSTEMS. FABRICATION COST AND RELIABILITY REQUIRE MMT PROGRAM STRUCTURES.						
SOLUTION = PRODUCE COMPACT MODULATORS USING CAD TELLURIDE OR SIMILAR ELECTROPTIC MODULATOR MATERIALS AND IMPROVE RELIABILITY OF OUTPUT. DEVELOP FABR. METHODS FOR COMPACT SCATTERFREE FREQUENCY SHIFTERS.						
(5072) TITLE = MINI EO LASER PROCESSOR FOR SMART WEAPON DELIVERY						480
PROBLEM = PRODUCE TUNABLE LASERS, IR FIBER WAVEGUIDE STRUCTURES AND INTEGRATED OPTICS CIRCUITS WHICH OPERATE ON THE RAW OPTICAL SIGNAL, THUS REALIZING SIGNAL PROCESSING DIRECTLY INSTEAD OF CONVERTING OPTICAL INTO ELECTRICAL SIGNALS.						
SOLUTION = DEVELOP MANUF. TECHNIQUES TO PRODUCE THESE TUNABLE LASERS.						

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* CATEGORY *
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*OPTICS *
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COMPONENT -- MISCELLANEOUS						
(5044) TITLE = ALKALI HALIDE COATINGS				500		
PROBLEM = PRECISION ANTI-REFLECTION PROTECTIVE COATINGS OF UNIFORM THICKNESS, UTILIZING NEW TECHNIQUES, MUST BE TRANSFERRED FROM LAB TO PRODUCTION, UTILIZING MINIMUM CLEAN ROOM REQUIREMENTS AND OPERATOR TRAINING.						
SOLUTION = PRODUCTION CONTROLS AND EQUIPMENT REQUIREMENTS MUST BE ESTABLISHED BY OBSERVING LABORATORY FABRICATION METHODOLOGY AND MAXIMUM HORIZONTAL AND SERIES PRODUCTION TECHNIQUES.						
(5046) TITLE = NON-LINEAR GAIN MCP'S FOR 3RD GEN. IMAGE INTENSIF.				800		
PROBLEM = 3RD GEN TUBES REQUIRE NON-LINEAR GAIN MCP'S TO SUPPRESS BRIGHT HORIZON SKY OR OTHER BRIGHT IMAGES WHILE PROVIDING FULL GAIN IN DARK SCENE AREAS. PRESENT MANUF. METHODS FOR MCP ONLY PRODUCE MCP WITH LINEAR GAIN IN THE NORMAL OPERATING RANGE.						
SOLUTION = ESTABLISH A NEW HIGH VOLUME MANUF. PROCESS CONTROL TO ACCURATELY CONTROL NON-LINEAR GAIN CHARACTERISTICS OF THE MCP WHILE MAINTAINING ALL PARAMETERS SUCH AS LOW NOISE, BELIMISHES, FIXED PATTERN NOISE, AND ION BARRIER PROTECTION.						

		FUNDING ($000)					
		PRIOR	79	80	81	82	83
COMPONENT -- MISCELLANEOUS (CONTINUED)							
(5047)	TITLE - ELECTRO-FORMED REPLICATED MIRRORS				500		
	PROBLEM - CONIC AND ASPHERIC MIRRORS MUST BE FORMED AT HIGH PRODUCTION RATE BY ELECTRFORMING PROCESS. ELECTRIC CURRENT MUST NOT FLUCTUATE TO PREVENT STRESS. THIS PROCESS MUST BE PERFORMED IN PRODUCTION.						
	SOLUTION - COMPUTER CONTROLLED PROCESS TO REPEAT LAB PROCEDURES MUST BE DEVELOPED TO CHEAPEN PRODUCTION QUANTITIES. THESE TECHNIQUES WILL BE REQUIRED BEFORE THE BENEFITS OF ASPERIC MIRRORS CAN BE REALIZED.						
(5061)	TITLE - MULTI-SPECTRAL COATINGS					750	
	PROBLEM - DOUBLE BAND PASS (1.06 AND 8-14 MICRON) MULTI-LAYER COATINGS MUST BE PRODUCED ON VARIOUS OPTICAL MATERIALS. THESE COATINGS MUST MEET MIL. STANDARDS FOR HARDNESS WHICH IS A FUNCTION OF THE PROCESS.						
	SOLUTION - STRICT PROCESS CONTROLS MUST BE ESTABLISHED. MINIMUM TIME BETWEEN LAYER DEPOSITION MUST BE ACHIEVED AND PRODUCTION TECHNIQUES MUST BE DEVELOPED.						
COMPONENT -- NIGHT VISION							
(9893)	TITLE - ADVANCED METHODS FOR FABRICATION OF MICROCHANNEL PLATES		623				
	PROBLEM - MICROCHANNEL PLATES ARE NOW MADE BY FUZING TOGETHER THOUSANDS OF COATED GLASS FIBERS THEN ETCHING OUT THE GLASS. CRACKING OCCURS FROM FIBER REDRAWING.						
	SOLUTION - DEVELOP A SYSTEM THAT USES A LASER BEAM TO DRILL THOUSANDS OF HOLES IN A THIN GLASS, CERAMIC OR SEMICONDUCTOR DISC. THEN FILL THE HOLES WITH ELECTRON MULTIPLICATION MATERIAL.						
COMPONENT -- WINDOWS/LENSES							
(3503)	TITLE - HOLOGRAPHIC OPTICS FOR NIGHT VISION GOGGLES			700			
	PROBLEM - CURRENT METHODS OF MANUFACTURING HOLOGRAPHIC OPTICS UTILIZE LABORATORY TECHNIQUES WHICH ARE INEFFICIENT AND COSTLY.						
	SOLUTION - DEVELOP PRODUCTION TECHNIQUES TO PRODUCE INEXPENSIVE HOLOGRAPHIC OPTICS.						
(3506)	TITLE - INFRARED COLOR CORRECTING GLASS			245			
	PROBLEM - PRESENT COMMON MODULE IR IMAGERS USED WITH THE ARMY FIRE CONTROL SYSTEM REQUIRE ABERRATION CORRECTING LENS ELEMENTS. THERE IS NO SUBSTITUTE FOR TEXAS INSTR. PROPRIETARY 1173 IR GLASS EXCEPT FOR THE NEWLY DEVELOPED AMTIR-1.						
	SOLUTION - ESTABLISH THE PROCESSES AND METHODS FOR MANUFACTURING THIS NEW GLASS IN SUFFICIENT QUANTITY TO SATISFY THE ARMY'S PRODUCTION DEMANDS.						

	FUNDING ($000)					
	PRIOR	79	80	81	82	83
COMPONENT -- WINDOWS/LENSES (CONTINUED)						
(5068) TITLE = FABRICATION OF COMPOSITE LENS BENCHES					3000	
PROBLEM = MOVE FROM A BRASSBOARD PROTOTYPE INTO A PRODUCTION ENVIRONMENT.						
SOLUTION = DEVELOP PROCESSES TO FABRICATE AND MACHINE COMPLEX COMPOSITE MATERIAL STRUCTURES HAVING EXTREMELY CLOSE TOLERANCES WHICH HAVE TO BE MATCHED FOR ENVIRONMENTAL RESPONSE.						
(9845) TITLE = NUMERICALLY CONTROLLED OPTICAL FABRICATION	300			600		
PROBLEM = ASPHERICAL LENS FABR. IS EXPENSIVE AS DONE BASICALLY MANUALLY WITH MANY INTERACTIVE CHECKS ON PROGRESS, INVOLVING REMOUNT, TEST SET-UP, EVALUATION, REMOUNT, THIS LIMITS ACCURACY.						
SOLUTION = THE PRESENT MMT ONLY DEMONSTRATES THE PRODUCABILITY OF ASPHERES. THIS MMT WILL ESTABLISH A PILOT PRODUCTION LINE DEMONSTRATION BASED ON THE PROCEDURES CURRENTLY BEING PROVEN OUT.						
CATEGORY						
POWER SOURCES						
COMPONENT -- BATTERIES						
(3016) TITLE = SMALL SIZE LITHIUM CELLS/BATTERIES					800	
PROBLEM = SMALL LITHIUM CELLS 1.5 A.H. OR LESS ARE PRESENTLY HANDMADE WITH LIMITED MECHANIZATION AND THEREFORE ARE EXPENSIVE. PRESENT FABRICATION METHODS ARE NOT ADAPTABLE.						
SOLUTION = NEW TECHNIQUES MUST BE MADE AVAILABLE TO AUTOMATE PRODUCTION OF THE SMALL CELLS TO REDUCE COST AND IMPROVE RELIABILITY.						
COMPONENT -- INFRARED						
(3012) TITLE = IR SOURCES FOR AN/ALQ-144					285	
PROBLEM = PRESENT INFRARED SOURCE FOR THE AN/ALQ-144 DOES NOT EMIT ENOUGH RADIATION IN BAND NO. 4.						
SOLUTION = ESTABLISH PDN TECHNIQUES FOR FABRICATING BORON NITRIDE HEATED SOURCES AND PROCESSING, SEALING SOURCES IN INFRARED TRANSMISSIVE ENVELOPES RESULTING IN A SOURCE OF RADIATION CAPABILE OF SATISFYING ALL FOUR BANDS WITH NO INCREASE IN ELECTRICAL POWER.						

		FUNDING ($000)				
		PRIOR	79	80	81	82	83
COMPONENT -- INFRARED (CONTINUED)							
(5023)	TITLE = POWER CONSERVATION IR SOURCE ENVELOPE					400	
	PROBLEM = PRESENT MILITARY IR SYSTEMS USE IR SOURCES WITH ENVELOPES THAT TRANSMIT BROADBAND RADIATION WHICH LIMITS SYSTEM EFFICIENCY.						
	SOLUTION = ESTABLISH PRODUCTION MEASURES FOR FABRICATING DIELECTRIC COATED IR SOURCE ENVELOPES WHICH WILL REFLECT UNWANTED RADIATION BACK INTO THE SOURCE. THIS WILL REDUCE ELECTRICAL POWER REQUIREMENTS.						
COMPONENT -- MISCELLANEOUS							
(5016)	TITLE = PROD CAPABILITY = LOW COST THERMOCOUPLE MODULES					350	
	PROBLEM = THE HIGH COST OF THERMOCOUPLE MODULES IS DUE TO THE EXPENSIVE MANUAL PROCESSES THAT RESULT IN LOW YIELD COMPONENTS.						
	SOLUTION = ESTABLISH EFFICIENT MANUFACTURING PROCESSES WHICH MAKE POSSIBLE THE ECONOMIC MASS PRODUCTION AND INCREASE RELIABILITY OF THE THERMOCOUPLE MODULE.						
(5022)	TITLE = LONG LIFE X=RAY MODULATOR FOR CATSCANNING EQUIP					550	
	PROBLEM = PRESENT CATSCANNING SYSTEMS CANNOT BE UTILIZED FOR BOMB DISPOSAL OR NON=DISTRUCTIVE TESTING BECAUSE EXISTING XRAY TUBES HAVE SHORT LIVES. A LONG=LIFE PULSED XRAY MODULATOR WOULD BE THE CRITICAL ITEM NEEDED TO EXPLOIT THIS NEW TECHNOLOGY FOR MILIT.						
	SOLUTION = A LONG=LIFE PULSED XRAY MODULATOR WOULD BE THE CRITICAL ITEM NEEDED TO EXPLOIT THIS NEW TECHNOLOGY FOR MILITARY PURPOSES.						
(5032)	TITLE = MM RADAR MODULATOR FOR MINI=RPV AND TUBES						650
	PROBLEM = MM RADAR MOD CAPABLE OF SURVIVING A RUGGED ENVIRONMENT WITH HIGH RELIABILITY REQUIRES COMPONENTS OF NO COMM INT. NEW SWITCH DEVELOPMENTS, PULSE SHARPENING TECHNIQUES, PULSE CHARGING, AND NANOSECOND PULSE TRANSFORMER MUST BE COMBINED INTO ONE UNIT.						
	SOLUTION = FABRICATE IN QUANTITY MM RADAR MODULATOR UTILIZING RECENT COMPONENT IMPROVEMENTS TO MEET MILITARY REQUIREMENTS WITH THE BEST EFFICIENCY, RELIABILITY, COST, WEIGHT POSSIBLE.						
(5042)	TITLE = LOW COST THIRD GENERATION IMAGE TUBE POWER SUPPLY				350		
	PROBLEM = EXISTING MANUFACTURING PROCEDURES FOR HIGH VOLTAGE POWER SUPPLIES FOR IMAGE TUBES ARE INADEQUATE TO ACHIEVE LOW PRODUCTION UNIT COST WITH HIGH PERFORMANCE AND RELIABILITY.						
	SOLUTION = ESTABLISH AUTOMATIC ASSEMBLY AND TEST PROCEDURES TO PRODUCE LOW COST POWER SUPPLIES FOR HIGH DENSITY=VOLTAGE STRESS REQUIREMENTS.						

		FUNDING ($000)				
	PRIOR	79	80	81	82	83

COMPONENT -- TRANSFORMER

(9563) TITLE - MINIATURE HIGH VOLTAGE POWER SUPPLY FOR IMAGE INTENSIFIERS — 600

PROBLEM - PRESENT IMAGE INTENSIFIER POWER SUPPLIES DO NOT MEET 3RD GEN. SHAPE AND SIZE REQUIREMENTS.

SOLUTION - DEVELOP NEW PROCESSES AND TECHNIQUES FOUND ON R AND D CONTRACTS.

CATEGORY
SOLID STATE

COMPONENT -- DIODES/RECTIFIERS

(3010) TITLE - MILLIMETER-WAVE SOURCES FOR 60 AND 94 GHZ — 900

PROBLEM - TO ESTABLISH A MANUFACTURING CAPABILITY FOR PRODUCTION OF IMPATT DIODES WHICH ARE UNIFORM ENOUGH TO BE FIELD REPLACEABLE IN ARMY SYSTEMS.

SOLUTION - ESTABLISH COMPUTER CONTROLLED EPITAXIAL OR IMPLANTATION FACILITIES FOR FABRICATION OF IMPATT DIODES. CANDIDATE APPROACHES ARE MOLECULAR BEAM EPITAXY, VAPOR PHASE EPITAXY, AND ION IMPLANTATION.

(3011) TITLE - MILLIMETER-WAVE IDIUM PHOSPHIDE GUNN DEVICES — 800

PROBLEM - INADEQUATE CONTROL OF EPI MATERIAL AND DEVICE PROCESSING STEPS REQUIRING CLOSE TOLERANCES FOR EFFICIENT MM OPERATION RESULTS IN LOW YIELD POOR UNIFORMITY AND HIGH UNIT COST FOR MILLIMETER-WAVE INDIUM PHOSPHIDE GUNN DEVICES.

SOLUTION - ENG IN EPITAXIAL MATERIAL PREPARATION, INJECTION-LIMITED CONTACT FORMATION, INTEGRAL HEAT SINK TECHNOLOGY AND PACKAGING WILL BE PERFORMED TO ESTABLISH MANF TECHNIQUES AND CONTROLS RESULTING IN A DEVICE COST REDUCTION OF MORE THAN TEN TO ONE.

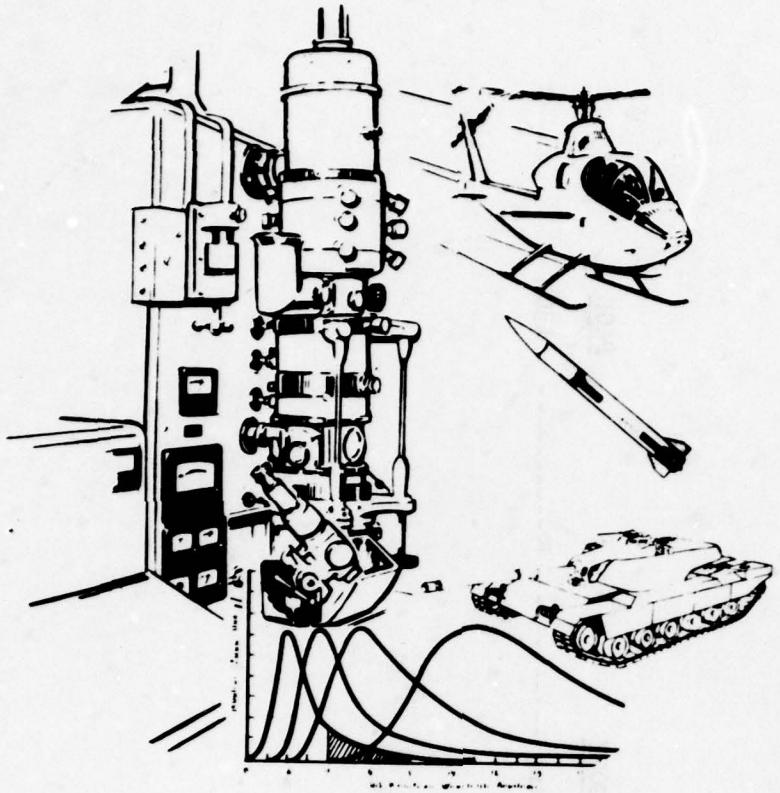
(3021) TITLE - LOW LOSS, HIGH POWER TUNING VARACTOR FOR USE IN MM XMTRS — 300

PROBLEM - THE INTERNAL SERIES RESISTANCE AND THE THERMAL RESISTANCE ARE TOO HIGH AND CONSEQUENTLY THE EFFICIENCY AND POWER HANDLING CAPABILITIES ARE INADEQUATE FOR HIGH POWER APPLICATIONS.

SOLUTION - DEVELOP GALLIUM ARSENIDE VARACTORS WITH HYPER ABRUPT JUNCTIONS AND INTEGRAL PLATED HEAT SINKS BY ADAPTING PRESENT IMPATT DIODE TECHNIQUES TO VARACTORS.

		FUNDING ($000)					
		PRIOR	79	80	81	82	83
COMPONENT -- DIODES/RECTIFIERS (CONTINUED)							
(5041)	TITLE - MILLIMETER WAVE MIXERS AND ARRAYS				1000		
	PROBLEM - LOW NOISE RUGGEDIZED REPRODUCIBLE MIXERS ARE NEEDED FOR RECEIVERS FOR RADAR ELECTRONIC WARFARE TERMINAL HOMING AND MISSILE GUIDANCE.						
	SOLUTION - IN SITU CONSTRUCTION AND DESIGN WILL PROVIDE REPRODUCIBLE UNITS AT FREQUENCIES FROM 40 GHZ UP TO 600 GHZ. NEW TECHNOLOGIES TO BE DEVELOPED INCLUDE EBEAM LITHOGRAPHY AND COMPUTER CONTROL OF MATERIALS GROWTH.						
COMPONENT -- MISCELLANEOUS							
(5053)	TITLE - MILLIMETER WAVE INTEGRATED CIRCUITS					1000	
	PROBLEM - LOW COST SMALL SIZE RUGGEDIZED RECEIVERS AND TRANSMITTERS ARE NEEDED AT 94 140 AND 220GHZ FOR RADAR AND TERMINAL HOMING COST IS MOST SIGNIFICANT.						
	SOLUTION - MONOLITHIC INTEGRATED CIRCUITS TECHNOLOGY WILL BE APPLIED TO MM WAVE INTEGRATED CIRCUITS GREATLY REDUCING COST OF COMPONENTS AND SUBSYSTEMS.						
COMPONENT -- SWITCHES							
(3020)	TITLE - FAST RISETIME SCR SWITCH			250			
	PROBLEM - AVALIABLE SCR COMMERCIAL SWITCHES ARE UNSATISFACTORY FOR MICROWAVE AND LASER SYSTEMS DUE TO SLOW RISE TIME.						
	SOLUTION - ESTABLISH A PRODUCTION SOURCE FOR A FAST RISE TIME SCR TO COVER A WIDE RANGE OF MILITARY REQUIREMENTS.						
(5031)	TITLE - LIGHT ACTIVATED SILICON SWITCH						1200
	PROBLEM - MM AND OPTICAL RADARS NEED A SUB-NANOSECOND SWITCH. NO SWITCH EXISTS TODAY WHICH WILL MEET MILITARY REQUIREMENTS NOR IS THERE SUFFICIENT OUTSIDE INTEREST TO SPUR COMMERCIAL PRODUCTION.						
	SOLUTION - ESTABLISH PRODUCTION TECHNIQUES TO MANUFACTURE LASS DEVICES FOR MM AND OPTICAL RADARS.						
COMPONENT -- TRANSISTORS							
(3022)	TITLE - LOW THERMAL RESISTANCE MICROWAVE TRANSISTORS		66	500			
	PROBLEM - TO REDUCE THE PRESENT LEVELS OF THERMAL RESISTANCE IN MICROWAVE POWER TRANSISTORS BY FIFTY PERCENT IN ORDER TO MEET MILITARY GOALS OF OPERATIONAL LIFE AND ELECTRICAL PERFORMANCE.						
	SOLUTION - TO DEVELOP PRODUCTION TECHNIQUES WHICH WILL DECREASE THE THERMAL RESISTANCE OF SILICON TRANSISTORS BY MEANS OF WAFER THINNING AND BACK METAL PLATING.						

		FUNDING ($000)				
	PRIOR	79	80	81	82	83
COMPONENT -- TRANSISTORS (CONTINUED)						
(3025) TITLE - LOW COST MICROWAVE POWER TRANSISTOR			500			
PROBLEM - TO ESTABLISH MANUFACTURING CAPABILITY FOR LOW COST HIGH POWER MICROWAVE TRANSISTORS.						
SOLUTION - TO ESTABLISH AUTOMATED PROCEDURES TO REPLACE MANUAL INTRA-PACKAGE LEAD BONDING OF HUNDREDS OF LEADS PER TRANSISTOR.						
(5054) TITLE - MONOLITHICALLY MATCHED POWER GASFETS					800	
PROBLEM - GAAS MICROWAVE POWER FETS REQUIRE LARGE GATE WIDTHS TO ACHIEVE HIGH OUTPUT POWER LEVELS LOW TERMINAL IMPEDANCES ACCOMPANY THE LARGE GATE WIDTHS AND ADVERSELY EFFECT A DEVICES BANDWIDTH CAPABILITY AND OVERALL RF PERFORMANCE.						
SOLUTION - ESTABLISH PRODUCTION TECHNIQUES TO FABRICATE MONOLITHIC MATCHING CIRCUITS FOR POWER COMBINING A NUMBER OF SMALLER GATE WIDTH CELLS RESULTING DEVICES WILL HAVE HIGH USABLE TERMINAL IMPEDANCES AND INTRINSIC DEVICE RF PERFORMANCE WILL BE PRESERVED.						



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US ARMY MATERIALS AND MECHANICS RESEARCH CENTER

(AMMRC)

The Army Materials and Mechanics Research Center (AMMRC) is designated the DARCOM Lead Laboratory for Materials Testing Technology. In this role, AMMRC is responsible for management and direction of the DARCOM materials testing technology activities and formulation of the Materials Testing Technology (MTT) Program. This program formulation is accomplished by identifying and defining materials testing problem areas in response to system requirements of the DARCOM R&D and Readiness Commands and Project Managers utilizing materials testing technology. The Lead Laboratory mission also encompasses the advising and assisting of the major subordinate commands and Project Managers in the utilization of Materials Testing Technology in order to assure a smooth transition from the developmental to the production phases of the life cycle. Concurrent with the above responsibilities is the furnishing of technical assistance in the application of methods and techniques in solving material problems in connection with procured items.

The MTT Program has shown a steady growth over the last several years, from 2.5 million dollars in FY73 to 4.5 million dollars in FY78. This growth has been largely due to the increased participation in the Program by DARCOM Project Managers, as well as increased attention to the Program by DARCOM Quality Assurance managers. The most recent planning for the MTT Program illustrated a leveling off of the Program at 4.5 million dollars. This, however, does not indicate the tremendous pressure on the Program to expand, as shown by the Project Managers' input, and the increasing necessity of restricting the dollar level of funded subtasks. Another increasing trend within the MMT Program has also been the directing of more and more testing related projects to the MTT Program. Specific areas of effort are as follows:

a. Automated Testing

One of the primary needs in NDT and in inspection in general is to remove the decision-making from the inspector where possible. In FY79 and beyond efforts will be intensively directed toward providing engineering prototype systems utilizing automated decision-making. These include automated radiographic and ultrasonic techniques, optical/laser techniques, and computerized chemical analysis. The ultimate goal in all automated testing systems is the essential feedback to the total system for automated process control.

b. Predictive Failure

The need for diagnostic measurement techniques for anticipation of catastrophic failure and for the measurement of remaining life, both in

operating equipment and in units being overhauled and rebuilt, presents a tremendous opportunity for cost savings and reliability improvement. A principal thrust has come from the loss of single engine aircraft due to malfunction. In essence, the field of diagnostics and in-situ measurements adjunct to non-destructive testing represents the real time use of NDT techniques with analysis and decision elements built in.

c. Materials

As the newer materials are utilized in major weapon systems, it is imperative that new and/or improved inspection techniques be available to measure characteristics or parameters to assure adequate and reliable performance. Of particular interest in the next five years are composites, elastomers, plastics, and ceramics, with continuing interest in metals and energetics (explosives, pyrotechnics, and propellants).

d. Techniques

Specifically covered in the objectives of the MTT Program is the investigation of specific physical principles which can potentially offer significant improvement in sensitivity, cost, portability, or speed, and combinations of these. The development and application of techniques, such as ultrasonics, infrared, holography, spectroscopy, chromatography, etc., can significantly improve DARCOM materiel and offer substantial improvement in process control.

AMMRC

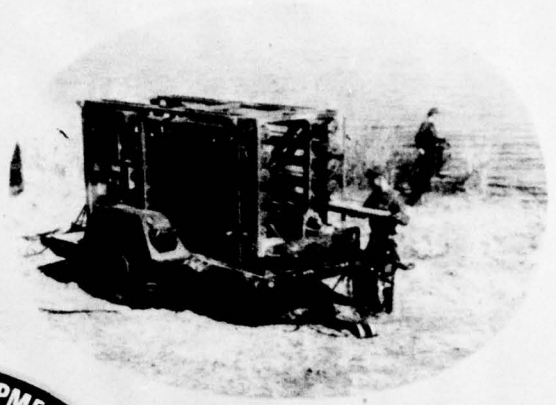
COMMAND FUNDING SUMMARY
(THOUSANDS)

CATEGORY	FY79	FY80	FY81	FY82	FY83
TESTING	4500	4500	4500	5000	5000
TOTAL	4500	4500	4500	5000	5000

CATEGORY

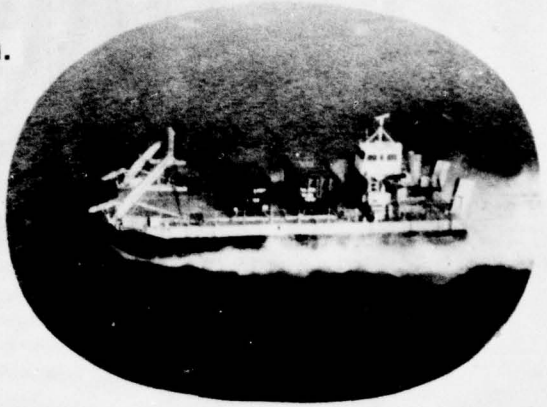
TESTING

		FUNDING ($000)				
	PRIOR	79	80	81	82	83
COMPONENT -- CHEMICAL						
(6350) TITLE - MATERIALS TESTING TECHNOLOGY (MTT)		950	950	950	1050	1050
PROBLEM - CURRENT LABORATORY METHODS FOR CHEMICAL TESTING ARE SPECIALIZED AND EXPENSIVE. REAL TIME TESTING TECHNIQUES ARE NEEDED TO CONTROL CHEMICAL PROCESSING.						
SOLUTION - ADAPT QUICK RESPONSE CHEMICAL TESTING EQUIPMENT TO AUTOMATE THE CONTROL OF CHEMICAL PROCESSES.						
COMPONENT -- MECHANICAL						
(6350) TITLE - MATERIALS TESTING TECHNOLOGY (MTT)		950	950	950	1050	1050
PROBLEM - METHODS OF MECHANICAL TESTING ARE BASICALLY TIME CONSUMING, LABORATORY TYPE OPERATIONS. THE TESTING IS OFTEN ULTIMATE AND THEREFORE DISTRUCTIVE OR IT TENDS TO INTRODUCE RESIDUAL STRESS/STRAIN IN THE TESTED ITEMS.						
SOLUTION - ESTABLISH IMPROVED REAL-TIME INSPECTION TECHNIQUES TO REDUCE PRODUCTION BOTTLENECKS ASSOCIATED WITH MECHANICAL TESTING. ALSO, THE OPTIMUM TESTING CRITERIA WILL BE ESTABLISHED WHEN NECESSARY.						
COMPONENT -- NON-DESTRUCTIVE						
(6350) TITLE - MATERIALS TESTING TECHNOLOGY (MTT)	8502	2600	2600	2600	2900	2900
PROBLEM - DESTRUCTIVE AND CERTAIN CONVENTIONAL NON-DESTRUCTIVE TESTING TECHNIQUES ARE RESPECTIVELY UNSUITED AND INADEQUATE OR HARD TO BE ADAPTED TO ON-LINE PRODUCTION TESTING USAGE.						
SOLUTION - DETERMINE FEASIBILITY OF ADAPTING LAB-PROVEN NDT METHODS OR MODIFD THE EXISTING TEST PROCEDURES FOR ON-LINE PRODUCTION QUALITY ASSURANCE TESTING.						



U.S. ARMY MOBILITY EQUIPMENT
MERADCOM
RESEARCH & DEVELOPMENT COMMAND

Fort Belvoir, Va.



US ARMY MOBILITY EQUIPMENT RESEARCH AND DEVELOPMENT COMMAND

(MERADCOM)

MERADCOM, located at Fort Belvoir, VA, conducts a widely diversified program to improve the Army's combat readiness in four major areas: barrier and counterbarrier systems; countersurveillance systems; energy and environmental systems; and supply distribution and construction equipment systems.

Procurements for items under MERADCOM's cognizance are placed with the private sector, and much of MERADCOM's MMT effort is accomplished by the private sector.

To address the problem of increased system acquisition costs, MERADCOM has identified major problem areas where improved manufacturing technology is needed. Major problem areas confronting MERADCOM include:

a. Obtaining Fuel Stacks that Exhibit Required Performance and Life with Minimum Manufacturing and Noble Metal Catalyst Cost. Manufacturing methods and technology have been developed for producing fuel cells up to 0.4 ft^2 in area with catalyst loadings of nominally two grams per square foot of electrode area. Extending this technology to larger area fuel cells (1 ft^2 or more) and incorporating Kocite^R catalyst technology is viewed as an important step towards satisfying the Army requirements for Tactical Utility Power Plants. The Kocite^R catalyst is a recent development funded by MERADCOM and the US Department of Energy. Kocite^R has the potential for reducing noble metal catalyst loadings by 85 percent. The primary solution of the problem lies in development efficient manufacturing methods and technology for all fuel cell components that will enable large area cell stacks to be built at a lower cost per KW. A major thrust of this Command is to obtain high quality fuel cell stacks at a reasonable price. Projects attacking this area are 3716, 3733 and 3764.

b. Limitations of High Temperature Super Alloy Components of Gas Turbine Engines. A limiting factor in the life and performance of gas turbines is the ability of the components to withstand the abrasive and corrosive environment at peak operating temperatures. Super alloy metals utilizing strategic materials are limited to 1750^oF operating temperature and are subject to catastrophic failure when subjected to high dust concentrations or corrosive atmosphere such as salt. Thermal efficiency can be improved by increasing peak cycle temperature currently limited by maximum operating temperature of materials of the burner, turbine inlet nozzle, and turbine wheel. The most critical component for damage due to wear and corrosion is the turbine nozzle.

Materials are needed which have increased operating temperature limits and improved resistance to corrosion and abrasive wear at a reasonable cost. Projects addressing this problem area are 3717 and 3719.

c. Military Quality Power Conditioners. The development of lightweight, military quality power conditioners is, to a large extent, dependent upon the availability of reliable, lightweight, compact electronic components. The power stages of these power conditioners employ an important class of these components - power semiconducting devices. Currently available versions of these power semiconducting devices in the required ratings often are too heavy and bulky to be conveniently used in the power stages of military power conditioners under development. Also, in some instances, reliability of currently available devices is not adequate for military power conditioners. Recognizing the limitations of today's power semiconducting devices, MERADCOM has been developing reliable, lightweight, compact power semiconducting devices. Projects attacking this area are 3710, 3772 and 3789.

d. Providing Military Bridges at Moderate Cost, Which Have High Mobility and High Emplacement Speeds While Retaining the Ability to Withstand the Abusive Treatment Inherent in the Battlefield Environment. High strength, low density composite materials in both organic and/or metallic matrix appear to offer great promise for solutions to this problem. Increased production of high strength fiber materials has reduced materials cost. Techniques for the fabrication and installation of these materials into usable bridge components is the area in which large cost reductions are possible. The reduction of presently used labor intensive methods, through the application of automated processes, will reduce component costs. Initial design in these materials offer improved performance due to the flexibility possible in material configuration. Projects directed at this problem area are 3746, 3747 and 3786.

MERADCOM's efforts over the next five years could result in new technology that will impact the private sector. Successful completion of project 3605 will bring down the price of transcalent transistors. By lowering the cost of these devices, potential users in both the military and private sector will be able to discover the advantages of transcalent devices for a variety of applications.

Hydrocarbon fuel cell electric power plants are beginning to penetrate the civilian sector under the sponsorship of the Department of Energy. These power plants utilize fuel conditioners based upon the technology developed by the petrochemical industry. Planned efforts under project 3764 will establish more economical fuel conditioning designs using the latest ceramic, heat pipe, and catalyst technologies. The resultant conditioner subsystem, which will be cheaper to produce,

smaller in size, and have a longer life, will probably be adopted and utilized by the civilian energy market.

Fuel cell technology in other areas have potential for utilization by private industry. Indications are that methanol is one of the leading alternate fuel contenders, and that fuel cell utilization of methanol is one of the more efficient ways to use this fuel. Since it is apparent that fuel cells are beginning to penetrate the civilian electric power market, it is likely that Army methanol fuel conditioner design resulting from this study will be utilized by the civilian sector.

MERADCOM

COMMAND FUNDING SUMMARY
(THOUSANDS)

CATEGORY	FY79	FY80	FY81	FY82	FY83
BRIDGING	1278	0	627	750	3000
GENERAL	292	950	889	500	925
LAND MINES	163	0	0	460	530
POWER SOURCES	918	1678	2894	2342	1581
TOTAL	2651	2628	4410	4052	6036

CATEGORY	FUNDING ($000)					
BRIDGING	PRIOR	79	80	81	82	83
COMPONENT -- REINFORCEMENT						
(3745) TITLE - ALUMINUM SKIN-GRAPHITE/EPOXY SANDWICH BRIDGE REINF	186	383		430		600
PROBLEM - FORMULATION OF PROCEDURES TO MASS PRODUCE ALUMINUM SKIN-GRAPHITE EPOXY SANDWICH MATERIAL FOR BRIDGE STRUCTURAL MEMBERS.						
SOLUTION - SANDWICH ALUMINUM SKIN-GRAPHITE EPOXY ALUMINUM SKIN LAMINATE SHOWS PROMISE OF BEING A STRUCTURE THAT WOULD SATISFY OUR NEEDS IF IT CAN BE ECONOMICALLY MASS-PRODUCED USING ROOM CURING ADHESIVES.						
(3759) TITLE - KEVLAR CABLE REINFORCEMENT FOR MILITARY BRIDGES	150	175		197		400
PROBLEM - TO PROVIDE LIGHT WEIGHT REINFORCEMENT TENSION MEMBER HAVING HIGH TENSILE PROPERTIES AND MODULUS.						
SOLUTION - DETERMINE IF KEVLAR MATERIAL CAN BE PRODUCED ON A PRODUCTION BASIS AND MAINTAIN THE HIGH PHYSICAL PROPERTIES REQUIRED IN A REINFORCING MEMBER.						
COMPONENT -- STRUCTURAL MEMBERS						
(3743) TITLE - COMPOSITE SPUN MATERIAL TRAVERSING BM FOR BRIDGES	378	470				
PROBLEM - PROVIDE LIGHT WEIGHT TRAVERSING BEAM WITH LIGHT WEIGHT AND LOW FLEXIBILITY.						
SOLUTION - SPIN THE BEAM BY USING HIGH STRENGTH HIGH MODULUS GRAPHITE FIBERS IN AN EPOXY MATRIX WITH INTEGRAL CONNECTORS.						
(3746) TITLE - METAL MATRIX COMPOSITE MATERIAL					250	300
PROBLEM - CONNECTION OF COMPOSITE MATERIAL IS DIFFICULT IN LINEAR PLAINER COMPONENTS. MECHANICAL CONNECTORS ARE EXPENSIVE IN BOTH DESIGN AND MATERIAL.						
SOLUTION - IMBED HIGH MODULUS FIBER MATERIAL IN DUCTILE METAL WHICH CAN BE WORKED AND CONNECTED WITH STANDARD METHODS.						
(3756) TITLE - COMPOSITE MATERIAL GIRDER MODULES FOR BRIDGES						600
PROBLEM - REDUCE WEIGHT AND COST OF BRIDGE WHILE INCREASING FATIGUE LIFE, INCREASE BRIDGE SPAN AND LOAD CLASS WITHOUT A WEIGHT INCREASE.						
SOLUTION - SELECTIVELY PLACE COMPOSITE MATERIAL TO ACHIEVE BALANCE AND COMPATIBLE STIFFNESS.						
(3761) TITLE - DIMPLE PLATE WEB FOR BRIDGES	100	250				400
PROBLEM - HOW TO STABILIZE THIN SHEETS OF ALUMINUM TO CARRY HIGH SHEAR STRESSES WITHOUT BUCKLING.						
SOLUTION - CONTROLLED SPACING OF DRAWN DIMPLES OF PLATES AND SPOTWELD TWO PLATES TOGETHER AT BOTTOM OF DIMPLES TO FORM A SANDWICH PLATE.						

	FUNDING ($000)				
PRIOR	79	80	81	82	83

COMPONENT -- STRUCTURAL MEMBERS (CONTINUED)

		300			500	700

(3706) TITLE - MULTI HOLLOW SHEAR WEB MODULE

PROBLEM - TO PROVIDE A LIGHT WEIGHT SINGLE PIECE WEB MEMBER WHICH CAN BE EASILY ATTACHED TO TOP AND BOTTOM CHORD MEMBERS.

SOLUTION - WIND THE WEB MODULE ON A LARGE INFLATED CYLINDRICAL MANDREL USING GRAPHITE EPOXY, AFTER WINDING IN UNCURED STATE DEFLATE MANDREL AND FORCE WOUND MEMBER INTO MOLD HAVING DESIRED WEB SHAPE AND CURE.

CATEGORY
GENERAL

COMPONENT -- MISCELLANEOUS

			280	512		

(3704) TITLE - LIGHTWEIGHT POTABLE WATER HOSE

PROBLEM - CURRENT FIELD POTABLE WATER HOSE IS SUBJECT TO ABRASION, AND DETERIORATION WHEN MOISTURE IS PRESENT DUE TO MOLD AND MILDEW. THIS CAUSES UNNECESSARY COST AND EXCESS CARE AND HANDLING.

SOLUTION - DEVELOP MATERIALS AND MANUFACTURING TECHNOLOGY NECESSARY TO PRODUCE LIGHTWEIGHT COLLAPSIBLE SYNTHETIC POTABLE WATER HOSE.

			47	150		

(3708) TITLE - COLLAPSIBLE FABRIC TANKS - CIRCULAR SEAMLESS WEAVE

PROBLEM - TO IMPROVE THE RELIABILITY AND ENDURANCE OF FABRIC PILLOW TANKS BY ELIMINATING THE LONGITUDINAL SEAMS WHICH ARE VULCANIZED TOGETHER. THESE SEAMS ARE THE MOST LIKELY CAUSE OF CATASTROPHIC FAILURE.

SOLUTION - DEVELOP A MANUFACTURING METHOD OF WEAVING A CIRCULAR SEAMLESS TUBE.

			245	329		

(3709) TITLE - CONTINUOUS LENGTH FUEL HOSE

PROBLEM - PRESENT FUEL RESISTANT CONTINUOUS LENGTH HOSE IS MANDREL FABRICATION, FIFTY OR A HUNDRED FEET LENGTH OF HOSE IS FIRST MANDREL MADE AND THEN SECTIONS ARE SPLICED TOGETHER FOR THE DESIRED LENGTH. SPLICING IS LABOR INTENSIVE.

SOLUTION - EXTRUDE DESIRED LENGTHS OF HOSE WITHOUT SPLICES. FIRE HOSE IS PRODUCED BY THIS METHOD, WHICH IS ALSO APPICABLE TO FUEL HOSE. NON-SPLICED, EXTRUDED, CONTINUOUS HOSE WILL BE MORE RELIABLE AND LESS EXPENSIVE THAN PRESENT SPLICED HOSE.

FUNDING ($000)

	PRIOR	79	80	81	82	83
COMPONENT -- MISCELLANEOUS (CONTINUED)						
(3718) TITLE = DETERMINE PRODUCTION METHODS AIR CYCLE CIRCULATOR						350
PROBLEM = TECHNICAL INNOVATION HAS PRODUCED AN AIR CYCLE COMPRESSOR-EXPANDER, BUT THE FABRICATION TECHNIQUES AND MATERIALS OF CONSTRUCTION USED TO PRODUCE PROOF OF CONCEPT HARDWARE WILL BE UNECONOMICAL FOR FULL SCALE PRODUCTION.						
SOLUTION = DEVELOP NEW MANUFACTURING METHODS TO MACHINE ELLIPTICAL CAM TRACKS INTO END PLATES OF COMPRESSOR-EXPANDER.						
(3720) TITLE = IMPROVED MFG METHODS FOR TECS-18 CONTRL ENCLOSURES						225
PROBLEM = THE PRESENT ELECTRONIC CONTROL SYSTEMS FOR THE TECS PROGRAM HAVE HEAT EXCHANGERS/ENCLOSURES WHICH ARE DIFFICULT AND EXPENSIVE TO MANUFACTURE. THE PRESENT PACKAGING METHODS AND MACHINING PROCESSES ARE COSTLY.						
SOLUTION = CHANGE PACKAGING TECHNIQUES TO USE STANDARD MATERIAL SIZES AND LESS EXPENSIVE FABRICATING TECHNIQUES.						
(3730) TITLE = SMALL SIZED PARTICLES OF TNT				250	200	100
PROBLEM = TO DEVELOP MANUFACTURING METHODS FOR MASS PRODUCTION OF VERY SMALL PRECISION SIZED PARTICLES OF EXPLOSIVES (I.E. TNT, RDX, PETN, ETC.).						
SOLUTION = TO IDENTIFY AND DEFINE THE REQUIRED MANUFACTURING TECHNIQUES AND TOOLING TO PERMIT LOW COST PRODUCTION OF LARGE QUANTITIES OF PRECISION SMALL SIZED PARTICLES OF EXPLOSIVES.						
(3738) TITLE = WASTE HEAT ENVIRONMENTAL CONTROL UNIT					300	250
PROBLEM = MOBILE ABSORPTION ECM WILL REQUIRE MAJOR COMPONENTS PRODUCED BY TOOLS + PROCESSES PRESENTLY NON-EXISTENT. SIZE. PYROPHORIC MATERIAL MUST BE BONDED TO STEEL FRAG AND PRODUCED IN GREAT NUMBERS FOR THE SYSTEM						
SOLUTION = DEVELOP FABRICATION TECHNIQUES + TOOLS REQUIRED TO PRODUCE THE ABSORPTION ECM COMPONENTS INCLUDING THE GENERATOR, EVAPORATOR, ABSORBER, AND CONDENSER.						
(3747) TITLE = LACV-30, SKIRT AND FINGER COMPONENTS			191	127		
PROBLEM = FABRICATION OF SKIRT, FINGERS AND CONES IS CURRENTLY HIGHLY LABOR INTENSIVE, LEADING TO HIGH COMPONENT REPLACEMENT COSTS.						
SOLUTION = DEVELOP MECHANIZED/AUTOMATED FABRICATION TECHNIQUES TO REDUCE MANUFACTURING COSTS.						

CATEGORY
LAND MINES

		FUNDING ($000)					
		PRIOR	79	80	81	82	83
COMPONENT -- DETECTORS							
(3615)	TITLE - VEHICLE MOUNTED ROAD MINE DETECTOR SYSTEM ANTENNAS	195	163				
	PROBLEM - AT PRESENT CORNER REFLECTOR ANTENNA MODULES ARE UTILIZED IN THE VEHICLE-MOUNTED MINE DETECTOR SYSTEM ALL WORK (MACHINING, BENDING, MOLDING, ETC) IS CURRENTLY DONE BY HAND.						
	SOLUTION - THE MANUFACTURING PROBLEMS CAN BE RESOLVED BY APPLYING NEW MANUFACTURING PROCESSES TO COST-REDUCE THIS ITEM. ESSENTIALLY, STATE-OF-THE-ART TECHNIQUES WILL BE USED WHICH ARE MORE APPROPRIATELY ADAPTABLE TO MASS PRODUCTION.						
COMPONENT -- NEUTRALIZERS							
(3703)	TITLE - HARDENING OF VEHICLE COMPONENTS					260	330
	PROBLEM - ARMORED VEHICLE ROADWHEEL AND TRACK SHOW HAVE BEEN DEVELOPED WITH DIFFERENT ELASTOMERS. SOME ELASTOMER DELIMINATION OCCURS WHEN SUBJECTED TO 25 LBS OF EXPLOSIVES AND HIGH TEMPERATURE FROM OPERATIONAL MODE. MANUFACTURE OF COMPONENTS IS PRESENTLY HIGH.						
	SOLUTION - DEVELOP BONDING AGENTS TO INSURE ADHESION REGARDLESS OF TEMPERATURE AND ENVIRONMENTAL CHARACTERISTICS. DEVELOP FABRICATION TECHNIQUES SUCH AS FIBER WINDING AND SPECIAL MODLING CAPABILITIES TO DECREASE MANUFACTURING COST FOR MASS PRODUCTION.						
(3729)	TITLE - ROCKET MOTOR FOR PORTABLE PROPELLED LINE CHARGE					200	200
	PROBLEM - THE MAIN PORTABLE LINE CHARGE IS A STANDARD PIECE OF EQUIPMENT OF THE ISRAELI ARMY. PROPULSION FOR THIS DEVICE IS PROVIDED BY ROCKET MOTORS WHICH ARE MANUFACTURED IN USSR.						
	SOLUTION - IF ROCKET MOTORS ARE WELL EVALUATED REVERSE ENGINEERING WILL BE ACCOMPLISHED. THIS EFFORT WILL PROVIDE FOR ESTBLISHMENT OF MANUFACTURING TECHNIQUES FROM REVERSE ENGINEERED DESIGNS.						

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* CATEGORY *
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*POWER SOURCES *
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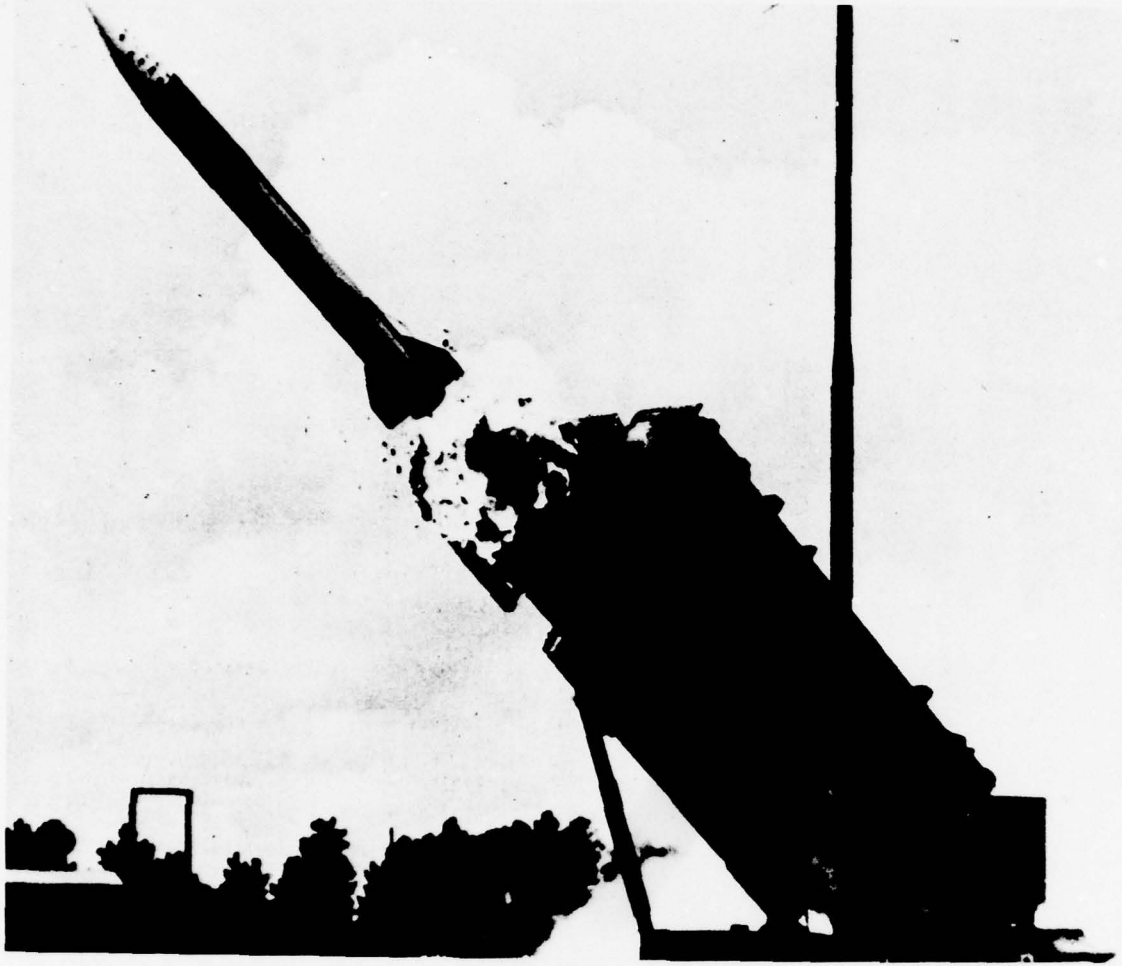
COMPONENT -- CELLS							
(3532)	TITLE - MOLTEN SALT LI/CL BATTERY		295				
	PROBLEM - PRESENT LEAD/ACID AND NICKEL/IRON BATTERIES OFTEN NEED RECHARGING IN ORDER TO COMPLETE AN EIGHT HOUR SHIFT.						
	SOLUTION - ESTABLISH METHODS FOR PRODUCING IN QUANTITY LITHIUM CHLORIDE MOLTEN SALT BATTERIES.						

FUNDING ($000)

	PRIOR	79	80	81	82	83
COMPONENT -- CELLS (CONTINUED)						
(3714) TITLE - LIGHTWEIGHT MILITARY SOLAR CELL POWER MODULE,100W					200	600
PROBLEM - SUCCESSFUL MANUFACTURE OF FUTURE POWER SOURCE IS REQUIRED DUE TO THE COMPLEX NATURE OF WARFARE AND THE AVAILABILITY OF ENERGY SOURCES.						
SOLUTION - PROVIDE METHODS OF PRODUCING LIGHTWEIGHT/SMALL SIZE POWER SYSTEMS AT A LOWER COST AND MODIFYING EXISTING PEAK POWER TRACKER.						
(3716) TITLE - KOCITE ELECTRODES			238	124		
PROBLEM - SIGNIFICANT REDUCTION IN FUEL CELL COSTS CAN BE REALIZED THROUGH REDUCTION IN NOBLE METAL CATALYST LOADINGS. ELECTRODES UTILIZING MINIMUM CATALYST LOADINGS ARE CURRENTLY PRODUCED IN SMALL BATCHES, SUBJECT TO VARIABILITY IN CHARACTERISTICS AND COST.						
SOLUTION - KOCITE CATALYST HAS POTENTIAL FOR REDUCING FUEL CELL NOBLE METAL COSTS BY 85 PERCENT. PRODUCTION METHODS FOR KOCITE ELECTRODES HAVE TO BE DEVELOPED. THESE METHODS MUST INCLUDE STRICT QUALITY CONTROL TO ACHIEVE PREDICTED SAVINGS.						
(3728) TITLE - METHANOL REFORMER MODULES			379	320		
PROBLEM - METHANOL REFORMERS ARE PRODUCED WITH MINIMUM TOOLING BY LABOR INTENSIVE OPERATIONS. LABOR INTENSIVE METHODS RESULT IN POOR PRODUCT QUALITY AND HIGH COSTS.						
SOLUTION - PRODUCTION CHARACTERISTICS WILL BE ANALYZED TO ARRIVE AT A REFORMER DESIGN CONSISTENT WITH EFFECTIVE MANUFACTURING TECHNIQUES.						
(3733) TITLE - PRODUCTION OF LARGE AREA FUEL CELL STACKS					200	150
PROBLEM - PRODUCTION METHODS FOR LARGE AREA FUEL CELLS ARE CURRENTLY INADEQUATE IN TERMS OF PRODUCTION YIELD, COMPONENT REJECTION RATE AND PERFORMANCE. UNIFORMITY MUST BE IMPROVED TO ENABLE ECONOMICAL PRODUCTION TO BE ACHIEVED.						
SOLUTION - DEVELOP MANUFACTURING METHODS AND TECHNOLOGY FOR PRODUCTION OF FUEL CELL COMPONENTS AND FUEL CELL STACKS. EFFORT WILL CONCENTRATE ON COMPONENT UNIFORMITY AND STACK ASSEMBLY TECHNIQUES.						
(3764) TITLE - LOGISTIC HYDROCARBON FUEL CONDITIONER					350	300
PROBLEM - PREDICTED FUEL CONDITIONER DESIGN USES EXPENSIVE HIGH TEMPERATURE ALLOYS, AND LABOR INTENSIVE WELDING AND ASSEMBLY TECHNIQUES.						
SOLUTION - REDSIGN OF FUEL CONDITIONER EMPLOYING LATEST CERAMIC, HEAT PIPE AND CATALYST TECHNOLOGIES WILL YIELD LOWER COST UNITS CAPABLE OF UTILIZING AUTOMATIC ASSEMBLY TECHNIQUES.						

		FUNDING ($000)					
		PRIOR	79	80	81	82	83
COMPONENT -- MISCELLANEOUS							
(3604)	TITLE - SOLID STATE POWER SWITCH	350	85				
	PROBLEM - EFFORT TO FABRICATE A COMPACT SWITCH PACKAGE BY HAND UTILIZING MULTIPLE POWER TRANSISTORS AND DRIVE CIRCUITS ON A COMMON HEATSINK HAS RESULTED IN POOR YIELD AND LOW RELIABILITY.						
	SOLUTION - DEVELOP MANUFACTURING PROCESSES FROM R+D DESIGN FOR FABRICATION OF COMPONENTS AND ASSEMBLY IN A MINATURE SIZE COMPACT HERMETICALLY SEALED PACKAGE WITH ADEQUATE HEAT DISSIPATING ABILITY.						
(3605)	TITLE - TRANSCALENT HIGH POWER TRANSISTOR	50	453	61			
	PROBLEM - CURRENTLY AVAILABLE SOLID STATE POWER DEVICES OF REQUIRED RATINGS AND THEIR HEATSINKS OFTEN ARE TOO HEAVY AND BULKY TO BE CONVENIENTLY USED IN COMPACT LIGHTWEIGHT POWER CONDITIONERS.						
	SOLUTION - DEVELOP MANUFACTURING PROCESSES FROM R D DESIGNS FOR COMPACT LIGHTWEIGHT TRANSCALENT DEVICES, THESE DEVICES WITH INTEGRAL HEAT PIPES DO NOT REQUIRE EXTERNALLY MOUNTED HEATSINKS.						
(3606)	TITLE - TRANSCALENT HIGH POWER RECTIFIER	360	85				
	PROBLEM - CURRENTLY AVAILABLE SOLID STATE POWER DEVICES OF REQUIRED RATINGS AND THEIR HEATSINKS OFTEN ARE TOO HEAVY AND BULKY TO BE CONVENIENTLY USED IN COMPACT LIGHTWEIGHT POWER CONDITIONERS.						
	SOLUTION - DEVELOP MANUFACTURING PROCESSES FROM R D DESIGNS FOR COMPACT LIGHT WEIGHT TRANSCALENT DEVICES, THESE DEVICES WITH INTEGRAL HEAT PIPES DO NOT REQUIRE EXTERNALLY MOUNTED HEAT SINKS.						
(3710)	TITLE - DUAL EPOXY SCR				490	250	
	PROBLEM - DUAL EPOXY IS A HIGH POWER DUAL ANTIPARALL SCR CONFIGURATION WITH ELECTRICAL ISOLATED FLAT PLATE HEAT SINK IDEALLY SUITED FOR MILITARY POWER CONDITIONER, THESE DEVICES ARE ONLY AVAILABLE ON A LABORATORY PROCESSED BASIS.						
	SOLUTION - ESTABLISH THE BEST STATE OF THE ART METHODS OF WAFER PURIFICATION, EPOXY AND EPOXY CASTING TECHNIQUES AND CONVERT LABORATORY PROCESS TO PRODUCTION METHODS.						
(3719)	TITLE - HEAT EXCHANGER FOR 10-30KW REGEN CYCLE GAS TURBINE						325
	PROBLEM - GAS TURBINE REGENERATORS AND RECOUPERATORS SIGNIFICANTLY INCREASE UNIT COST, SIZE AND WEIGHT WHICH OFFSETS BENEFIT OF SIGNIFICANTLY REDUCED FUEL CONSUMPTION.						
	SOLUTION - DETERMINE METHODS AND TECHNIQUES TO REDUCE FABRICATION COSTS FOR ADVANCED HEAT EXCHANGER CORE AND HEADER MATERIALS SUITABLE FOR OPERATING IN ADVANCED GAS TURBINE HIGH TEMPERATURE ENVIRONMENT.						

		FUNDING ($000)				
	PRIOR	79	80	81	82	83
COMPONENT -- MISCELLANEOUS (CONTINUED)						
(3735) TITLE - 3KW MILITARY POWER QUALITY INVERTER				700	500	
PROBLEM - ALL MANUFACTURING AND ASSEMBLY WORK IS ACCOMPLISHED BY HAND IN LABORATORY ENVIRONMENT RESULTING IN HIGH PRODUCTION COSTS.						
SOLUTION - INITIATE NEW STATE OF THE ART MANUFACTURING PROCESSES COUPLED WITH PRODUCTION LINE TECHNOLOGY BEST SUITED FOR MASS PRODUCTION.						
(3752) TITLE - 1.5 KW MILITARY POWER QUALITY INVERTER			600	500	90	
PROBLEM - ALL MANUFACTURING AND ASSEMBLY WORK IS ACCOMPLISHED BY HAND IN LABORATORY ENVIRONMENT RESULTING IN HIGH PRODUCTION COSTS.						
SOLUTION - INITIATE NEW STATE OF THE ART MANUFACTURING PROCESSES COUPLED WITH PRODUCTION LINE TECHNOLOGY BEST SUITED FOR MASS PRODUCTION.						
(3772) TITLE - INTEGRATED POWER SWITCH				360	359	100
PROBLEM - THE HIGH POWER SWITCHING CAPABILITY REQUIRES IMPROVED COOLING OF THE POWER STAGE. THIS REQUIRES MECHANICAL AND ELECTRICAL CONSIDERATION AND MODIFICATION DUE TO ANY COOLING MODIFICATION.						
SOLUTION - METHODS MUST BE DEVELOPED TO PRODUCE AND ATTACH HEAT PIPES FOR COOLING DURING QUANTITY PRODUCTION. RELATED ELECTRICAL AND MECHANICAL CHANGES MUST ALSO BE DEVELOPED FOR QUANTITY PRODUCTION.						
(3785) TITLE - SENSING AND CONTROL MODULE					393	106
PROBLEM - TRANSFORMERLESS INVERTERS UTILIZE MANY DISCRETE SEMICONDUCTORS INTERCONNECTED TO INTEGRATE CIRCUITS IN LIEU OF TRANSFORMERS BUT RESULTING HEAT DISSIPATION REQUIRES A BULKY PACKAGE WITH REDUCED RELIABILITY.						
SOLUTION - DEVELOP MANUFACTURING PROCESS FOR MODULES INCORPORATING INTEGRATED CIRCUITS AND OTHER ELECTRONIC COMPONENTS WITH A LARGE SCALE INTEGRATED CIRCUIT REPLACING DISCRETE DEVICES. MODULES TO INCLUDE SATISFACTORY COOLING DEVICE AS HEAT PIPE.						
COMPONENT -- TURBINES						
(3717) TITLE - HIGH TEMPERATURE NOZZLE FOR 10KW POWER UNIT	343		400	400		
PROBLEM - SUPER ALLOY METALS USED IN HOT COMPONENTS OF GAS TURBINES ARE LIMITED IN OPERATING TEMPERATURE AND ARE SUBJECT TO PREMATURE FAILURE IN DUSTY OR CORROSIVE ATMOSPHERE. ALLOY METALS ARE STRATEGIC MATERIALS AND ARE COSTLY TO MANUFACTURE.						
SOLUTION - DETERMINE METHODS AND TECHNIQUES TO REDUCE THE COST OF MANUFACTURING HIGH TEMPERATURE CERAMIC MATERIALS WHICH HAVE BEEN FOUND TO POSSESS HIGH TEMPERATURE RESISTANCE TO DUST ABRASION AND SALT CORROSION. MATERIALS CONTAIN NO STRATEGIC ELEMENTS.						



MISSILE COMMAND

CONTAINERS

US ARMY MISSILE COMMAND

(MICOM)

The US Army Missile Command was recently formed from the resources of the US Army Missile Research and Development Command (MIRADCOM) and the US Army Missile Materiel Readiness Command (MIRCOM). It is located at Redstone Arsenal, AL, and is responsible for research development and acquisition of missile systems for the Army. Facilities include flight test ranges, laboratories, and a simulation center.

Major systems managed by special project offices include STINGER (Shoulder-Fired Air Defense Guided Missile), US ROLAND (All-Weather Air Defence Missile System), GSRS (General Support Rocket System), Viper (Short-Range Anti-Tank Weapon), HELLFIRE (Helicopter-Carried Air-to-Ground Missile), PERSHING (400-Mile-Range Air-to-Ground Missile) and the 2.75 Inch Air-to-Ground Rocket. MICOM is also the Army's center for laser research and manages efforts to apply lasers in missile guidance and as weapons.

The major thrusts in MICOM's MMT program is in guidance systems. A large amount of this effort is planned for work on gyros, printed circuits, and seekers. Improvements in the gyro can be made by addressing proposals in new machining methods and assembly techniques. Efforts in the electronics area include projects on plated-through holes, thin foils, wave soldering, and cleanliness criteria. The seeker area includes work on infrared optics, radio frequency, and laser optics. Other work planned on guidance systems include projects for windows and radomes, optics, and hybrid circuits.

Another major thrust area is missile structures, which includes projects for airframes using metal, plastic, or composites. Efforts for composite airframes will address filament winding, inner shell forming and missile substructures. New joining, machining, and forming technologies will be investigated and applied.

Proposals in the area of test equipment include work on electrical, x-ray, neutron and hydraulic equipment. Calibration efforts include infrared testing of PC boards, digital fault isolation, and automatic circuit tuning.

MIRADCOM

COMMAND FUNDING SUMMARY
(THOUSANDS)

CATEGORY	FY79	FY80	FY81	FY82	FY83
CONTAINERS/LAUNCHERS	0	0	809	975	538
CONTROL SYSTEM	610	0	0	368	0
GROUND SUPPORT EQUIPMENT	1365	775	665	1895	1050
GUIDANCE SYSTEM	2912	6207	7523	4845	2475
MISSILE STRUCTURE	1100	700	3110	4499	2768
PROPULSION SYSTEM	525	1385	5467	2605	638
TEST EQUIPMENT	625	900	1702	1585	1081
TOTAL	7137	9967	19276	16772	8550

CATEGORY				FUNDING ($000)				
CONTAINERS/LAUNCHERS				PRIOR	79	80	81	82	83
COMPONENT -- LAUNCHERS									
(1027)	TITLE - LOW COST SMALL ROCKET CONTAINER/LAUNCHER PODS								338
	PROBLEM - CURRENT LAUNCH PODS ARE EXPENSIVE AND REQUIRE REUSE IN TO MAINTAIN COST PER ROUND AT AN ACCEPTABLE LEVEL.								
	SOLUTION - PRODUCE A LOW COST EXPENDABLE CONTAINER/LAUNCHER USING LOW COST PLASTIC STRUCTURES.								
(1029)	TITLE - FORGING AND EXTRUSION METHODS FOR POWDER AL ALLOYS CT90 CT91						385	248	
	PROBLEM - HIGH STRENGTH LIGHTWEIGHT STRUCTURES HAVE TYPICALLY RESORTED TO THE USE OF MATERIALS WITH VERY HIGH YIELD STRENGTHS AT THE SACRIFICE OF TOUGHNESS, FRACTURE TOUGHNESS, STRESS CORROSION CRACKING RESISTANCE AND FORMABILITY.								
	SOLUTION - RECENT DEVELOPMENTS IN POWDER METALLURGY ALUMINIUM ALLOYS FOR EXTRUSION AND FORGING HAVE MADE AVAILIABLE TWO ALLOYS WITH A COMBINATION OF PROPERTIES THAT HAVE SIGNICANTLY ADVANCED THE STRUCTURAL CAPABILITIES OF HI STR/WT MATLS AT REASONABLE COST								
(3159)	TITLE - QUALITY PROD. OF LIGHT WT, MULTIPLE TUBE ROCKET LAUNCHERS						250	350	200
	PROBLEM - MULTIPLE TUBE ROCKET LAUNCHERS ARE HEAVY AND EXPENSIVE.								
	SOLUTION - ESTABLISH PRODUCTION TECHNIQUES FOR IMPROVED QUALITY, LIGHT WEIGHT LAUNCHERS.								
COMPONENT -- SHIPPING CONTAINERS									
(3200)	TITLE - WIRE BOUND SHIPPING CONTAINERS							100	
	PROBLEM - CONTAINERS FOR LARGE MISSILE SYSTEMS ARE BULKY, HEAVY, AND EXPENSIVE.								
	SOLUTION - INVESTIGATE ADAPTATION AND PRODUCTION OF WOODEN WIRE BOUND MISSILE CONTAINERS.								
(3326)	TITLE - NON METALLIC WEAPON CONTAINER						174	187	
	PROBLEM - METAL WEAPON CONTAINERS ARE CONSIDERABLY MORE EXPENSIVE TO BUILD THAN NON METALLIC.								
	SOLUTION - ESTABLISH MANUFACTURING TECHNOLOGY FOR NON METALLIC CONTAINERS.								
CATEGORY									
CONTROL SYSTEM									

		FUNDING ($000)					
		PRIOR	79	80	81	82	83
COMPONENT -- CIRCUITRY							
(3108)	TITLE - MISSILE/ROCKET DISPENSING SYSTEM					368	
	PROBLEM - DISPENSING UNITS ARE FABRICATED, ASSEMBLED, AND TESTED BY HAND.						
	SOLUTION - ESTABLISHED AUTOMATED AND SEMI AUTOMATED SYSTEM FOR PRODUCING THE SWITCHING DEVICE.						
COMPONENT -- MISCELLANEOUS							
(3372)	TITLE - MFG METHODS FOR MAGNETIC COMPONENTS	410	610				
	PROBLEM - NEW MAGNETIC DEVICES PRESENT MANY MANUFACTURING PROBLEMS FROM APPLICATION OF THE INSULATION SYSTEM TO DISPLACEMENT OF WINDING LOCATIONS AND TENSION.						
	SOLUTION - ESTABLISH AND TEST FABRICATION TECHNIQUES FOR SMALL, ENCAPSULATED TRANSFORMERS. IMPLEMENT AND EVALUATE LOW COST TECHNIQUES FOR MANUFACTURE OF SUB-MINIATURE ELECTROMAGNETIC DEVICES.						

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* CATEGORY *
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GROUND SUPPORT EQUIPMENT
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COMPONENT -- CIRCUITRY							
(3113)	TITLE - STD. OF COMPUTER BASED DESIGN FOR PCB AND ELECTRONIC EQUIP.					250	200
	PROBLEM - THE GOVERNMENT IS PRESENTLY UNABLE TO UTILIZE CONTRACTOR DESIGN DATA FOR FABRICATION, QUICK TURN AROUND, AND RELIABILITY.						
	SOLUTION - DEVELOP A STANDARD SYSTEM LANGUAGE FOR PROCESSING DESIGN DATA TO BE USED BY A SECOND SOURCE OR BREAKOUT CONTRACTORS.						
(3172)	TITLE - CLINCHED LEAD ELIMINATION					175	
	PROBLEM - LEAD CLINCHING IS DISADVANTAGEOUS, DIFFICULTY EXISTS IN REPAIRING ASSEMBLIES.						
	SOLUTION - DEVELOP TECHNOLOGY TO UTILIZE COMPONENT CHIPS AND PARTS FOR USE ON AUTOMATIC INSERTION MACHINERY HANDLING MULTIPLE LEADS.						
(3214)	TITLE - INJECTION MOLDING ELECT. CONNECTORS + CABLES			400			
	PROBLEM - STRAIN RELIEF POTTING AND MOLDING, AND EVIRONMENTAL SEALING OF ELECTRICAL CABLE AND OF CONTACTOR ASSEMBLIES IS COSTLY.						
	SOLUTION - IDENTIFY THE MATERIALS, TOOLING CRITERIA, AND PROCESS METHODS WHICH CAN BE APPLIED TO A WIDE VARIETY OF CABLE/CONNECTOR COMBINATIONS.						

		FUNDING ($000)					
		PRIOR	79	80	81	82	83
COMPONENT -- CIRCUITRY (CONTINUED)							
(3217)	TITLE - AUTO PROD OF TRAVELING WAVE TUBES	498	740				
	PROBLEM - THE SAM-D TWT IS THE MOST EXPENSIVE COMPONENT IN THE GUIDANCE SYSTEM AND IS A SIGNIFICANT SYSTEM COST DRIVER. A FUNDAMENTAL CHANGE OF CONCEPT IN THE MANUFACTURING PROCESS IS REQUIRED.						
	SOLUTION - DEVELOP AUTOMATED PROCEDURES TO PERFORM FABRICATION PROCESSING AND TEST OPERATION THAT PRESENTLY REQUIRES EXTENSIVE LABOR.						
(3233)	TITLE - COMPUTERIZED INTEGRATED MANUFACTURING SUPPORT					700	700
	PROBLEM - MANUFACTURING SYSTEMS MUST BECOME MORE PRODUCTIVE, FLEXIBLE AND PRECISE AND BETTER ABLE TO COPE WITH VARYING REQUIREMENTS.						
	SOLUTION - ESTABLISH A SYSTEM DESIGN RELATING INPUT, OUTPUTS, FORMATS, AND DATA TO MEET REQUIREMENTS OF THE TOTAL DESIGN TO USE PROGRESSION.						
(3253)	TITLE - HI CURRENT DENSITY CATHODE	175	175				
	PROBLEM - THERMIONIC CATHODES HAVE HEATING AND COOLING PROBLEMS. HIGH OPERATING TEMPERATURES REDUCE THE LIFETIME OF THE CATHODE.						
	SOLUTION - ESTABLISH THE MANUFACTURING PROCESSES FOR THIN FILM FIELD EMISSION CATHODES. FIELD EMISSION CATHODES DO NOT REQUIRE HEATER POWER AND COOLING EQUIPMENT.						
(3376)	TITLE - TESTING ELECTRO-OPTICAL COMPONENTS AND SUBSYSTEMS	375		375			
	PROBLEM - MANUFACTURING TECHNOLOGY NECESSARY FOR PRODUCTION OF ELECTRO-OPTICAL SYSTEMS IS VERY LIMITED. NO CORRELATION EXISTS BETWEEN COMPONENT SPECS AND ELECTRO-OPTICAL SYSTEM PERFORMANCE.						
	SOLUTION - ACHIEVE ECONOMY OF PRODUCTION. TESTING METHODS, OR TECHNIQUES, COULD BE DEVELOPED TO VALIDATE EXISTING SPECS OR EVEN REPLACE EXISTING SPECS WITH SPECS WHICH COMPACT SYSTEM PERFORMANCE MORE.						
COMPONENT -- GENERAL							
(3235)	TITLE - ENERGY CONSERVATION AND REDUCED OPERATING COST IN A FACILITY				240	220	
	PROBLEM - OVERHEAD IS A MAJOR COST FACTOR IN OPERATING A PRODUCTION FACILITY, ESPECIALLY ENERGY COSTS.						
	SOLUTION - SELECT AUTOMATIC PROCESSES AND COMPUTER SYSTEM TO CONTROL AND REDUCE ELECTRICITY DEMANDS.						
(3238)	TITLE - MANUFACTURING COST ANALYSIS (CAM)					175	150
	PROBLEM - THERE IS A NEED TO DEFINE AND CONTROL AQUISTION PROGRAM COST DURING CONTRACT DEFINITION AND DEVELOPMENTAL PHASES.						
	SOLUTION - STRUCTURE COMPUTER MODEL TO CALCULATE THE LABOR CONTENT OF A DESIGN CONCEPT IN STANDARD SETUP AND RUN TIME.						

	FUNDING ($000)					
	PRIOR	79	80	81	82	83
COMPONENT -- GENERAL (CONTINUED)						
(3249) TITLE - AUTOMATIC READING AND RECORDING OF PART AND SERIAL NUMBERS				200	150	
PROBLEM - PRESENT METHODS OF SUPPLYING PART NUMBERS TO CONTROLLING COMPUTER ARE RELATIVELY SLOW AND SUBJECT TO HIGH ERROR.						
SOLUTION - INVESTIGATE AUTOMATED METHODS FOR TRANSFERRING PART AND SERIAL NUMBER INFORMATION.						
(3268) TITLE - AUTOMATIC CONTROL OF PLATING	450	450				
PROBLEM - MANUAL CONTROL METHODS CANNOT MAINTAIN THE TIGHT TOLERANCES THAT ARE REQUIRED.						
SOLUTION - DEVELOP CENTRALIZED CONTROLLER SYSTEM WHICH WILL SENSE MULTIPLE INPUTS, KEEPING PROCESS PARAMETERS IN BALANCE.						
(3437) TITLE - RECOVERY/RECYCLING OF HEAVY METAL FROM SPENT PROCESSING SOLS				225	225	
PROBLEM - THE PRESENT NATIONWIDE PRACTICES FOR THE DISPOSAL OF WASTE HEAVY METAL MATERIALS IS TREATMENT IN A CONVENTIONAL WASTE TREATMENT PLANT.						
SOLUTION - DEVELOP ONE OR MORE SYSTEMS AND PROCESSES THAT WILL RECOVER THESE PRESENTLY DISCARDED MATERIALS IN A SALEABLE RE-USABLE FORM.						

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* CATEGORY *
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*GUIDANCE SYSTEM *
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COMPONENT -- ACCELEROMETERS						
(1018) TITLE - IMPROVED MFG PROCESSES FOR DRY TUNED ACCELEROMETERS (CAM)			380			
PROBLEM - THERE IS A NEED TO ESTABLISH MANUFACTURING METHODS NECESSARY TO INCREASE YIELD AND REDUCE COST OF DRY TUNED ACCELEROMETERS. THE PRESENT METHOD IS LABOR INTENSIVE AND PRONE TO ERROR.						
SOLUTION - ELECTRO-DISCHARGE MACHINING CAN BE ADAPTED TO AUTOMATED MACHINING OF THE COMPLEX DRY FLEXURE SUPPORTS. THIS APPROACH WILL PROVIDE THE FLEXIBILITY TO EXPERIMENT TO OPTIMIZE THE SUPPORT DESIGN FOR QUANTITY PRODUCTION.						
(3276) TITLE - MANUFACTURING TECHNOLOGY FOR AUTOMATIC COIL WINDING				265		
PROBLEM - FABRICATION ASSEMBLY AND TESTING OF LEAD COIL ASSEMBLY IS COSTLY.						
SOLUTION - DEVELOP TECHNIQUES TO AUTOMATICALLY WIND AND TEST COILS.						

		FUNDING ($000)					
		PRIOR	79	80	81	82	83
COMPONENT	-- BATTERIES						
(3280)	TITLE - ENG. ANAL. OF MFG PARAMETERS FOR THERMAL BATTERIES		145	240			
	PROBLEM - SLIGHT VARIATIONS IN MANUFACTURING PARAMETERS HAVE GREATLY MAGNIFIED EFFECT ON FINAL BATTERY PERFORMANCE AS A RESULT REJECTION RATES ARE HIGH.						
	SOLUTION - OPTIMIZE EACH FACET OF MANUFACTURING TECHNIQUES BY STATISTICALLY CORRELATING VARIED PARAMETERS.						
(3281)	TITLE - SILVER ZINC GUIDANCE BATTERIES (CAM)			250	250	250	
	PROBLEM - ANODE AND CATHODE MANUFACTURING FOR SILVER ZINC BATTERIES IS BASED ON TWENTY YEAR OLD TECHNIQUES. REQUIREMENTS CALL FOR IN LINE PRODUCTION AND ACCEPTANCE TESTS.						
	SOLUTION - DEVELOP TECHNIQUES FOR CONTINUOUS PLATE MANUFACTURING AND AUTOMATIC PLATE SETTING.						
COMPONENT	-- GYROS						
(3136)	TITLE - IMP. MANUFACTURING PROCESSES FOR COMPLIANT BEARING GYROS	450	350				
	PROBLEM - THE PRESENT METHOD OF MANUFACTURE IS TOO EXPENSIVE FOR VOLUME PRODUCTION.						
	SOLUTION - DEVELOP MASS PRODUCTION TECHNIQUES.						
COMPONENT	-- HYBRIDS						
(3110)	TITLE - HYBRID CIRCUIT ASSEMBLY UTILIZING AUTOMATED TECHNIQUES					250	
	PROBLEM - FILM HYBRID CIRCUITS ARE PRESENTLY MANUFACTURED IN A LABORATORY ATMOSPHERE BY ONLY A FEW PRODUCERS.						
	SOLUTION - CONVERT LABATORY TECHNIQUES INTO PRODUCTION METHODS UTILIZING AUTOMATED COMMERCIAL EQUIPMENT.						
(3146)	TITLE - PROCESS DEVELOPMENT OF PHOTOLITHGRAPHIC PROCESS		350				
	PROBLEM - SCREEN PRINTING OF FINE LINES DOES NOT ALLOW HIGH DENSITY DUE TO RHEOLOGY OFINK SYSTEMS.						
	SOLUTION - ESTABLISH TECHNOLOGY FOR ETCHING THICK FILM MATERIALS FOR MULTI-LAYER CIRCUITS.						
(3182)	TITLE - PRODUCTION TOOLING TECHNIQUES FOR MODULAR ELECTRONICS				350	400	
	PROBLEM - VERY DENSE PACKAGING MAKES ASSEMBLY VERY COSTLY.						
	SOLUTION - ESTABLISH PRODUCTION TOOLING TECHNIQUES FOR ASSEMBLING MODULAR ELECTRONICS.						

		FUNDING ($000)					
		PRIOR	79	80	81	82	83
JMPONENT -- HYBRIDS (CONTINUED)							
(3410)	TITLE - PRODUCTION METHODS FOR HEAT PUMPING FOR HYBRID/LSI		250				
	PROBLEM - THE USE OF MICRO-ELECTRONICS AND LSI CIRCUITRY OFTEN TIMES LEADS TO HEAT DISSIPATION PROBLEMS.						
	SOLUTION - DEVELOP MANUFACTURING METHODS EMPLOYING THERMO-ELECTRIC EFFECTS TO REMOVE HEAT AT THE HEAT SOURCE.						
(3435)	TITLE - SIMPLIFICATION OF HIGH-POWER THICK FILM HYBRIDS			350			
	PROBLEM - THE PRESENT METHOD OF COOLING HIGH POWER HYBRID CIRCUITS INVOLVES A COMPLEX AND EXPENSIVE PROCEDURE USED ONLY ON LIMITED PRODUCTION ITEMS. USE OF A SINGLE BERYLLIA SUBSTRATE HAS BEEN DEMONSTRATED BUT NEEDS FURTHER DEVELOPMENT.						
	SOLUTION - A MANUFACTURING PROCESS WILL BE DEVELOPED TO SCREEN AND FIRE THICK FILM INKS ONTO BERYLLIA SURFACES. COMMERCIAL INKS WILL BE EVALUATED FOR COMPATABILITY WITH BERYLLIA AND THE TOXICITY OF BERYLLIA WILL BE TAKEN INTO ACCOUNT.						
(3436)	TITLE - DEVELOP CERAMIC CIRCUIT BOARDS AND LARGE AREA HYBRIDS	325		450			
	PROBLEM - ADVANCED WEAPONS SYSTEMS NOW REQUIRE GREATER COMPLEXITY AND PACKAGING DENSITY THAN CAN BE PRODUCED BY CONVENTIONAL HYBRID TECHNOLOGY WITH SUITABLE COST AND RELIABILITY TRADEOFFS.						
	SOLUTION - DEVELOPMENT OF LARGE SCALE HYBRIDS WILL PROVIDE HIGH DENSITY ELECTRONICS PACKAGING WITH INCREASED RELIABILITY.						
(3439)	TITLE - LOW COST HYBRID MICROELECTRONIC CIRCUITS					300	
	PROBLEM - DESIGN CRITERIA AND COMPONENT SELECTION AFFECT THE TOTAL FABRICATION CYCLE TO AN EXTENT THAT CONSTANT OPERATOR ATTENTION IS REQUIRED.						
	SOLUTION - DETERMINE THE COST DRIVERS OF HYBRID CIRCUIT FABRICATION AND TEST. DEFINE FINITE PROBLEMS TO ALLOW FOR ECONOMICALLY FEASIBLE MACHINE OPERATION.						
JMPONENT -- INTEGRATED ELECTRONICS							
(1019)	TITLE - CONVERSION OF SURPLUS PENTABORANE TO B10			507			
	PROBLEM - THE DIBORANE (B2) USED IN THE MANUFACTURE OF DECABORANE (B10) IS A COST DRIVER.						
	SOLUTION - DEVELOP A PROCESS TO MIX GOVERNMENT OWNED PENTABORANE (B5) WITH B2 TO REDUCE THE COST OF THE PRODUCT B10.						

		FUNDING ($000)					
		PRIOR	79	80	81	82	83
COMPONENT -- INTEGRATED ELECTRONICS (CONTINUED)							
(1024)	TITLE = RADIO FREQUENCY STRIPLINE HYBRID COMPONENTS			400			
	PROBLEM = THE TREND IN STRIPLINE TECHNOLOGY IS TO INTEGRATE WITHIN THE STRIPLINE ELEMENT DISCRETE COMPONENTS BOTH ACTIVE AND PASSIVE. TWO PROBLEMS NEED RESOLUTION = (1) NEED FOR EXTREME DIMENSIONAL ACCURACY, (2) COMPENSATION VARIABLE DIELECTIC THICKNESS.						
	SOLUTION = DEVELOP A PROGRAM TO ESTABLISH REQUIREMENTS, PROCESSES, QUALITY ASSURANCE, AND LIMITATIONS OF PLACEMENT, ASSEMBLY, AND INTERCONNECTION FOR INCORPORATING DISCRETE COMPONENTS INTEGRAL WITH RF STRIPLINE COMPONENTS.						
(1030)	TITLE = AUTO TEST, MOUNTING + STACKING OF LOCASERT NONAXIAL DEVICES			230	229		
	PROBLEM = PRESENT METHODS OF MOUNTING AND TESTING PARTS USING LOCASERTS ARE 10PCT HIGHER THAN THEY WOULD BE WITH AUTOMATED METHODS.						
	SOLUTION = PROVIDE A SYSTEM THAT WILL AUTOMATICALLY DETECT DEVICE ORIENTATION, POSITIONTHE DEVICE, INSERT THE DEVICE ON THE LOCASERT, ELECTRICALLY TEST THE DEVICE AND MOUNT THE DEVICE INTO STICKS FOR THE INSERTION MACHINE.						
(1031)	TITLE = HIGH SPEED PLATING OF CARD EDGE CONTACTS.			230	240		
	PROBLEM = MASKING OF THE CONNECTOR IS AN EXPENSIVE PROCESS AND REQUIRES A CLEANING PROCESS TO REMOVE THE RESIDUE FROM THE TAPE. THE ADJACENT PLATING JUNCTION OF DISSIMILAR METALS REQUIRES STRICT CONTROLS TO PREVENT HAIRLINE CRACKS.						
	SOLUTION = DEVELOP HIGH SPEED PULSE PLATING OF THE CONTACTS. THIS WILL ELIMINATE THE REQUIREMENT FOR MASKING, CLEANING TO REMOVE THE MASKING RESIDUE AND REDUCE COST.						
(3160)	TITLE = CLEANLINESS CRITERA AND PROCESSES FOR PRINTED WIRING BOARD	150	150				
	PROBLEM = CRITERIA FOR PCB CLEANLINESS IS VAGUE AND COSTS ASSOCIATED WITH IT ARE A HIGH PERCENTAGE OF FINAL PRODUCT COST.						
	SOLUTION = DEVELOP PROCESS TECHNIQUES FOR VARIOUS LEVELS OF CLEANLINESS AND ELIMINATE NON-COST EFFECTIVE OPERATIONS.						
(3164)	TITLE = COMPONENT SIDE PRINTED CIRCUIT BOARD SOLDERING					325	
	PROBLEM = THERE IS NO KNOWN METHOD FOR HOLDING COMPONENTS IN ALIGNMENT FOR MOUNTING.						
	SOLUTION = REFINE PROCESS FOR FOIL SIDE MOUNTING OF COMPONENTS TO ACCOMODATE FLEXIBLE CIRCUITS.						

		FUNDING ($000)					
		PRIOR	79	80	81	82	83
COMPONENT -- INTEGRATED ELECTRONICS (CONTINUED)							
(3184)	TITLE - SCREEN PRINTING PROCESSES FOR PTH ON PLASTIC PCB'S					250	250
	PROBLEM - SET UP AND RUN TIME FOR ELECTROLESS COPPER PLATED THRU HOLES (PTH) IS APPROXIMATELY 3.75 MIN PER BOARD WITHOUT INSPECTION OR MAINTENANCE.						
	SOLUTION - SCREEN PRINTING COULD ACCOMPLISH THE SAME JOB IN APPROXIMATELY .48 MIN PER BOARD. INVESTIGATE CURING CYCLE, SCREEN PREPARATION TIME, AND PASTE RHEOLOGY FOR OPTIMUM FLOW THRU HOLES.						
(3237)	TITLE - RELATE DESIGN TO COST OF PRINTED CIRCUIT BOARDS						270
	PROBLEM - OVERCROWDING OF PRINTED CIRCUIT BOARDS RESULTS IN UNACCEPTABLE SCRAP RATES.						
	SOLUTION - DEVELOP A SET OF DESIGN TRADEOFFS FOR MINIMIZING COSTS BY CALCULATING COST PENALTIES OF VIOLATIONS.						
(3254)	TITLE - SEMI-FLEXIBLE THIN FILM SEMICONDUCTORS	400		425			
	PROBLEM - PRESENT CIRCUIT BOARDS LACK THE PACKING DENSITY AND STRINGENT PACKAGING QUALITIES PROJECTED FOR FUTURE MISSILE ELECTRONIC SYSTEMS.						
	SOLUTION - DEVELOP MANUFACTURING PROCESS FOR PUTTING THIN FILM MICRO-CIRCUITS ON FLEXIBLE SUBSTRATES.						
(3256)	TITLE - PROCESS DEVELOPMENT FOR COMPOSITE THIN FILMS						210
	PROBLEM - CONSTRUCTION OF FILMS ARE SUCH THAT INDIVIDUAL LAYERS OF A MULTILAYER STRUCTURE PERFORM A SINGLE FUNCTION.						
	SOLUTION - IDENTIFY POTENTIALLY EXPLOITABLE COMPOSITE THIN FILM PHENOMENA AND SELECT FOR DEVELOPMENT IN A MANUFACTURING PROCESS.						
(3262)	TITLE - PROD. METHOD FOR AUTOMATIC PLACE AND SOLDER OF FLATPACK						330
	PROBLEM - WAVE SOLDERING LEAVES EXCESSIVE AND UNCONTROLLED AMOUNTS OF SOLDER ON THE CIRCUIT BOARDS.						
	SOLUTION - ESTABLISH MANUFACTURING METHODS FOR CONTROLLING SOLDERING OF CIRCUIT BOARDS.						
(3263)	TITLE - MANF. TECH. FOR PWB UTILIZING LEADLESS COMPONENTS			250	250		
	PROBLEM - THE VOLUME, WEIGHT, QUANTITY, RELIABILITY AND COST OF PCB USING WIRE LEADS CAN BE SUBSTANIALLY IMPROVED.						
	SOLUTION - ESTABLISH MANUFACTURING TECHNOLOGY TO FABRICATE, TEST, AND INSPECT PRINTED WIRE ASSEMBLIES THAT USE LEADLESS COMPONENTS.						

		FUNDING ($000)				
	PRIOR	79	80	81	82	83
COMPONENT -- INTEGRATED ELECTRONICS (CONTINUED)						
(3267) TITLE - PRODUCTION PROCESSES FOR REMOVING EPOXY SMEAR IN PTH		200		200		
PROBLEM - REMOVAL OF EPOXY SMEAR IN PLATING THRU HOLES IN PTH.						
SOLUTION - INCREASE EFFICIENCY OF HONING MACHINES.						
(3272) TITLE - FLEXIBLE PRINTED CIRCUITS WITH INTEGRAL MOLDED CONNECTORS		217				
PROBLEM - MANUFACTURE OF CONVENTIONAL ROUND WIRE CABLING WITH CONNECTORS IS LARGELY A HAND LABOR ITEM.						
SOLUTION - DEVELOP AUTOMATED PILOT LINE TO MANUFACTURE ULTRA-RELIABLE FLAT CABLES WITH INTEGRAL CONNECTORS.						
(3369) TITLE - UTILIZATION OF LARGE SCALE INTEGRATION (LSI) TECHNIQUES					400	400
PROBLEM - THE DESIGN AND UTILIZATION OF LSI ELECTRONICS IN AN ADVANCED DEVELOPMENT PROGRAM IS NOT FEASIBLE BECAUSE OF THE INABILITY TO MAKE QUICK CHANGES.						
SOLUTION - CONDUCT PROJECT FOR LSI DEVELOPMENT, QUALIFICATION, PRODUCTION ENGINEERING AND PILOT RUN FOR THE STINGER ALTERNATE MISSILE GUIDANCE ELECTRONICS.						
(3411) TITLE - MANUFACTURE OF NON PLANAR PRINTED CIRCUIT BOARDS			220	550		
PROBLEM - USE OF FLAT CIRCUIT BOARDS RESULTS IN COMPLEX AND EXPENSIVE INTERCONNECTIONS WITH LOWERED RELIABILITY.						
SOLUTION - PRODUCE NON PLANAR PCB'S SHAPED TO FIT THE AVAILABLE COMPARTMENTS.						
(3415) TITLE - AUTOMATIC PHOTOGRAPHIC PRODUCTION OF THICK FILM MICROCIRCUIT				200	200	
PROBLEM - SCREEN PRINTING OF FINE LINES DOES NOT ALLOW HIGH DENSITY DUE TO RHEOLOGY OF ZINC SYSTEMS.						
SOLUTION - DEVELOP THICK FILM HYBRID PROCESSING CAPABILITY INCLUDING PHOTOLITHOGRAPHIC PATTERNING.						
(3444) TITLE - FULLY ADDITIVE MANUFACTURING FOR PRINTED WIRING BOARDS		200	200			
PROBLEM - THE PRESENT SUBTRACTIVE METHOD OF PRODUCING CIRCUIT BOARDS IS WASTEFULL OF COPPER SLOW AND EXPENSIVE.						
SOLUTION - PRODUCE CIRCUIT BOARDS BY A FULLY ADDITIVE PROCESS STARTING WITH A BARE BOARD. THE WIRING PATTERN WILL BE BUILT UP USING AN ELECTROLESS METAL DEPOSITION SYSTEM.						

	FUNDING, ($000)					
	PRIOR	79	80	81	82	83
COMPONENT -- OPTICS						
(3152) TITLE = PRODUCTION OF OPTICAL ELEMENTS (CAM)						
PROBLEM = HIGH GRADE OPTICS IN MODERATE QUANTITY CANNOT BE PRODUCED AT LOW COST WITH REPEATABILITY.					200	200
SOLUTION = APPLY COMPUTER CONTROL TO PROCESS OPERATIONS WITH SENSOR CONTROL AND PROCESS FEEDBACK TO ASSURE HIGH YIELD.						
(3189) TITLE = IMPROVED PROCESS FOR ZOOM OPTICS BEAM RIDER TRANSMITTER						
PROBLEM = THE TRANSMITTER IS PRODUCED USING PROTOTYPE TECHNOLOGY IN SMALL QUANTITIES AT HIGH COST.			375	400		
SOLUTION = ESTABLISH NEW PRODUCTION TECHNIQUES TO PRODUCE THE TRANSMITTER IN LARGE QUANTITIES.						
(3445) TITLE = PRECISION MACHINING OF OPTICAL ELEMENTS						
PROBLEM = EXISTING PRECISION MACHINING FACILITIES CANNOT KEEP UP WITH THE DEMAND, MEET OPTICAL DESIGN REQUIREMENTS, MEET PRODUCTION SCHEDULES, AND STAY WITHIN REASONABLE COST BOUNDARIES.		300	400	500		
SOLUTION = INTEGRATE BOTH THE WELL PROVEN ERDA DEVELOPED SINGLE POINT DIAMOND MACHINING CAPABILITIES AND THE DEVELOPING INTERFEROMETRIC AIDED AND COMPUTER CONTROLLED TECHNOLOGY INTO A MANUFACTURING METHOD.						
COMPONENT -- SEEKERS						
(1034) TITLE = MANF PROCESS FOR ACTIVE AIR DEFENSE SEEKERS						
PROBLEM = MANUFACTURING PROCESSES FOR QUANTITY PRODUCTION OF ACTIVE AIR DEFENSE SEEKERS DOES NOT EXIST.				550		
SOLUTION = A PRODUCTION TEST WILL BE DESIGNED TO CHECK PERFORMANCE CHARACTERISTICS AGAINST MANUFACTURING PARAMETERS.						
(3081) TITLE = PROD OF RADAR MONOPULSE SEEKERS USING PC + STRIPLINE TECH						
PROBLEM = THE CURRENT RADAR MONOPULSE SEEKERS ARE COSTLY, COMPLEX HYBRID NETWORKS.				150	200	
SOLUTION = APPLY PRINTED CIRCUIT AND STRIPLINE TECHNOLOGY TO THE FABRICATION OF SUCH A SEEKER TO REDUCE PER UNIT COST.						
(3116) TITLE = ROSETTE AIR DEFENSE SEEKER OPTICS AND DETECTORS						
PROBLEM = VERY DENSE PACKAGING MAKES ASSEMBLY VERY COSTLY.	500	750				
SOLUTION = ESTABLISH PRODUCTION TOOLING TECHNIQUES FOR ROSETTE SEEKER DETECTORS AND OPTICS.						

		FUNDING ($000)				
	PRIOR	79	80	81	82	83
COMPONENT -- SEEKERS (CONTINUED)						
(3139) TITLE - MILLIMETER RADIOMETRIC SEEKERS FOR SUBMISSILE APPLICATION			350	250		
PROBLEM - LOW QUANTITY PRODUCTION IS TOO COSTLY FOR THE SYSTEM REQUIREMENTS.						
SOLUTION - ESTABLISH AUTOMATED FABRICATION/ASSEMBLY TECHNOLOGY FOR HIGH PRODUCTION CAPABILITY AND IMPROVE PRODUCTION TEST METHODS.						
(3178) TITLE - IMPROVED MANUFACTURING PROCESSES FOR LASER IR/OPTICAL SEEKER				225		
PROBLEM - FIBER OPTICS FIXTURE ARE DIFFICULT AND EXPENSIVE TO MAKE.						
SOLUTION - REDUCE FIBER OPTICS FIXTURE DIFFICULTIES BY DEVISING METHODS TO REDUCE HANDLING OF FIBER FIXTURE AND DETECTOR ARRAY.						
(3186) TITLE - IMPROVED MANUFACTURE OF INFRARED SUBMISSILE SEEKERS			500	450		
PROBLEM - LOW YIELD OF SEEKER COMPONENTS IS DUE TO HANDLING AND CHECKOUT OF GYRO OPTICS.						
SOLUTION - ESTABLISH PROCEDURES FOR AUTOMATED HANDLING AND CHECKOUT OF GYRO OPTICS.						
(3427) TITLE - IMPROVED MANF. TECH. FOR THE MULTI-ENVIRONMENT ACTIVE SEEKER			450	500		
PROBLEM - DIODE ARRAY TRANSMITTER, POLARIZATION ANTENNA, AND ACOUSTIC WAVE DEVICES USED IN THIS SEEKER ARE PRESENTLY BUILT BY PROTOTYPE SHOP METHODS.						
SOLUTION - ESTABLISH METHODS FOR PRODUCING THESE CRITICAL COMPONENTS SO THAT PERFORMANCE PARAMETERS CAN BE CLOSELY CONTROLLED.						
(3428) TITLE - IMPROVED TECHNIQUES FOR COMMON APERTURE MULTISPECTRUM SEEKER				259	350	
PROBLEM - PRESENT METHODS FOR MAKING WIDE BAND ON A ONE AT A TIME BASIS, DOES NOT PERMIT GOOD CONTROL OF PERFORMANCE.						
SOLUTION - MANUFACTURING TECHNIQUES ARE REQUIRED TO PRODUCE THESE COMPONENTS IN MODERATE QUANTITIES WITH CLOSER TOLERANCES.						
COMPONENT -- SENSORS						
(3080) TITLE - PROD. OF SANDWICH DETECTORS FOR MULTI. WAVE LENGTH SENSORS				200	150	150
PROBLEM - IN PRESENT SENSORS AND SEEKERS, ONLY ONE MODE OF DETECTION AND SEEKER HOMING CAN BE ACCOMPLISHED WITHIN THE CONSTRAINTS OF SMALL DIAMETER SYSTEMS.						
SOLUTION - ESTABLISH TECHNIQUES FOR SANDWICHING THE DETECTORS ON A COMMON SUBSTRATE. THIS WILL ALLOW TWO DETECTION MODES.						

		FUNDING ($000)				
		PRIOR	79	80	81	82	83
COMPONENT -- SENSORS (CONTINUED)							
(3175)	TITLE = MANUFACTURING PROCESSES FOR SOLID STATE IMAGING SENSORS				250	280	
	PROBLEM = EXISTING PROCESSES ARE LOW YIELD AND NON-UNIFORM, MECHANICAL VAPOR DEPOSITION MUST BE OPTIMIZED.						
	SOLUTION = ESTABLISH THE PROCESSES CIRCUMVENTING PRESENT PROBLEMS ON WIRE BONDING, TWEAKING, TESTING, ETC.						
(3177)	TITLE = IMPROVED MANF. PROCESS FOR SUBMISSILE ELECTRONIC SUBSYSTEM				250	175	
	PROBLEM = PRESENT MANUFACTURING PROCESSES SUBSTANTIALLY INCREASE THE COST OF HOMING SUBSYSTEMS.						
	SOLUTION = INVESTIGATE VOLUME METHODS FOR PRODUCING ELECTRONIC HOMING SUBSYSTEMS.						
(3221)	TITLE = FLUIDIC RATE SENSOR				165	165	165
	PROBLEM = PRESENT MASS PRODUCED RATE SENSORS ARE COSTLY FOR USE IN A MANPORTABLE AIR DEFENSE SYSTEM.						
	SOLUTION = CONDUCT PROJECT TO DO QUALIFICATION, PRODUCTION ENGINEERING, TOOLING, AND PILOT RUN FOR RATE SENSOR.						
(3277)	TITLE = AUTOMATIC INERTIAL SENSOR FABRICATION				350	350	
	PROBLEM = INERTIAL SENSOR FABRICATION REQUIRES PRECISION MACHINING AND ASSEMBLY METHODS WITH SEVERAL ITERATIONS, ALL OF WHICH INCREASE COST.						
	SOLUTION = ESTABLISH AUTOMATIC FLUID FILL STATION AND SET UP PILOT STATION FOR AUTOMATIC BALANCING OF GYRO ROTORS.						
COMPONENT -- WINDOWS/RADOMES							
(1032)	TITLE = MANF PROCESS FOR ABLATIVE COMPOSITE RADOMES				300		
	PROBLEM = DUROID MATERIAL IS THE ONLY MATERIAL AVAILABLE OFFERRING LOW EROSION RATES WITHOUT CHAR.						
	SOLUTION = DEVELOP PROCEDURE FOR INCORPORATING OXYGEN COMPOUNDS INTO SILICONE RESIN TO REDUCE ABLATIVE CHAR.						
(3176)	TITLE = MANUFACTURE OF SILICON NITRIDE RADOMES				390	350	
	PROBLEM = THERE IS NO EXISTING ECONOMICAL MANUFACTURING PROCESSES FOR LARGE RADOMES FROM CURRENT MATERIALS.						
	SOLUTION = SLIPCAST SILICON POWDER AND FIRE THE RADOME IN A NITROGEN ATMOSPHERE.						

		FUNDING ($000)				
	PRIOR	79	80	81	82	83
COMPONENT -- WINDOWS/RADOMES (CONTINUED)						
(3426) TITLE = IMPROVED PROCESSES FOR MIRRORS AND WINDOWS FOR HE LASERS					250	350
PROBLEM = MIRRORS AND WINDOWS FOR HIGH ENERGY LASER APPLICATION ARE EXPENSIVE TO FABRICATE AND ARE REPRODUCIBILITY POOR.						
SOLUTION = ESTABLISH METHODS FOR PRODUCING MODERATE QUANTITIES OF MIRRORS AND WINDOWS AT LOWER COST AND GREATER UNIFORMITY.						
(3432) TITLE = IMPROVED IR DOME MATERIALS						150
PROBLEM = MACHINING COSTS FOR REFRACTORY OXIDES ARE HIGH.						
SOLUTION = ESTABLISH PRODUCTION PROCESS USING AMMRC GRADIENT FURNACE TECHNIQUE.						

****
*** C A T E G O R Y ***
****
***MISSILE STRUCTURE ***
****

COMPONENT -- AIRFRAMES-COMPOSITES						
(1020) TITLE = MFG PROCESSES FOR FUSED SILICA FIBERS				458	521	
PROBLEM = THERE IS NO COMMERCIAL SOURCE FOR HIGH PURITY FUSED SILICA FIBERS.						
SOLUTION = DEVELOP PROCEDURES FOR FIBER OPTICS APPLICATIONS AND SET UP A PILOT PRODUCTION LINE TO PRODUCE FUSED SILICA FIBERS OF STRUCTURAL QUALITY						
(1026) TITLE = LOW COST MFG TECHNIQUES FOR HIGH PRODUCTION MISSILE VANES			260	200		
PROBLEM = METAL CONTROL VANES,FINS AND MISSILE FAIRINGS CAUSE HIGH COST,WEIGHT PENALTIES AND LONG LEAD TIME						
SOLUTION = DEVELOP A6 N/C TAPE LAYING MACHINE TO AUTOMATE THE PRODUCTION OF MISSILE VANES AND CONTROL FINS.						
(3331) TITLE = MANUFACTURING PROCESS FOR FILAMENT WINDING					270	270
PROBLEM = METAL MOTOR CASES ARE HIGH IN COST AND PROCUREMENT LEAD TIMES ARE LONG.						
SOLUTION = ESTABLISH FILAMENT WINDING EQUIPMENT AND TOOLS TO ACCOMPLISH HIGH VOLUME PRODUCTION.						
(3335) TITLE = ADVANCED COMPOSITE SUBSTRUCTURES FOR MISSILES				300	300	
PROBLEM = THE CONVENTIONAL APPROACH FOR BUILDING UP STRUCTURE FROM DETAILED PARTS RESULT IN HIGH COST.						
SOLUTION = USE ADVANCED COMPOSITE STRUCTURE TO ELIMINATE PRACTICALLY ALL MACHINING.						

		FUNDING ($000)					
		PRIOR	79	80	81	82	83
COMPONENT	-- AIRFRAMES-COMPOSITES (CONTINUED)						
(3382)	TITLE - FOR BRAIDED COMPOSITE STRUCTURE					500	525
	PROBLEM - CURRENT LOW COST TECHNIQUES RESULT IN CONFIGURATION LIMITATIONS WHEREAS TECHNIQUES THAT MINIMIZE THESE LIMITATIONS ARE COSTLY.						
	SOLUTION - ESTABLISH TECHNOLOGY OF BRAIDING COMPOSITE STRUCTURES WHICH ARE COST COMPETATIVE AND PROVIDE ADVANTAGES.						
(3385)	TITLE - UTILIZATION OF COMMERCIAL GRADE KEVLAR 49						100
	PROBLEM - COMMERCIAL GRADE KEVLAR 49 DIFFERS FROM AEROSPACE GRADE IN THAT THE COMMERCIAL ROVING IS LARGER IN DIAMETER AND DOES NOT ACCEPT THE EXISTING RESIN SYSTEM.						
	SOLUTION - ESTABLISH RESIN THAT IS MORE COMPATABLE WITH COMMERCIAL GRADE/WINDING PROCESS THAT IMPROVES PROPERTIES OF TUBES MADE OF COMMERCIAL GRADE.						
(3420)	TITLE - ADV. COMPOSITE MATERIAL FOR GUID. INNER SHELL SPT. STRUCTURE				225	225	
	PROBLEM - ELECTRONIC PACKAGE SUPPORT STRUCTURES ARE EXPENSIVE TO FABRICATE.						
	SOLUTION - INVESTIGATE AND OPTIMIZE LOW COST FABRICATION OF ADVANCED COMPOSITE MATERIALS FOR INNER SHELL SUPPORT STRUCTURE.						
COMPONENT	-- AIRFRAMES-METAL/PLASTIC						
(3179)	TITLE - IMPROVED MANUFACTURING PROCESS FOR SUBMISSILE AIRFRAMES				200	260	
	PROBLEM - CURRENT TECHNIQUES OF MANUFACTURING TERMINALLY GUIDED SUBMISSILE AIRFRAMES REQUIRE ADEQUATE PROCESS CONTROL AND DESIGN RELIABILITY.						
	SOLUTION - DEVELOP METHODS TO INCREASE YIELD AND REDUCE COST OF TERMINALLY GUIDED SUBMISSILE AIRFRAMES						
(3431)	TITLE - AN ECONOMICAL PROCESS FOR ELECTROPLATING ALUMINUM ON STEEL					250	250
	PROBLEM - HYDROGEN EMBRITTLEMENT IS A SERIOUS PROBLEM OF HIGH STRENGTH STEELS.						
	SOLUTION - DEVELOP PROCESS ELECTROPLATING ALUMINUM ON STEEL IN WHICH NO HYDROGEN GAS IS PRODUCED.						
COMPONENT	-- COMPONENTS						
(3288)	TITLE - MANUFACTURING TECHNOLOGY FOR DIE CASTING					450	450
	PROBLEM - WEIGHT AND SPACE CONSTRAINTS HAVE RESULTED IN COMPLEX AND HIGH DENSITY CONFIGURATIONS OF METAL PARTS WHICH ARE MACHINED.						
	SOLUTION - ESTABLISH AND PROVE-OUT DIE CASTING TECHNIQUES FOR THESE COMPLEX CONFIGURATION.						

		FUNDING ($000)				
	PRIOR	79	80	81	82	83
COMPONENT -- COMPONENTS (CONTINUED)						
(3289) TITLE - PROCESSES FOR INVESTMENT CASTING				158	158	158
PROBLEM - MANUFACTURING IRREGULAR SHAPES IS TRADITIONALLY DIFFICULT AND CREATES EXPENSIVE SECONDARY OPERATIONS.						
SOLUTION - ESTABLISH CONFIGURATION FAMILIES TO DETERMINE THE EXTENT THAT THIN WALL-MAXIMUM AREAS MAY BE FABRICATED BY INVESTMENT CASTING.						
(3291) TITLE - LOW COST TOOLING FOR INJECTION MOLDING				224		
PROBLEM - CURRENT METAL FABRICATION TECHNIQUES FOR COMPLEX MISSILE COMPONENTS ARE COSTLY BECAUSE PRECISION TOLERANCE AND COMPLEX SHAPES FREQUENTLY REQUIRE SPECIAL MACHINING AND FABRICATION WHICH RESULTS IN HIGH MATERIAL USAGE AND IS TIME CONSUMING.						
SOLUTION - INJECTION MOLDING AND MODIFIED IJECTION MOLDING ARE SUITABLE FOR A NUMBER OF MISSILE MATERIALS BUT THE TECHNOLOGY FOR USING THESE PROCESSES ON THESE MATERIALS HAS NOT BEEN SUFFICENTLY DEVELOPED. PROCESSING INFORMATION WILL BE DEVELOPED.						
COMPONENT -- FORMING						
(3282) TITLE - CONFORM EXTRUSION PROCESS				375	375	375
PROBLEM - CONSIDERABLE COSTS ARE INCURRED IN TRANSPORTATION, DAMAGE AND LOSS OF SEMI-FINISHED PARTS.						
SOLUTION - REVIEW MISSILE PARTS AND DETERMINE IF THEY CAN BE PRODUCED BY CONFORM PROCESS.						
COMPONENT -- GENERAL						
(3381) TITLE - LOW COST IMPROVED 2-D HEATSHIELD MANUFACTURE		500				
PROBLEM - HEATSHIELD FABRICATION BY TAPE WRAPPING IS LOW SPEED, HIGH COST PROCESS.						
SOLUTION - DEVELOP SPLICE FREE HEAT SHIELDS USING BRAIDING PROCESS.						
COMPONENT -- JOINING						
(3144) TITLE - USE OF INFRARED DETECTION FOR AUTO. CONTROL WELD PENETRATION				150	150	
PROBLEM - THERE IS NO ACCEPTABLE MEANS OF CONTROLING WELD PENETRATION ON COMPONENTS FABRICATED FROM THIN SHEETS OF HIGH STRENGTH STEEL ALLOYS.						
SOLUTION - ESTABLISH FEEDBACK SYSTEM FOR WELDING.						

		FUNDING ($000)					
		PRIOR	79	A0	A1	A2	B3
COMPONENT -- JOINING (CONTINUED)							
(3219)	TITLE = AUTOMATIC POLYMER ATTACHMENT PRODUCTION METHODS		200	200			
	PROBLEM = PRESENT TECHNOLOGY EMPLOYS A POLYMER DISPENSING MACHINE WHICH IS OPERATED MANUALLY, A TIME CONSUMING AND COSTLY PROCESS.						
	SOLUTION = DEVELOP AN AUTOMATIC PRODUCTION POLYMER ATTACHMENT METHOD						
(3304)	TITLE = ESTABLISH INERTIAL WELDING					400	
	PROBLEM = CRITICAL HIGH STRENGTH MISSILE AND LAUNCHER FORGING DETAIL REQUIRE LONG LEAD TIMES AND ARE EXPENSIVE.						
	SOLUTION = ADAPT TO AEROSPACE USE MANUFACTURING PROCESS FOR JOINING DETAILS AND PROVIDE HIGH STRENGTH STRUCTUAL COMPONENTS.						
(3307)	TITLE = PLASMA ARC WELDING FOR MISSILE STRUCTURES				250		
	PROBLEM = DISTORTION AND THE HAZE EFFECT ON WELD JOINT INTEGRITY.						
	SOLUTION = OPTIMIZE PROCESS TECHNIQUES NEEDED TO PRODUCE PLASMA ARC WELDS.						
(3441)	TITLE = APPLICATION OF HIGH ENERGY LASER MANUFACTURING PROCESSES	490	400				
	PROBLEM = COST IS A CRITICAL FACTOR IN CONVENTIONAL WELDING ASSOCIATED WITH O E MANUFACTURE OF HIGH VOLUME MISSILE SYSTEMS SUCH AS CONTAINERS, LAUNCHERS, ETC. THE IMPLEMENTATION OF LASER PROCESSES HAS THE POTENTIAL FOR ENORMOUS COST SAVINGS.						
	SOLUTION = INTEGRATE HIGH ENERGY LASER TECHNOLOGY AND COMPUTER AIDED MANUFACTURING CONTROLS INTO SYSTEMS CAPABLE OF HIGH PRODUCTION RATES AND MINIMAL COSTS.						
COMPONENT -- MACHINING							
(1021)	TITLE = COMPUTERIZED PROD PROC PLAN (CPPP) FOR MACH CYLINDRCAL PARTS			240	250		
	PROBLEM = MANUAL METHODS FOR PRODUCTION PROCESS PLANNING RESULT IN HIGH COSTS						
	SOLUTION = DEVELOP A COMPUTER SOFTWARESYSTEM FOR PROCESS PLANNING OF MACHINED CYLINDRICAL PARTS THAT WILL BE MANUFACTURER-INDEPENDENT. MANUFACTURING RATIONALE IS EXPRESSED IN ENGLISH-LIKE FORM FOR SOFTWARE EXECUTION.						
(3301)	TITLE = OPTIMIZED MACHINING PROCEDURES					320	320
	PROBLEM = MISSILE PARTS REQUIRING MACHINING BEAR EXCESSIVE COSTS.						
	SOLUTION = ESTABLISH IN PROCESS QUALITY CONTROL SYSTEM.						

		FUNDING ($000)					
		PRIOR	79	80	81	82	83
COMPONENT -- MACHINING (CONTINUED)							
(3302)	TITLE - ELECTRO DISCHARGE MACHINING PROCEDURE				320	320	320
	PROBLEM - THERE ARE MANY FABRICATION PROBLEMS DUE TO TIGHT TOLERANCE REQUIREMENTS IN FABRICATING MOUNTING HOLES FOR ARRAY ELEMENTS OF THE RADAR ANTENNA FOR THE PATRIOT SYSTEM.						
	SOLUTION - ESTABLISH TOOLING AND TECHNIQUES FOR FORMING HOLES IN FULL-SIZE ARRAY ELEMENT SUPPORT PLATES BY ELECTRO DISCHARGE MACHINING.						
********** CATEGORY ********** PROPULSION SYSTEM **********							
COMPONENT -- MOTOR CASES							
(3142)	TITLE - PROD METHOD FOR LOW COST PAPER MOTOR COMPONENTS		275	200			
	PROBLEM - HIGH VOLUME MISSILES AND ROCKETS USE HIGH STRENGTH TO WEIGHT METAL MOTOR CASES WHICH ARE A COSTLY ITEM.						
	SOLUTION - ESTABLISH WINDING TECHNIQUES FOR TURNING OUT LOW COST PAPER-PHENOLIC MOTOR CASE BODIES ON STANDARD INDUSTRIAL TOOLING.						
(3287)	TITLE - LOW COST STRIP LAMINATE MOTOR CASES	275	250				
	PROBLEM - CURRENT MANUFACTURING PROCESSES FOR ROCKET MOTORS ARE EXPENSIVE AND SLOW.						
	SOLUTION - USE STRIP LAMINATE TUBULAR PROCESS; LAMINATE ADHESIVE COATED STRIP STEEL ON A MANDREL AND CURE AND CUT TUBES TO LENGTH.						
(3294)	TITLE - PRODUCTION PROCESS FOR ROTARY ROLL FORMING			200	175		
	PROBLEM - MECHANICALLY JOINING OR WELDING A CONVENTIONAL CLOSURE TO COMMERCIAL TUBING IS EXPENSIVE.						
	SOLUTION - DEVELOP METHODS FOR PRODUCING INTEGRAL NOZZLES WITH TUBULAR PRODUCTS USING ROTARY ROLL FORMING TECHNIQUES.						
(3343)	TITLE - FABRICATION OF INTEGRATED CASE AND GRAIN					500	500
	PROBLEM - CONSIDERABLE LABOR IS REQUIRED TO MANUFACTURE ASSEMBLE AND FINISH PROPULSION SYSTEMS.						
	SOLUTION - DEVELOP STRIP WOUND INTEGRATED CASE AND GRAIN PROCESS TO INTEGRATE MANUFACTURE ASSEMBLY AND FINISHING IN LOW COST AUTOMATIC PRODUCTION LINE.						

		FUNDING ($000)					
		PRIOR	79	A0	A1	A2	A3
COMPONENT -- MOTOR CASES (CONTINUED)							
(3419)	TITLE - THERMOMECHANICAL METHODS FOR HIGH STRENGTH STL RKT MTR CASES				250	250	
	PROBLEM - HIGH STRENGTH ROCKET MOTOR CASE MANUFACTURING PROCESSES ARE COSTLY.						
	SOLUTION - DEVELOP AUTOMATED PROCEDURES TO PERFORM THERMOMECHANICAL FABRICATION PROCESS FOR HIGH STRENGTH MOTOR CASES AND TEST.						
COMPONENT -- MOTOR COMPONENTS							
(1036)	TITLE - PRODUCTION METHODS FOR VSTT TURBINE ROTORS				290		
	PROBLEM - TURBINE ROTORS ARE SUBJECT TO STRESS AND FATIGUE LEVELS AS ENGINE THURST INCREASES.						
	SOLUTION - IMPLEMENT PILOT PRODUCTION PROGRAM TO ESTABLISH COST EFFECTIVE PRODUCTION AND TEST TECHNIQUES TO FABRICATE TURBINE ROTORS WITH INCREASED STRESS AND FATIGUE LEVELS.						
COMPONENT -- NOZZLES							
(3396)	TITLE - INJECTION MOLDING OF ONE PIECE NOZZLES	180		200			
	PROBLEM - ROCKET MOTORS AS ALTERNATIVES TO TUBE ARTILLERY ARE TOO COSTLY.						
	SOLUTION - ESTABLISH MANUFACTURING PROCESS FOR INJECTION MOLDING LOW COST ONE-PIECE SOLID PROPELLANT MOTOR NOZZLES.						
(3423)	TITLE - LOW COST/HIGH PERFORMANCE FIBROUS GRAPHITE ROCKET NOZZLES				250	250	
	PROBLEM - ROCKET SYSTEMS USING HIGH PERFORMANCE CARBON/CARBON OR PYROLYTIC GRAPHITE NOZZLES INCUR HIGH COMPONENT COST.						
	SOLUTION - DEVELOP USE OF FIBROUS GRAPHITE AS REPLACEMENT MATERIAL.						
COMPONENT -- PROPELLANTS							
(1037)	TITLE - LOW COST EXTRUDABLE PYROTECHNIC PELLETING PROCESS				650		
	PROBLEM - PELLETING OPERATION IS A FUNCTION OF PELLET SIZE, THE SMALLER THE PELLET THE GREATER THE COST.						
	SOLUTION - DEVELOP EXTRUDABLE COMPOSITIONS WITH THE SAME IGNITION CHARACTERISTICS AS PELLETS. DESIGN CONTINUOUS OPERATION TO PRODUCE VARIOUS SIZED PELLETS.						
(1038)	TITLE - PROD OF NITRO POLYMERS FOR SMOKELESS PROPELLANTS				650		
	PROBLEM - NITROCELLULOSE PLASTICIZER BINDER HAS A VERY LIMITED FLEXIBILITY FOR FORMULATION OF SMOKELESS PROPELLANT COMPOSITIONS.						
	SOLUTION - MAKE PRODUCTION OF POLYETHYLENE GLYCOL NITRAMINE POLYMER COMMERCIALLY AVAILABLE.						

		FUNDING ($000)				
	PRIOR	79	80	81	82	83
COMPONENT -- PROPELLANTS (CONTINUED)						
(1039) TITLE - ALTERNATE PROCESS FOR THE PREPARATION OF IPDI				400		
PROBLEM - IPDI IS A CURING AGENT FOR COMPOSITE PROPELLANTS BUT IS CURRENTLY AVAILABLE FROM ONE FOREIGN SOURCE, WEST GERMANY.						
SOLUTION - INVESTIGATE ALTERNATE SYNTHETIC PROCESSES FOR THE MANUFACTURE OF IPDI.						
(3317) TITLE - CASTING OF PROPELLANTS						138
PROBLEM - THE END BURNING SUSTAINER GRAIN FOR STINGER IS PRESENTLY CAST AND CURED, MACHINED, INHIBITED WITH BOOT WHICH IS BONDED TO EXTERIOR OF GRAIN.						
SOLUTION - DEVELOP COST-IN-BOOT PROCESS TO CAST GRAIN DIRECTLY INTO INHIBITOR BOOT.						
(3320) TITLE - NON-DESTRUCTIVE TESTING (NDT) OF PROPELLANTS					165	
PROBLEM - THE FULL COMPLEMENT ON NDT TEST BY CURRENT METHODS IS TOO EXPENSIVE TO BE USED.						
SOLUTION - DEVELOP A COMPUTERIZED SYSTEM FOR THE ASSESSMENT OF NDT DATA.						
(3404) TITLE - MANUFACTURE OF ULTRAFINE AMMONIUM PERCHLORATE			160	180		
PROBLEM - BURNING RATES OF SPECIFIC SYSTEMS WILL OFTEN BE OUT OF SPECIFICATIONS BECAUSE OF THE UFAP MANUFACTURE AND REPRODUCIBILITY PROBLEMS.						
SOLUTION - ESTABLISH METHODOLOGY FOR MANUFACTURING HIGH QUALITY REPRODUCIBLE UFAP.						
(3447) TITLE - MMT SCALE UP AND DEMO FOR THE RECOV OF NHC FROM WASTE PROPEL			375	132		
PROBLEM - THERE IS A LARGE AMOUNT OF SCRAP IN THE MANUFACTURE OF PROPELLANT CONTAINING NHC.						
SOLUTION - SCALEUP OF THE LABORATORY PROCESS TO EXTRAC/RECOVER THE NHC FROM THE SCRAP PROPELLANTS						
(3448) TITLE - RECOVERY OF DIBORANE IN THE MANUFACTURE OF NHC			250	400		
PROBLEM - THERE IS AN 8% LOSS OF UNREACTED DIBORANE FROM THE PROCESS USED TO PRODUCE NHC						
SOLUTION - RECOVER AND RECYCLE THE DIBORANE WITH A DIMETHYL-ZINC CHLORIDE PROCESS						

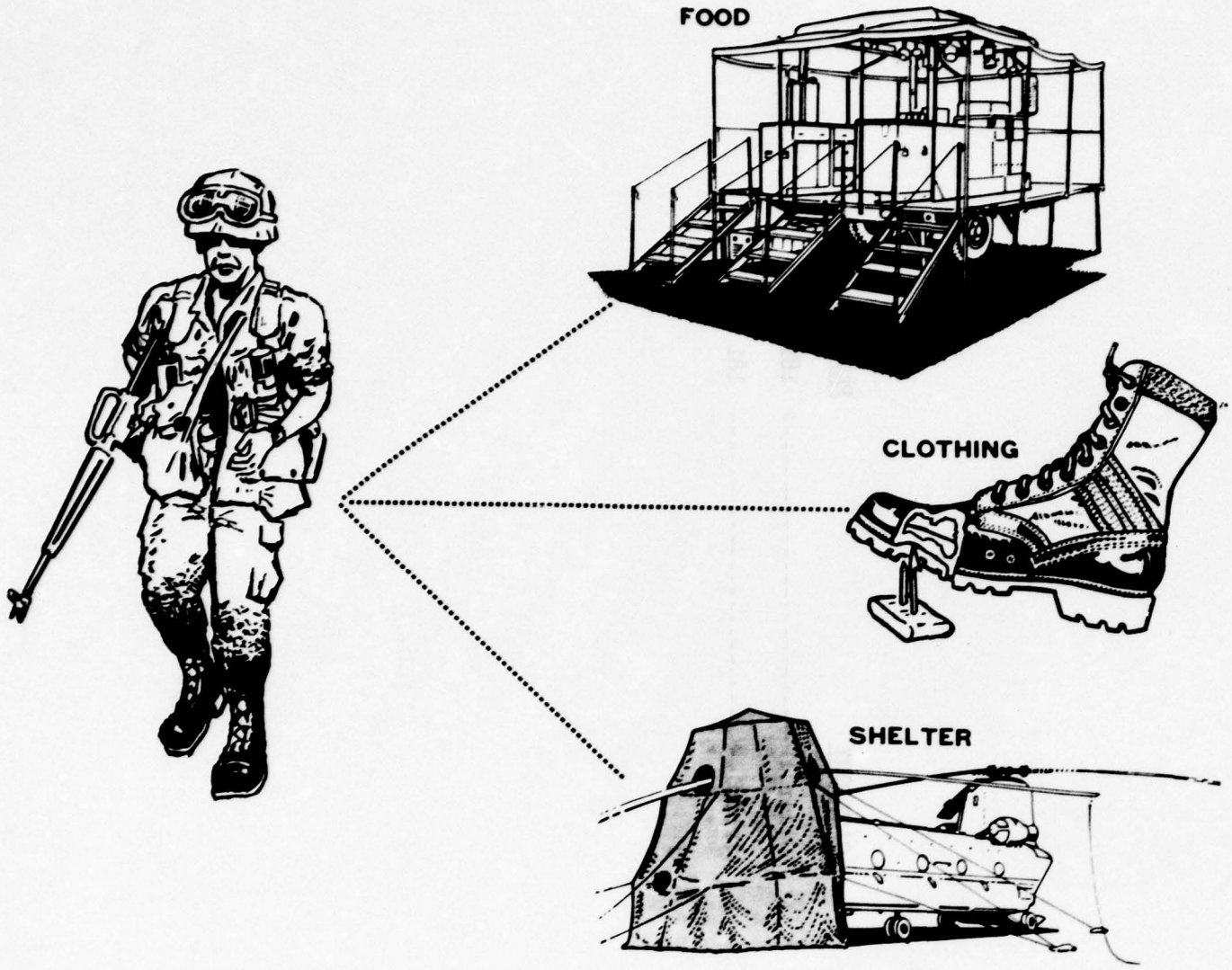
		FUNDING ($000)				
	PRIOR	79	80	81	82	83
COMPONENT -- PROPELLANTS (CONTINUED)						
(3449) TITLE - OPTIONAL PROPELLANT INGREDIENTS				150	540	
PROBLEM - A NUMBER OF CHEMICAL INGREDIENTS USED IN SOLID ROCKET PROPELLANTS HAVE BECOME UNAVAILIABLE BECAUSE SOME OF THE REAGENTS ARE HAZARDOUS.						
SOLUTION - STUDIES SHOW THAT ISOPHRONONE DIISOCYANATE (IPDI) CAN BE MADE IN A BATCH PROCESS WITHOUT USING PHOSGENE. THIS LABORATORY PROCESS WILL BE SCALED UP.						
(3450) TITLE - MMT SCALE UP AND DEMO OF A PROC FOR THE PROD OF DIBORANE				950	900	
PROBLEM - DIBORANE COSTS $100 A POUND. THERE IS A MISSION REQ OF OVER 350,000 LB.						
SOLUTION - DEMO A LOW COST PROC AND ESTABLISH SCALING PARAMETERS FOR THE PROD OF DIBORANE						
COMPONENT -- PROPELLENTS						
(1035) TITLE - DEMONSTRATION OF LOW COST CARBORANE MODIFIER				750		
PROBLEM - NMC IS USED AS A BALLISTIC MODIFIER FOR SOLID ROCKET PROPELLANTS BUT IS VERY EXPENSIVE DUE TO A LOW YIELD PROCESS.						
SOLUTION - INVESTIGATE ALKYNE PROCESS FOR PRODUCTION OF NMC TO REDUCE NET PRODUCT COST.						

****
* CATEGORY *
****
*TEST EQUIPMENT *
****

COMPONENT -- ELECTRONIC COMPONENTS						
(1023) TITLE - DIGITAL FAULT ISOLATION FOR HYBRID MICROELECTRONIC MODULES			300			
PROBLEM - HYBRID MICROELECTRONIC MODULES REQUIRE A SIGNIFICANT INCREASE IN DIGITAL FAULT ISOLATION CAPABILITY. INTERNAL PROBING IS OFTEN NECESSARY TO DIAGNOSE PROBLEMS						
SOLUTION - DEVELOP A MANUFACTURING TECHNOLOGY FOR EMPLOYING THE PROBE TRACE METHOD FOR FAULT ISOLATION IN THE PRODUCTION OF HYBRID MICROELECTRONIC MODULES.						
(3242) TITLE - DIGITAL FAULT ISOLATION OF PRINTED CIRCUIT BOARDS	425	425				
PROBLEM - DENSE MISSILE DIGITAL ELECTRONIC SYSTEMS REQUIRE A SIGNIFICANT IMPROVEMENT IN DIGITAL FAULT ISOLATION COSTS AND SCHEDULE DELAYS.						
SOLUTION - DEVELOP A MANUFACTURING TECHNOLOGY FOR EMPLOYING THE PROBE TRACE METHOD FOR FAULT ISOLATION						

		FUNDING ($000)				
		PRIOR	79	A0	A1	A2	B3
COMPONENT	-- ELECTRONIC COMPONENTS (CONTINUED)						
(3243)	TITLE - ANALOG FAULT ISOLATION OF PRINTED CIRCUIT BOARDS					425	425
	PROBLEM - MANUAL FAULT ISOLATION AND TROUBLE SHOOTING METHODS ARE SLOW.						
	SOLUTION - ESTABLISH AUTOMATIC FAULT ISOLATION AND TROUBLE SHOOTING METHODS FOR ANALOG CIRCUIT ASSEMBLIES.						
(3251)	TITLE - HIGH TEMPERATURE OPERATING TESTS FOR MICROCIRCUITS				490	490	
	PROBLEM - LIFE TESTS ON SEMICONDUCTOR DEVICES ARE IMPRACTICAL DUE TO THE HUNDREDS OF THOUSANDS OF TEST HOURS REQUIRED.						
	SOLUTION - IMPLEMENT HIGH TEMPERATURE OPERATING TESTS AS EARLY IN THE MANUFACTURING CYCLE AS FEASIBLE.						
(3322)	TITLE - INFRARED ELEMENT TESTING				125	125	125
	PROBLEM - IR SYSTEM OPTICAL ELEMENTS ARE SPECIFIED IN TERMS OF MIL-O-13830 WHICH REQUIRES SUBJECTIVE JUDGEMENT.						
	SOLUTION - ESTABLISH A SUPPLEMENT TO MIL-O-13830, OPTICAL DESIGN GUIDANCE FOR FUNCTION TESTING, STANDARD TESTS AND EQUIPMENT.						
(3434)	TITLE - INTEGRATION OF COMPUTER AUTOMATIC TESTING WITH CAD				450	450	
	PROBLEM - DUE TO INCREASING LOGIC COMPLEXITY IN DIGITAL CIRCUITS AND MODULES AND LARGER AND HIGHER DENSITY ANALOG MODULES, CURRENT TESTING TECHNIQUES ON MODULE LEVEL ARE NOT COST EFFECTIVE, REQUIRING EXCESSIVE LABOR AND HIGH SKILL LEVELS.						
	SOLUTION - A COMPUTER AUTOMATED TESTING (CAT) STATION WITH INFORMATION OBTAINED FROM A COMPUTER AIDED DESIGN (CAD) SYSTEM WOULD ELIMINATE THE NECESSITY OF DESIGINING, BUILDING, AND TESTING AN ELECTRICAL TEST SET-UP AND ACQUIRING RELATED EQUIPMENT.						
(3438)	TITLE - DELIDDING PARALLEL SEAM SEALED HYBRID MICROELECT PACKAGES		200				
	PROBLEM - THERE IS NO PRODUCTION TECHNIQUES OR EQUIPMENT AVAILABLE TO ACCOMPLISH DELIDDING OF HYBRID PACKAGES.						
	SOLUTION - DEVELOP A DELIDDING DEVICE UTILIZING A MESA PERMANENT DIAMOND LAP TO ITS MAXIMUM ADVANTAGE.						
COMPONENT	-- GENERAL						
(3394)	TITLE - NON DESTRUCTIVE TEST OF LINE PIPE ROCKET MOTORS						254
	PROBLEM - ROCKETS ARE NOT COST COMPETITIVE TO TUBE ARTILLERY IN SUCH APPLICATIONS AS AREA FIRE SATURATION.						
	SOLUTION - OPTIMIZE MILL FABRICATION PROCEDURES FOR API LINE PIPE.						

		FUNDING ($000)				
	PRIOR	79	80	81	82	83
COMPONENT -- GENERAL (CONTINUED)						
(3443) TITLE - MFR TESTS FOR ANISOTROPIC MISSILE PARTS				85	95	
PROBLEM - THERE IS A CRITICAL NEED FOR ANISOTROPIC MATERIAL PROPERTIES TO AID IN THE DESIGN AND QUALITY CONTROL OF THESE ITEMS.						
SOLUTION - DETERMINE STRUCTURAL ANISOTROPIC MATERIAL PROPERTIES IN ACTUAL MISSILE COMPONENTS UNDER EVALUATION USING MULTIAXIAL SPECIMEN LOADING TECHNIQUES.						
COMPONENT -- X-RAY AND N-RAY						
(3241) TITLE - AUTOMATIC X-RAY READER TEST EQUIPMENT FOR 3D X-RAYS			600	552		
PROBLEM - X-RAY IS LIMITED TO A TWO DIMENSIONAL FORMAT AND IS DEPENDENT ON THE TRAINING AND JUDGEMENT OF THE INSPECTOR.						
SOLUTION - AUTOMATE THE ANALYSIS OF X-RAY RESULTS, AND PROVIDE DEPTH PERSPECTIVE BY PARALLELS OR HOLOGRAPHIC TECHNIQUES.						
(3244) TITLE - NEUTRON BOMBARDMENT NONDESTRUCTIVE TESTING						277
PROBLEM - ORGANIC CONTAMINATION DOES NOT LEND ITSELF TO X-RAY INSPECTION.						
SOLUTION - ESTABLISH TESTING PROCEDURE FOR NONORGANIC COMPONENTS WITH ORGANIC CONTAMINATION.						



NATICK R&D COMMAND

(NARADCOM)

US ARMY NATICK RESEARCH AND DEVELOPMENT COMMAND

(NARADCOM)

NARADCOM, located in Natick, MA, is responsible for research and development in the areas of air drop equipment (platforms, parachutes, and packaging), organizational equipment, refrigeration equipment, non-powered heaters, DOD tactical shelters, individual field sanitation equipment, biological materials (germicides and insecticides), tents, clothing and personnel equipment, DOD food and food service equipment, containers and packaging (excluding MHE containers), physical security (safes and padlocks), materials (textiles, rubber, leather, plastic, paper, and chemicals), fields support equipment (printing, composing, and duplicating), hand tools, office equipment and supplies and furnishings, appliances, and cleaning equipment.

A major problem confronting NARADCOM is economically providing adequate clothing and equipment to the field soldier. The projects submitted by NARADCOM address this area, and can have a direct impact on the private sector.

NARADCOM

COMMAND FUNDING SUMMARY
(THOUSANDS)

CATEGORY	FY79	FY80	FY81	FY82	FY83
GENERAL	0	100	100	50	0
TROOP	510	665	654	0	0
TOTAL	510	765	754	50	0

		FUNDING ($000)				
	PRIOR	79	A0	A1	A2	A3

COMPONENT ** MISCELLANEOUS

(8070) TITLE = PADLOCK,COMBINATION,CHANGEABLE — 100 100 50

PROBLEM = SOLE SOURCE MANUFACTURING CANNOT MEET MILITARY AND/OR CIVIL AGENCIES DEMANDS, BROADEN THE PROCUREMENT BASE.

SOLUTION = OBTAIN ADDITIONAL PARTICIPATION IN PRODUCING SECURITY LOCKS THIS WILL REDUCE LEAD TIME, ELIMINATE, SOLE SOURCE,OFFER QUICK RESPONSE IN TIME OF URGENCY,REDUCE COSTS BECAUSE OF COMPETITIVE BIDDING.

****
* CATEGORY *
****
*TROOP *
****

COMPONENT ** PROTECTIVE GEAR

(8063) TITLE = IMPROVED METHODS OF MFG OF BUTYL RUBBER HANDWEAR — 510 165 154

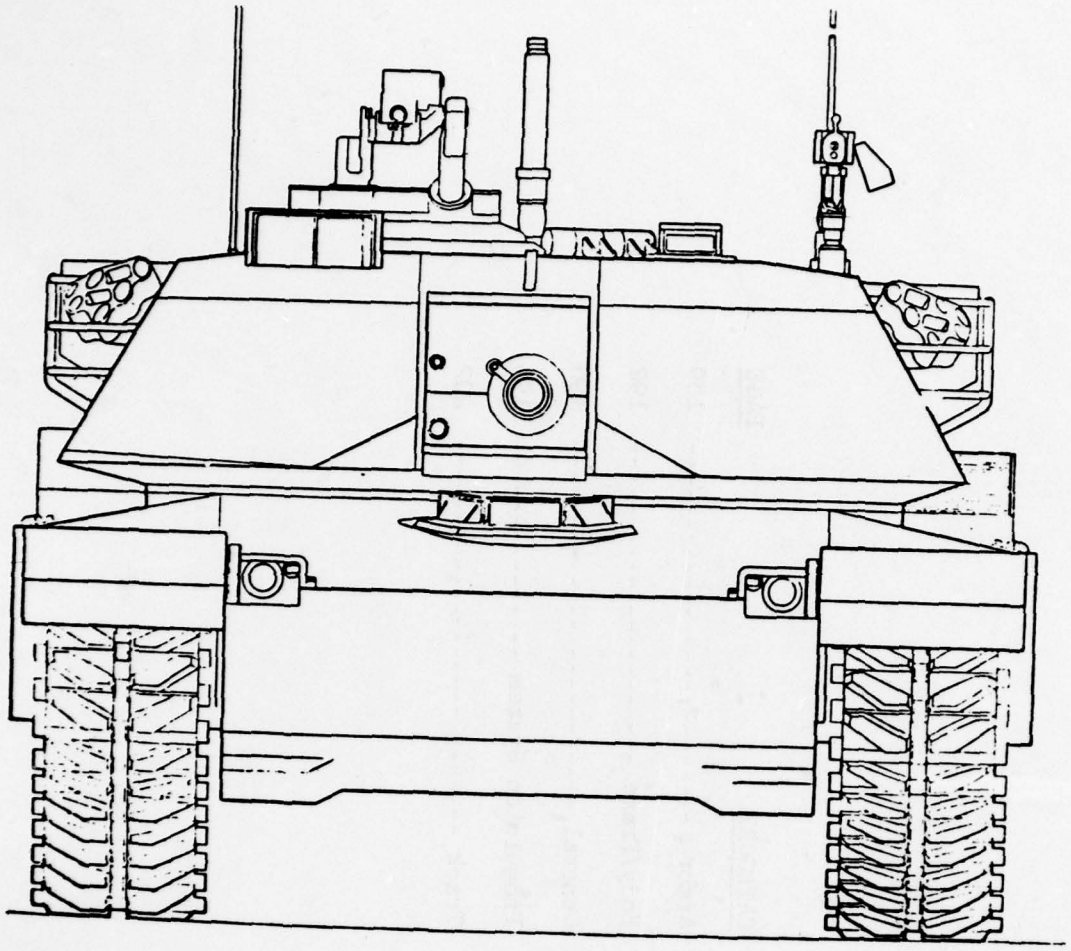
PROBLEM = THE PRESENT METHOD OF STANDARD BUTYL RUBBER GLOVE FOR CW PROTECTION IS BY A SOLE SOURCE DIPPING PROCESS WHICH REQUIRES CLOSE QUALITY AND ENVIRONMENTAL SUPERVISION INCREASED COST AND LIMITED DURABILITY AND PROTECTION.

SOLUTION = EVALUATE SEVERAL METHODS OF MANUFACTURE THAT WILL INCREASE PRODUCTION LESS HAZARDOUS CONDITIONS THAT WILL MANUFACTURE A MORE DENSE BUTYL GLOVE OFFERING GREATER PROTECTION AND DURABILITY.

(8066) TITLE = CONTINUOUS FILAMENT PRODUCTION METHOD = PASGT HELM — 500 500

PROBLEM = CONVENTIONAL MODE OF MOLDING THE PASGT HELMENT I.E. WEAVING KEVLAR YARNS INTO FABRIC CUTTING PREFORM AND LAYING UP, IS VERY WASTEFUL.

SOLUTION = LAYUP PREFORM BY CONTINUOUS YARN AND WETTING WITH RESIN THUS REDUCING WASTE SAVING 30 TO 40 DOLLARS PER HELMET.



TANK-AUTOMOTIVE R&D COMMAND
(TARADCOM)

US ARMY TANK-AUTOMOTIVE RESEARCH AND DEVELOPMENT COMMAND

(TARADCOM)

TARADCOM, with headquarters in Warren, MI, has the mission of developing, acquiring, and fielding tracked and wheeled military combat, tactical, and general purpose vehicles. The mission is worldwide in scope and includes among its customers all of the US military services, and friendly foreign nations. The production base for mission items is made up of both private and government-owned contractor-operated facilities. MMT efforts are accomplished partially in-house and partially out-of-house. The TARADCOM MMT program is separated into five categories: armor, general, propulsion, track and suspension and vehicle body.

The main requirements placed on TARADCOM today in the field of armor are to increase the ballistic tolerance of conventional armor while reducing its overall weight, and develop new lightweight armor for the high speed, high survivability vehicles which are currently being evaluated in field tests. To meet these requirements, the Command is emphasizing Electro-Slag Remelt (ESR) steel armor, combination type armor and the application of spall surpressive armor to the interior walls of combat vehicles to reduce the overall ballistic threat. TARADCOM is also developing high strength armors by mechanical treatments, emphasizing the latest methods to fabricate heavy aluminum plate and adapting the latest R&D in metallic and non-metallic armor to both tracked and non-tracked vehicles to increase material properties while decreasing overall material and construction costs. TARADCOM is also seeking more cost effective and higher quality armor by establishing improved procedures for casting alloy and armor steels treated with rare earths and other compounds or additives.

To pursue these new armor developments, it will be necessary to have commercially available joining processes so that these new armors can be used cost effectively in production. To meet this requirement, TARADCOM has establish several MMT projects. Areas covered include joining ESR steel armor, welding complex alloys and shapes by laser, identifying electron beam welding applications, and optimizing welding procedures, and ultrasonic inspection of welds.

Other areas of interest in armor are fabrication techniques for expendable plastic decoy tanks, production procedures for the application of color-changing coatings, materials and coatings to reduce the efficiency of tracking devices, and the use of CAM in hull fabrication.

In general support of combat and tactical vehicles, TARADCOM is actively pursuing manufacturing technology in various areas. Projects

are included for non-corrosive materials, chemical joining techniques, use of advanced microprocessors and multiplexing, high speed machining, and flexible machining pilot lines for batch production. Several projects are also proposed for the CAM area; these include a new machinery and equipment data base, computer simulation of production, application of adaptive control technology to vehicle components, and extension of CAD/CAM principles to spare parts manufacture.

The major requirements for propulsion and track are to develop production techniques to manufacture propulsion and drive systems for the XM1, XM2, XM3 and future tracked and non-tracked combat and tactical vehicles. For management visibility, this category has been divided into engine, transmission, and track and suspension areas. As with the other categories, fabrication and joining are of major concern. TARADCOM is actively pursuing production development of advanced casting techniques for integrally cast compressors, automated assembly line welding techniques, compliant joints to join metals and non-metals, and automated laser machining of complex machine alloys. Life cycle costs for various tactical and combat vehicles can be significantly increased by eliminating premature failure or reduced service life of components due to corrosion and deterioration of material during the normal life cycle. To support this area, TARADCOM is endeavoring to bring on line ceramic reinforced combustors.

The track and suspension category is constantly caught in the technical dilema of producing more advanced systems to meet the ever increasing demands of higher performance in more adverse terrains while maintaining the overall reliability and maintainability of the system at or near current system costs. To achieve these objectives, the track area, as with the other categories, has been sub-divided into major thrust areas for better visibility and management control. These areas are general, rubber pads, shoes, track sprockets, wedges and suspension components. In these areas the general thrusts have been to introduce production techniques for metal matrix composites, non-metallic matrix composites, advanced rubber compounds, new rubberization systems, advance elastomeric compounds, lightweight castings, hard surface coatings and powder metallurgy.

In body/frame, the main thrusts are the conservation of fuel and material. To meet these requirements the objective is to reduce the overall weight of the vehicle, to increase its payload, and lower the life cycle cost of the systems by reducing the corrosion and degradation of the materials of construction. Here the main areas of concern are coatings, lightweight/composite structures, miscellaneous components, structural members, suspension systems, and seats and fuel tanks. Within these areas, work will be accomplished in elastic reservoir molding of reinforced trailer module bodies to reduce weight and costs, rapid

during automotive paints, new fungicidal paints acceptable to the FDA, automated and computer controlled processes for joining metals with adhesives, plastic cab tops, maintenance free batteries with high impact resistance and non-corrosive, lightweight non-structural tactical vehicle components.

The results of these MMT projects are not limited to the DOD. The general results of these projects should have beneficial impact on the overall civilian sector since they encounter similar problems. Any project to increase joining rates, automate a process, reduce scrap, increase life, reduce wear or corrosion, reduce weight or increase performance will benefit the commercial sector since it will reduce initial acquisition costs or reduces life cycle costs. Thus, while TARADCOM's program is generally directed toward generic tank-automotive problems, there will be a significant technical spin-off to the commercial sector.

TARADCOM

COMMAND FUNDING SUMMARY
(THOUSANDS)

CATEGORY	FY79	FY80	FY81	FY82	FY83
ARMOR	2290	2410	3305	4160	5025
BODY/FRAME	775	925	3230	3750	3525
GENERAL	755	1370	4300	3200	3750
PROPULSION SYSTEM	910	843	3075	3950	5550
TRACK	375	650	2025	1450	1725
TOTAL	5105	6198	15935	16510	19575

CATEGORY	FUNDING ($000) PRIOR	79	80	81	82	83
ARMOR						
COMPONENT -- GENERAL						
(4557) TITLE - HIGH EFFICIENCY JOINING OF ESR ARMOR	300				200	200
PROBLEM - ESR STEEL ARMOR UTILIZED FOR VEHICLE CONSTRUCTION AND BALLISTIC APPLIQUES MUST HAVE HIGH JOINT EFFICIENCIES TO TAKE ADVANTAGE OF THE INCREASED PROTECTION.						
SOLUTION - IMPROVE JOINING PROCESSES TO INCREASE PROTECTION TO THE LEVEL OF A PARENT MATERIAL. WORK ON EDGE PREPARATION AND PRE- AND POST-HEAT TREATMENT.						
(4575) TITLE - LASER WELDING TECHNIQUES FOR MILITARY VEHICLES	175	375			250	250
PROBLEM - NO MANUFACTURING BASELINE EXISTS FOR WELDING HIGH STRENGTH MATERIAL BY ADVANCED HIGH-SPEED WELDING TECHNIQUES.						
SOLUTION - STUDY THE USE OF LASER WELDING TO ESTABLISH A PRODUCTION BASELINE.						
(4577) TITLE - ATTACHMENT OF COMBINATION ARMOR TO COMBAT VEHICLES				125	125	125
PROBLEM - COMBINATION ARMOR SYSTEMS PROVIDE LARGE BALLISTIC IMPROVEMENT BUT REQUIRE COMPLEX ATTACHMENT METHODS.						
SOLUTION - IDENTIFY COST EFFECTIVE METHODS FOR PRODUCTION APPLICATION.						
(4578) TITLE - ELECTRON BEAM WELDING FOR FERROUS COMPONENTS				175	250	250
PROBLEM - ELECTRON BEAM WELDING FOR FERROUS MATERIALS REQUIRES MODIFICATION TO ASSURE WELD QUALITY.						
SOLUTION - IDENTIFY LOW COST AUTOMATED TECHNIQUES FOR APPLICATION OF ELECTRON BEAM WELDING OF FERROUS MATERIALS.						
(4586) TITLE - IMPROVED SOLIDIFICATION AND SOUNDESS THICK ARMOR CASTING		500	1160	500	200	
PROBLEM - PRESENT CASTING TECHNIQUES NEED UPDATING IN ORDER TO EXPLOIT THE ADVANTAGE OF CASTING PROCESS.						
SOLUTION - ESTABLISH IN PRODUCTION TECHNIQUES FOR CONTROLLING SOLIDIFICATION RATES IN MOLDS TO IMPROVE PROPERTIES AND REDUCE COSTS.						
(5009) TITLE - FORGING ARMOR COMPONENTS FROM FORGED AND CAST PREFORMS	525			175	175	125
PROBLEM - IMPROVED AVAILABILITY OF PREFORMS IS NEEDED.						
SOLUTION - ESTABLISH PRODUCTION TECHNIQUES TO FORGE AND CAST THE PREFORM AS A MILL INGOT.						
(5040) TITLE - FABRICATION TECHNIQUES FOR MANUFACTURING PLASTIC TANK DECOYS					250	300
PROBLEM - FABRICATE AN INEXPENSIVE VEHICLE DECOY WHICH WOULD BE EXPENDABLE.						
SOLUTION - ESTABLISH MANUFACTURING PROCESS UTILIZING PLASTIC COMPONENTS FOR BUILDING FULL SCALE PLASTIC COMBAT VEHICLE DECOYS.						

		FUNDING ($000)				
	PRIOR	79	A0	A1	A2	A3
COMPONENT -- GENERAL (CONTINUED)						
(5045) TITLE - SPALL SUPPRESSIVE FOR COMBAT VEHICLES		150	190	225	500	300
PROBLEM - CURRENT METALLIC ARMOR DOES NOT SUPPRESS FLYING SHRAPNEL WITHIN THE VEHICLE CREW COMPARTMENT.						
SOLUTION - ESTABLISH METHODS OF APPLYING SPALL SUPPRESIVE ARMOR TO THE INTERIOR WALLS OF COMBAT VEHICLES.						
(5049) TITLE - LASER ENERG ABSORBING COATINGS				200	150	150
PROBLEM - THE INCREASED USE OF LASER BEAM FOR RANGE FINDERS AND MISSILE GUIDANCE INCREASES THE PROBABILITY OF HIT.						
SOLUTION - ESTABLISH FEASIBILITY OF APPLYING LASER ABSORBING COATINGS ON COMBAT VEHICLES.						
(5050) TITLE - AUTOMATED DISSIMILAR METAL JOINING	255			125	125	150
PROBLEM - COMPLEXITIES IN THE FABRICATION BY UTILIZING DISSIMILAR METALS FOR SPECIFIC THREAT DEFEAT DOES NOT ENHANCE ITSELF TO PRODUCTION TECHNIQUES.						
SOLUTION - ESTABLISH MANUFACTURING TECHNIQUES AUTOMATING THE WELDING AND POSITIONING FOR JOINING DISSIMILAR METALS.						
(5051) TITLE - TECHNIQUES FOR JOINING ARMOR MATERIALS BY ULTRA SONIC METHOD					200	175
PROBLEM - CONVENTIONAL JOINING PROCESSES INDUCE HEAT AFFECTED ZONES ADJACENT TO JOINT METALS WHICH HAVE ADVERSE AFFECTS ON BALLISTIC PROPERTIES.						
SOLUTION - ESTABLISH MANUFACTURING PROCESSES WHICH WILL JOIN METALS WITH A MINIMUM AMOUNT OF HEAT PRODUCTION COUPLING WITH ULTRASONIC WELDING.						
(5061) TITLE - HIGH STRENGTH ALUMINUM FOR ARMOR				200	200	200
PROBLEM - RESPONSE TO A PROCESS AND FABRICATION TECHNIQUES ARE UNRELIABLE IN NEWLY DEVELOPED ALLOYS.						
SOLUTION - DEVELOP PROCESSING TECHNIQUES AND QUALITY ASSURANCE AND PROVISIONS TO ASSURE CONSISTENT QUALITY COMPONENTS.						
(5065) TITLE - ADVANCED TECHNOLOGY SURVEILLANCE COUNTERMEASURES MATERIALS			390	280	110	325
PROBLEM - USE OF MATERIALS WHICH WILL DEFEAT SURVEILLANCE MEASURES HAS NOT BEEN EXPLOITED IN PRODUCTION.						
SOLUTION - PRODUCTION TECHNIQUES ARE NEEDED TO ASSURE SUFFICIENT QUALITY TO PERFORM SATISFACTORILY.						

		FUNDING ($000)					
		PRIOR	79	80	81	82	83
COMPONENT -- GENERAL (CONTINUED)							
(5088)	TITLE - HIGH-POWER ELECTRON BEAM WELDING IN AIR	200	250	250	250	200	200
	PROBLEM - USE OF ELECTRON BEAM HAS NOT BEEN EXPLOITED.						
	SOLUTION - ESTABLISH PROCEDURES UTILIZING THIS NEW PROCESS FOR RAPID ECONOMICAL JOINING OF ARMOR MATERIALS.						
(5091)	TITLE - HEAVY ALUMINUM PLATE FABRICATION			420	200	150	150
	PROBLEM - FABRICATION OF HEAVY ALUMINUM PLATE NEEDS TO BE IMPROVED.						
	SOLUTION - ESTABLISH PROCESSES AND TECHNIQUES TO UTILIZE LATEST METHOD IN THE FABRICATION PROCESS.						
(5094)	TITLE - ALLOY AND ARMOR STEELS TREATED WITH RARE EARTH ADDITIVES		680		150		
	PROBLEM - ARMOR STEELS UTILIZED CONVENTIONAL DEOXIDIZING AND SCAVENGING PROCESSES IN STEEL MAKING.						
	SOLUTION - ESTABLISH TECHNIQUES TO TREAT STEELS WITH RARE EARTH ADDITIONS.						
(5096)	TITLE - WELD REPAIR OF ARMOR CASTINGS				200	125	125
	PROBLEM - FOUNDRY WELD REPAIR OF ARMOR CASTINGS IS A DISTASTEFUL HIGHLY LABOR INTENSE OPERATION.						
	SOLUTION - ESTABLISH A PROCESS WHICH WILL EXPEDITE AND REDUCE LABOR INTENSITY.						
(6010)	TITLE - IMPROVED WELD POWER SUPPLIES FOR CAM WELDING					300	300
	PROBLEM - PRESENT POWER SUPPLIES DO NOT EMPLOY THE LATEST IN ELECTRONIC TECHNOLOGY AND ARE NOT OPTIMALLY COMPATABLE FOR COMPUTER CONTROL AND AUTOMATION---AUTOMATION OF WELD IS NECESSARY IF COSTS ARE TO BE CONTROLLED AND PRODUCTIVITY INCREASED.						
	SOLUTION - EMPLOY AVAILABLE ELECTRONIC TECHNOLOGY AND BUILD IMPROVED WELDING SUPPLIES THAT MEET PERFORMANCE DEMANDS REQUIRED FOR AUTOMATION OF WELDING.						
(6038)	TITLE - HIGH DEPOSITION WELDING PROCESSES FOR ARMOR		335				
	PROBLEM - WELDING IS LABOR INTENSIVE AND HIGH COST IT IS A MAJOR COST DRIVER IN ARMOR VEHICLE MANUFACTURE.						
	SOLUTION - HIGH DEPOSITION WELDING PROCESSES WILL PERMIT WELDING TO BE ACCOMPLISHED MORE RAPIDLY THUS REDUCING MANPOWER REQUIREMENTS AND INCREASING PRODUCTIVITY.						

		FUNDING ($000)				
	PRIOR	79	80	81	82	83
COMPONENT -- HULL/BODY						
(5017) TITLE - AUTOMATED WELDING OF ALUMINUM COMBAT VEHICLES	250				200	250
PROBLEM - MANUAL WELDING IS TIME CONSUMING AND FATIGING.						
SOLUTION - DEVELOP IMPROVED AUTOMATED PROCESS TO WELD ALUMINUM HULLS.						
(5072) TITLE - PRODUCTION OF HULL/TURRETS FOR COMBAT VEHICLES						1000
PROBLEM - CASTING FACILITIES LACK ADVANCED METHODS, TECHNIQUES AND CONTROLS WHICH CONTRIBUTE TO LOWER DENSITY, LOWER PERFORMANCE, AND HIGHER COSTS OF THE CAST STEEL ARMORS.						
SOLUTION - NEW FOUNDRY TECHNIQUES WILL BE UTILIZED WHICH WILL RESULT IN AN IMPROVED ARMOR CONFIGURATION.						
(6007) TITLE - WELDING WITH POWDERED METAL FOR RAPID DEPOSITION.				200	200	200
PROBLEM - WELD JOINT PROPERTIES ARE DEGRADED BY EXCESSIVE HEAT AFFECTED ZONE WHICH ARE INHERENT IN THE SUBMERGED ARC WELDING PROCESS.						
SOLUTION - USE OF POWDERED METALS WILL INCREASE THE DEPOSITION RATE THEREBY REDUCE HEAT TRANSFER INTO THE PLATE THUS DECREASE THE HEAT AFFECTED ZONE.						
COMPONENT -- TURRETS/CUPOLA						
(4574) TITLE - COMPUTER SIMULATION OF WELDING PROCESSES				300	250	250
PROBLEM - INCORPORATION OF ADVANCED MATERIALS DEVELOPED IN R AND D PROGRAMS ARE INHIBITED BECAUSE OF FABRICATION PROBLEMS.						
SOLUTION - ESTABLISH A METHODOLOGY WHICH PERMITS A STUDY OF ALL PRODUCTION VARIABLES ON AN ANALYTICAL BASIS TO ESTABLISH A PRACTICAL PROCEDURE.						

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* CATEGORY *
****
*BODY/FRAME *
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COMPONENT -- COATING						
(5044) TITLE - ESTABLISH RAPID CURING OF AUTOMOTIVE PROTECTIVE COATINGS-UVR				200	200	
PROBLEM - PROTECTIVE COATINGS REQUIRE TEDIOUS, TIGHTLY CONTROLLED APPLICATION WITH LONG CURE TIMES.						
SOLUTION - PRODUCE PROTECTIVE COATINGS WITH SHORT CURE TIMES USING ULTRA VIOLET RADIATION.						

		FUNDING ($000)					
		PRIOR	79	80	81	82	83
COMPONENT -- COATING (CONTINUED)							
(5046)	TITLE - RADAR DISPERSING AND ABSORBING AUTOMOTIVE COATINGS				200	250	300
	PROBLEM - COMBAT VEHICLES WILL REFLECT RADAR ENERGIES, THUS ALLOWING ITSELF TO BE DETECTED.						
	SOLUTION - ESTABLISH PRODUCTION METHODS FOR COATINGS WHICH WILL DISPERSE AND ABSORB RADAR WAVE LENGTHS.						
(5047)	TITLE - ENVIRONMENTAL COLOR ADAPTING COATINGS FOR COMBAT VEHICLES					300	300
	PROBLEM - ARMY VEHICLE COLORS DO NOT BLEND WITH EVERY TERRAIN AND/OR ENVIRONMENTAL CONDITION.						
	SOLUTION - ESTABLISH PROCESS FOR APPLICATION OF COATINGS WHICH WILL CHANGE COLOR TO BLEND INTO ANY ENVIRONMENT.						
(6012)	TITLE - PRODUCTION TECHNIQUES FOR THE APPLICATION NEW NONTOXIC PAINT						
	PROBLEM - THE OLD PAINT WITH METAL ANTI-FUNGICIDES HAVE BEEN DISAPPROVED BY THE FDA.						
	SOLUTION - DEVELOP NEW METHODS FOR APPLYING THE NEWLY DEVELOPED PAINTS.						
COMPONENT -- COATINGS							
(4259)	TITLE - NON STICK UNDERCOATING FOR TACTICAL VEHICLES				175	150	150
	PROBLEM - NO MANUFACTURING BASE LINE EXISTS FOR APPLYING MUD-REPELLING COATINGS TO TACTICAL VEHICLES.						
	SOLUTION - ESTABLISH MANUFACTURING PROCESSES TO PROVIDE MUD-REPELLING COATINGS.						
COMPONENT -- FUEL TANKS							
(5064)	TITLE - LIGHTWEIGHT SADDLE TANK		140				
	PROBLEM - FABRICATE AN ECONMICAL HIGH IMPACT NON-METALLIC FUEL TANK.						
	SOLUTION - ESTABLISH PROCEDURES AND METHODS TO PRODUCE A LEAK-PROOF FUEL TANK.						
COMPONENT -- LIGHTWEIGHT/COMPOSITE STRUCTURES							
(5039)	TITLE - INSULATED PLASTIC ENVIRONMENTAL TRAILER MODULES (ERM)				300	350	
	PROBLEM - MINIMUM EFFORT WAS EXERTED TO DEVELOP TECHNIQUES TO UTILIZE ALL PLASTIC, NON-STRUCTURAL VEHICLE BODIES.						
	SOLUTION - ESTABLISH THE FEASIBILITY OF USING ELASTIC RESERVOIR MOLDING REINFORCED BODIES FOR TRAILER MODULES.						

		FUNDING ($000)				
		PRIOR	79	A0	81	A2	A3
COMPONENT -- LIGHTWEIGHT/COMPOSITE STRUCTURES (CONTINUED)							
(5042)	TITLE - MANUFACTURING TECHNIQUES FOR NON-METALLIC TOTAL VEHICLES					500	500
	PROBLEM - CURRENT NON-STRUCTURAL VEHICLE BODIES MADE FROM METALS ARE EXCESSIVE IN WEIGHT AND TEND TO CORRODE.						
	SOLUTION - ESTABLISH FEASIBILITY OF MOLDING A VEHICLE BODY USING A MINIMUM OF PARTS.						
(6000)	TITLE - LIGHTWEIGHT TILT-UP HOOD/FENDER ASSEMBLY		200	350	225		
	PROBLEM - CURRENT HOOD/FENDER ASSEMBLY MADE FROM STEEL STAMPINGS ARE TOO HEAVY FOR ONE MAN TO LIFT.						
	SOLUTION - REDUCE WEIGHT BY MANUFACTURING ITEMS FROM LIGHTWEIGHT FORMABLE PLASTIC.						
(6011)	TITLE - SPRINGS FROM CARBON-FIBER PLASTIC-COMPOSITES				250	250	250
	PROBLEM - STEEL SPRINGS FOR TACTICAL VEHICLES ARE HEAVY AND SUBJECT TO FAILURE FROM FATIGUE. CARBON FIBER COMPOSITES ARE LIGHTER AND HAVE EXCELLENT FATIGUE RESISTANCE.						
	SOLUTION - THE TECHNOLOGY IS KNOWN TO MANUFACTURE LEAF SPRINGS FROM CARBON-FIBER-PLASTIC COMPOSITES- HOWEVER THE TECHNIQUES FOR MASS PRODUCTION NEED TO BE DEVELOPED.						
COMPONENT -- MISC COMPONENTS							
(4345)	TITLE - METALLIC COMPOSITES IN VEHICULAR STRUCTURED APPLICATIONS				180	200	200
	PROBLEM - SOLID MEMBERS IMPOSE PENALTIES ON MOBILITY AND LOAD CARRYING CAPACITY.						
	SOLUTION - PROCESS TECHNIQUES IN THE USE OF COMPOSITES WILL BE INVESTIGATED.						
(4389)	TITLE - PRODUCTION OF REMOVEABLE PLASTIC TOPS FOR SOFT TOP TRUCK CAB		225	150	200		
	PROBLEM - CANVAS TOPS AND BACKS AFFORD MINIMUM COMFORT AND ENVIRONMENTAL PROTECTION. REPLACEMENT IS OFTEN NECESSARY.						
	SOLUTION - FABRICATE RIDIG PLASTIC COMPONENTS WITHOUT MAJOR CHANGES TO VEHICLES IN SERVICE.						
(5003)	TITLE - MFG TECH OF STRONG WIRE WRAPPING TO MAKE COMPLEX COMPONENTS					500	225
	PROBLEM - COMPLEX HIGH STRENGTH ITEM CONFIGURATIONS ARE DIFFICULT TO PRODUCE.						
	SOLUTION - UTILIZE MULTI-AXIS WRAPPING MACHINES TO PRODUCE COMPLEX ITEMS IN THE ULTRA HIGH STRENGTH AREA.						

		FUNDING ($000)					
		PRIOR	79	80	81	82	83
COMPONENT -- MISC COMPONENTS (CONTINUED)							
(5019)	TITLE = TACTICAL VEHICLE STORAGE BATTERY	220		290	200	200	
	PROBLEM = THE MAJOR CAUSE OF TACTICAL VEHICLE BATTERY FAILURE IS BATTERY CONTAINER BREAKAGE.						
	SOLUTION = PROVIDE NEW HIGH IMPACT PLASTIC CONTAINER TO INCREASE FIELD PERFORMANCE REQUIREMENTS AND TO ACCOMODATE THE MAINTENANCE FREE CONCEPT ALREADY RELEASED IN LARGER MILITARY BATTERY SIZES.						
(5067)	TITLE = PLASTIC BATTERY BOX	30	60	60	200		
	PROBLEM = METALLIC BATTERY BOXES ARE SUBJECT TO CORROSION, THEREBY, DAMAGING THE VEHICLE.						
	SOLUTION = ESTABLISH PRODUCTION TECHNIQUES TO USE NON-CORROSIVE NON-METALS.						
COMPONENT -- SEATS							
(5066)	TITLE = COMPOSITE WOOD SLATS FOR TRUCK CARGO RACKS	100					
	PROBLEM = HARDWOODS ARE BECOMING INCREASINGLY UNAVAILABLE.						
	SOLUTION = ESTABLISH TECHNIQUES TO UTILIZE WOOD SUBSTITUTES IN TACTICAL VEHICLE APPLICATIONS.						
COMPONENT -- STRUCTURAL MEMBERS							
(4579)	TITLE = INDUSTRIAL PRACTICES FOR WELDING CONSTRUCTIONAL ALLOY STEELS				250	200	200
	PROBLEM = A WIDE VARIETY OF HIGH STRENGTH CONSTRUCTIONAL ALLOYS STILL WILL BE USED IN GREATER QUANTITIES TO MEET WEIGHT REQUIREMENTS.						
	SOLUTION = DOCUMENT RECOMMENDED WELDING PRACTICES AND PROCEDURES TO IDENTIFY SIGNIFICANT FACTORS AFFECTING PRODUCTION QUALITY FOR THE VARIOUS MATERIALS AND EQUIPMENT.						
(6015)	TITLE = APPLICATION OF ADHESIVE FOR LAYERED METALLIC STRUCTURES				250	250	250
	PROBLEM = USE OF ADHESIVES FOR JOINING METALLIC PLATE REQUIRES EXTENSIVE USE OF MANUAL OPERATION.						
	SOLUTION = DEVELOP AUTOMATED AND COMPUTER CONTROLLED PROCESSES FOR JOINING MATERIALS.						

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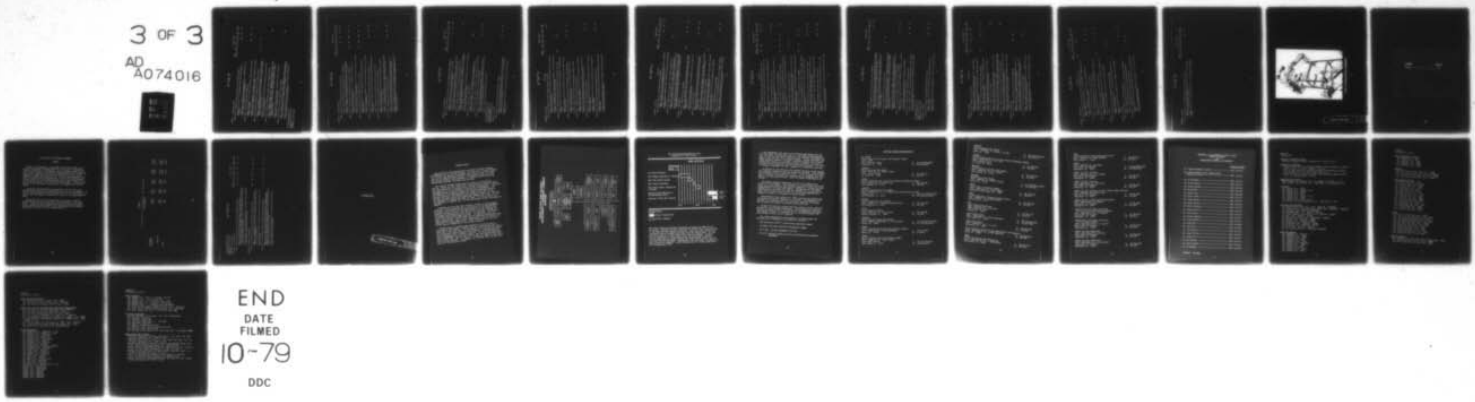

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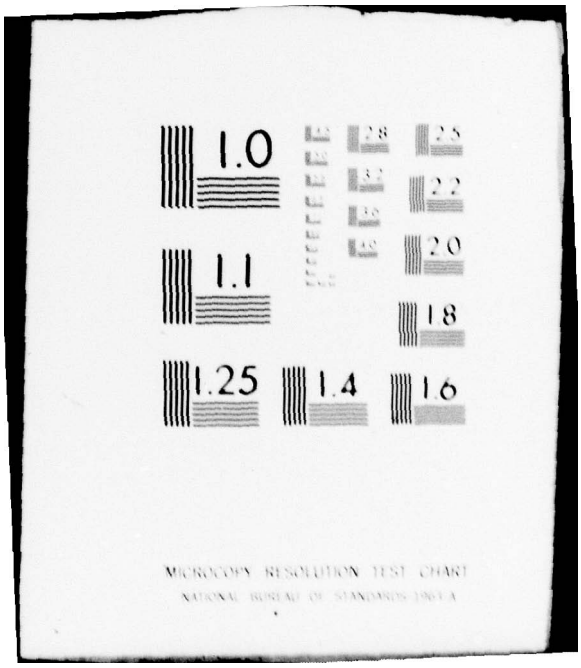
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		FUNDING ($000)				
	PRIOR	79	80	81	82	83
COMPONENT -- SUSPENSION SYSTEM						
(4295) TITLE - COMPONENTS FABRICATION USING ULTRA HIGH STRENGTH STEELS				200	200	200
PROBLEM - THE USE OF ULTRA HIGH STRENGTH STEELS HAS NOT BEEN PROPERLY EXPLORED.						
SOLUTION - STUDY SEVERAL ULTRA HIGH STRENGTH STEELS TO DETERMINE THE MOST ADVANTAGEOUS AND ECONOMICAL FOR FABRICATION.						
(4556) TITLE - TITANIUM TORSION SPRING FABRICATION				200	200	200
PROBLEM - THE USE OF TITANIUM ALLOYS IN SUSPENSION TORSION BARS HAS NOT BEEN PROPERLY EXPLORED.						
SOLUTION - ESTABLISH PROCESSING TECHNIQUES TO ASSURE PRODUCABILITY OF DURABLE COMPONENTS ON AN ECONOMICAL AND CONSISTENT BASIS.						
(5002) TITLE - FABRICATING TORSION BAR SPRINGS FROM HIGH STRENGTH STEEL	150	75	200			
PROBLEM - ENGINEERING ALLOY STEELS CAN BE HEAT TREATED TO A MAXIMUM WORKING HARDNESS WHICH REQUIRES LARGE DIAMETER BARS THEREBY INTERFERING WITH DESIGN FITS AND INCREASING WEIGHT.						
SOLUTION - ESTABLISH METHODS OF FABRICATING TORSION BARS UTILIZING 300000 MINIMUM YIELD MATERIALS.						
(5074) TITLE - PRODUCTION TECHNIQUES FOR COMBAT VEHICLE SUSPENSION SYSTEMS						500
PROBLEM - SUSPENSION SYSTEMS OF COMBAT VEHICLES ARE UNDERGOING A LARGE DESIGN CHANGE TO PROVIDE INCREASED MOBILITY PERFORMANCE BY UTILIZING NEWLY DEVELOPED COMPONENTS. APPLICATION OF THE ADVANCED SYSTEMS WILL INCREASE ACQUISITION COSTS.						
SOLUTION - APPLY ADVANCED MANUFACTURING TECHNIQUES TO REDUCE OR PREVENT INCREASES IN THE ACQUISITION COSTS.						
(6009) TITLE - FRICTION WELDING OF COMBAT VEHICLE COMPONENTS						250
PROBLEM - CURRENT METHODS OF WELDING PRODUCE EXCESS HEAT AFFECTED ZONES THAT MUST BE ELIMINATED BY HEAT TREATMENT WHICH IS EXPENSIVE AND TIME CONSUMING.						
SOLUTION - FRICTION WELDING WILL ELIMINATE THE NEED FOR HEAT TREATMENT AND ALSO ACCELERATE WELDING TIME IN PRODUCTION.						

CATEGORY
GENERAL

		FUNDING ($000)				
		PRIOR	79	80	81	82	83
COMPONENT -- MISCELLANEOUS							
(5068)	TITLE = NEW ANTI-CORROSIVE MATERIALS AND TECHNIQUES			200	250	250	250
	PROBLEM = METALLIC COMPONENTS ARE DETERIORATED BY THE ENVIRONMENT.						
	SOLUTION = ESTABLISH TECHNIQUES OF ECONOMICALLY APPLYING ANTI-CORROSIVE MATERIAL COATINGS TO THE COMPONENTS OF THE TACTICAL VEHICLE FLEET.						
(5082)	TITLE = FLEXIBLE MACHINING SYSTEM PILOT LINE FOR TCV COMPONENT		440	880	880	600	400
	PROBLEM = MACHINING RELATIVELY SMALL QUANTITIES BY ON-LINE METHOD IS INEFFICIENT AND UNECONOMICAL.						
	SOLUTION = ESTABLISH A MACHINE CENTER WHICH WILL HANDLE SMALL BATCH-TYPE PARTS WITH MINIMUM UTILIZATION OF MANPOWER.						
(5090)	TITLE = IMPROVED AND COST EFFECTIVE MACHINING TECHNOLOGY		315	290	290	150	150
	PROBLEM = MACHINE DATA ON NEWER MATERIALS AND NEW REMOVAL RATES ARE NOT ESTABLISHED.						
	SOLUTION = ESTABLISH DATA WHEREAS THE NEW MACHINING EQUIPMENT MAY BE UTILIZED WITH MAXIMUM EFFICIENCY.						
(5093)	TITLE = MANUFACTURING METHODS FOR HIGH SPEED MACHINING FERROUS ALLOY				950	1500	1500
	PROBLEM = FAST CHIP REMOVAL FOR FERROUS ALLOYS HAVE NOT BEEN ESTABLISHED FOR PRODUCTION.						
	SOLUTION = ESTABLISH FAST CHIP REMOVAL FOR PRODUCTION CONDITIONS.						
(6017)	TITLE = CHEMICAL JOINING TECHNIQUE FOR METALLIC COMPONENTS						400
	PROBLEM = CURRENT TECHNIQUES FOR JOINING MATERIAL REQUIRE EXPENDITURE OF ENERGY AND JOINING MATERIALS.						
	SOLUTION = INVESTIGATE A PROCESS WHICH WILL BARE ADJOINING SURFACES AND LEAVE THEM IN A HIGHLY REACTIVE STATE WHICH WILL PROMOTE IMMEDIATE JOINING.						
(6021)	TITLE = COMPUTER SIMULATION OF PRODUCTION LINES				200	200	200
	PROBLEM = FACILITIZATION PLANNING FOR PRODUCING NEW VEHICLES IS COSTLY AND DOES NOT PROVIDE MEANS FOR SELECTING OPTIMUM FABRICATION PROCESSES.						
	SOLUTION = A COMPUTER SIMULATION OF THE PRODUCTION LINE WILL LAYOUT A COMPLETE FACTORY AND PERMIT SELECTION OF THE MOST EFFECTIVE PROCESSES EARLY IN PREPRODUCTION PHASE.						

		FUNDING ($000)				
	PRIOR	79	80	81	82	83
COMPONENT -- MISCELLANEOUS						
(5016) TITLE - IMPROVED HIGH STRENGTH ALUMINUM COMPONENTS BY MECH TREATMENT				350	200	250
PROBLEM - COMMERCIALLY AVAILABLE HIGH STRENGTH ALUMINUM ALLOYS NEED IMPROVEMENT IN DUCTILITY AND FRACTURE TOUGHNESS.						
SOLUTION - ESTABLISH PRODUCTION PROCESSES UTILIZING ADVANCES IN BOTH METAL SOLIDIFICATION AND THERMAL MECHANICAL WORKING OF ALUMINUM ALLOYS.						
(6014) TITLE - AUTOMATED PRODUCTION OF MULTIPLEXING NETWORKS FOR COMBAT VEH						400
PROBLEM - ADVANCED TECHNIQUES FOR ELECTRICAL POWER DISTRIBUTION AND VEHICLE CONTROL WILL USE ADVANCED MICROPRESSURES AND MULTIPLEXING AND INTRODUCE NEED FOR NEW ASSEMBLY TECHNIQUE.						
SOLUTION - COMPUTER AIDED DESIGN AND MANUFACTURING WILL BE APPLIED TO ASSEMBLY OF THE COMPLEX ELECTRONIC SYSTEMS.						
(6025) TITLE - MANUFACTURING LASER FACILITY				1080		
PROBLEM - THE FEASIBILITY OF USING LASERS FOR METAL PROCESSING IS ESTABLISHED. IMPLEMENTATION IS IMPEDED BY THE COST OF FACILITIZATION.						
SOLUTION - ESTABLISH A FACILITY TO IMPLEMENT LASER TECHNOLOGY IN PRODUCTION.						
(6029) TITLE - MANUFACTURING PROCESS FOR METAL MATRIX COMPOSITES				300	300	200
PROBLEM - METAL MATRIX COMPOSITES MAKE POSSIBLE COMPONENTS HAVING REDUCED WEIGHT AND INCREASED STRENGTH THE MANUFACTURING METHODS FOR PRODUCTION MUST BE DEVELOPED BY UPSCALING LAB METHODS.						
SOLUTION - UPSCALE AND OPTIMIZE MANUFACTURING METHODS.						

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* CATEGORY *
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*PROPULSION SYSTEM *
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COMPONENT -- ENGINE						
(5053) TITLE - MANUFACTURE OF ENGINE COMPONENTS OF CERAMIC				450	500	550
PROBLEM - ADVANCED ENGINES REQUIRE CERAMIC COMPONENTS IF THEY ARE TO OPERATE EFFICIENTLY THE METHODS OF MANUFACTURING COMPONENTS OF THESE COMPONENTS IN PRODUCTION ARE NOT AVAILABLE.						
SOLUTION - ESTABLISH PRODUCTION METHODS FOR MANUFACTURE OF CERAMIC ENGINE COMPONENTS.						

		FUNDING ($000)				
		PRIOR	79	80	81	82	83
COMPONENT	-- ENGINE (CONTINUED)						
(5071)	TITLE - PRODUCTION ENGINE SYSTEMS FOR COMBAT VEHICLES						1000
	PROBLEM - THE LACK OF AN AUTOMATED TECHNOLOGY BASE CONTRIBUTES TO HIGH COSTS AND LOWERED PERFORMANCE.						
	SOLUTION - INCORPORATE THE NEW TECHNOLOGY BASE ADAPTABLE TO THIS CLASS OF ARMY MATERIEL AND THE MAJOR COST DRIVER ELEMENTS.						
(5084)	TITLE - FABRICATION TECHNIQUES FOR PRODUCTION OF INTERGRAL CAST COMP	500			200		
	PROBLEM - ROTORS FOR COMBAT TURBINE ENGINES ARE EXPENSIVE, HIGH TEMPERATURE ALLOYS.						
	SOLUTION - ESTABLISH FABRICATION TECHNIQUES TO PRODUCE AN INTEGRAL METALLIC AND CERAMIC ROTOR.						
(5095)	TITLE - SEAM LOCATOR AND FOLLOWER FOR EB WELDED CYLINDER ASSEMBLIES				150	150	100
	PROBLEM - WELDING OF THE STEEL AND ALUMINUM PARTS FOR ENGINE CYLINDER ASSEMBLY IS PERFORMED MANUALLY.						
	SOLUTION - DEVELOP A SEAM LOCATOR AND FOLLOWER FOR AUTOMATED WELDING.						
(6008)	TITLE - AUTOMATED COMPUTER CONTROL LASER MACHINING						
	PROBLEM - CONVENTIONAL MEANS OF MACHINING HIGH ALLOY MATERIALS TO PRECISE DIMENSIONS IS TIME CONSUMING.						
	SOLUTION - LASER MACHINING WITH COMPUTER CONTROL WILL ALLOW RAPID REMOVAL OF DIFFICULT TO MACHINE MATERIALS WHILE MAINTAINING PRECISION.						
(6018)	TITLE - JOINING OF ATTACHMENTS ON CERAMICS					300	300
	PROBLEM - CURRENT METHOD OF JOINING METALS TO CERAMIC JOINTS ARE NOT RELIABLE AND HAVE POOR LIFE.						
	SOLUTION - INVESTIGATE USE OF JOINTS THAT ARE COMPLIANT OR USE INTERMEDIATE CONNECTING PHASE.						
(6019)	TITLE - GRAIN BOUNDARY IMPROVEMENT PROCESSING FOR CERAMICS					200	300
	PROBLEM - EFFECT OF HIGH TEMPERATURE ON CERAMICS GRAIN BOUNDARIES LIMIT THEIR APPLICATION.						
	SOLUTION - UPSCALE DEVELOPED TECHNIQUES FOR DEVELOPING A NONGLASS BOUNDARY OR ELIMINATE THE GRAIN BOUNDARY PHASE.						

		FUNDING ($000)					
		PRIOR	79	80	81	82	83
COMPONENT -- ENGINE (CONTINUED)							
(6020)	TITLE - PRODUCTION OF REINFORCED CERAMIC COMBUSTORS				400	300	300
	PROBLEM - TECHNIQUE FOR LARGE SCALE PRODUCTION OF COMBUSTORS NOT AVAILABLE. THESE COMBUSTORS IMPROVE ENGINE PERFORMANCE GREATLY.						
	SOLUTION - UPSCALE LABORATORY PROVEN TECHNIQUE FOR FABRICATING COMBUSTOR FOR PRODUCTION.						
(6028)	TITLE - PRODUCTION QUALITY CONTROL BY AUTO INSPECTION EQUIPMENT(CAM)			293			
	PROBLEM - THE INCREASED COMPLEXITY OF COMBAT VEHICLES HAS RESULTED IN EXCESSIVE TIME AND HIGH SKILL LEVEL REQUIREMENTS FOR INSPECTION AND TEST.						
	SOLUTION - DEVELOP AUTOMATED DIAGNOSTIC EQUIPMENT TO REDUCE TIME AND LOWER SKILL REQUIREMENTS. AUTOTESTING OF WIRING HARNESSES AND ENGINES WILL BE ACCOMPOLISHED. AUROMATION OF INSPECTION RECORDS WILL BE ACCOMPOLISHED.						
COMPONENT -- TRANSMISSION							
(4319)	TITLE - FORGE POWDERED METAL PREFORMS	375			150	150	150
	PROBLEM - HIGH COST RESULTS FROM MACHINING GEARS FROM FORGED GEAR BLANKS. METAL REMOVAL CAN ACCOUNT FOR AS MUCH AS 60 PER CENT OF THE COST OF THE FINISHED ITEM.						
	SOLUTION - ESTABLISH POWDER METAL FORGING TECHNIQUES WHICH WILL RESULT IN A GEAR MADE TO FINAL DIMENSIONS.						
(4573)	TITLE - HOT FORGED GEARS				225	200	200
	PROBLEM - HIGH COST RESULTS FROM MACHINING GEARS FROM FORGED GEAR BLANKS. METAL REMOVAL CAN ACCOUNT FOR AS MUCH AS 60 PER CENT OF THE COST OF THE FINISHED ITEM.						
	SOLUTION - ESTABLISH MANUFACTURING PROCESSES WHICH WOULD RESULT IN A FINISHED GEAR TO DRAWING TOLERANCES FROM BAR STOCK AT ELEVATED TEMPERATURES.						
(4583)	TITLE - ESR PROCESS FOR GEAR BLANK FORGINGS	150			200		
	PROBLEM - SERVICE LIFE OF HIGH STRESSED GEARS NEEDS TO BE IMPROVED FOR LOWER MAINTENANCE AND HIGHER PRODUCT ASSURANCE.						
	SOLUTION - DEVELOP FURTHER AND APPLY THE ELECTROSLAG REMELT PROCESS TO CRITICAL GEAR BLANKS.						
(5005)	TITLE - COLD FORGED GEARS TO DRAWING TOLERANCES					250	250
	PROBLEM - MACHINING AND OTHER PROCESSES ADD COST TO THE FINISHED COMPONENT.						
	SOLUTION - ESTABLISH A MFG PROCESS TO RESULT IN A FINISHED GEAR TO DRAWING TOLERANCES FROM BAR STOCK AT AMBIENT TEMPERATURES.						

		FUNDING ($000)					
		PRIOR	79	80	81	82	83
COMPONENT -- TRANSMISSION (CONTINUED)							
(5024)	TITLE - GEAR DIE DESIGN AND MFG UTILIZING COMPUTER TECHNOLOGY (CAM)	200	205			200	200
	PROBLEM - PROPER TOOTH PATTERN ON BEVEL GEARS MUST BE MADE BY TRIAL AND ERROR.						
	SOLUTION - USE CAM METHOD TO DECREASE NEED FOR REWORKING PRECISION GEAR FORGING DIES.						
(5073)	TITLE - PRODUCTION OF TRANSMISSIONS FOR COMBAT VEHICLES					500	1000
	PROBLEM - MANUFACTURING PROCESSES USED ARE LABOR INTENSIVE AND REFLECT ON HIGH MANUFACTURING COSTS.						
	SOLUTION - APPLY NEWLY AVAILABLE NET SHAPING PROCESSES.						
(5080)	TITLE - FAB METH FOR HIGH STRENGTH NEAR NET SHAPE AL TRANS CASES	200	125	150	200		200
	PROBLEM - TRANS CASES ARE BULKY AND NEED COMPLEX FABRICATION AND MACHINING.						
	SOLUTION - EST PROCESSES TO FAB CASES TO NET SHAPE USING HIGH STRENGTH LIGHT WEIGHT ALLOYS.						
(5081)	TITLE - FABRICATE FRICTION RIGHS AND REACTION PLATES		215	210			
	PROBLEM - FAB OF FRICTION RINGS AND REACTION PLATES RESULTS IN LARGE AMOUNTS OF SCRAP MATERIAL THUS CONTRIBUTING TO HIGH COST.						
	SOLUTION - ESTABLISH TECHNIQUES TO REDUCE SCRAP BY FABRICATING METHODS USING SPIRAL PROCESS TECHNIQUES.						
(5083)	TITLE - UPSCALING OF ADVANCED POWDER METALLURGY PROCESSES	500	175		200	200	
	PROBLEM - POWDER METALS PROCESSES HAVE NOT BEEN UTILIZED IN LARGE COMPONENTS						
	SOLUTION - EST PROCESSES WHICH PRODUCE HIGH DENSITY HIGH STRENGTH LARGE COMPLEX SHAPES.						
(5086)	TITLE - SURFACE HARDENING AND ALLOYING OF TRANS SYSTEMS WITH LASERS				225	200	200
	PROBLEM - TRANS COMP HEAT TREATED BY CARB AND OR INDUCTION TAKES LONG TIME AND HIGH ENERGY DIFFICULT TO CONTROL PARAMETERS.						
	SOLUTION - ESTABLISH TECH USING LASER BEAM OR PRECISE CONTROL OF HEAT TREAT PARAMETERS.						
(5092)	TITLE - RHEOCAST PRESSURE CASTING FOR COMBAT VEHICLE PARTS				225	200	200
	PROBLEM - PRESSURE CASTING UTILIZING INTERNAL REINFORCEMENTS HAVE NOT BEEN DEVELOPED.						
	SOLUTION - PRODUCTION TECHNIQUES WILL BE DEVELOPED TO PRODUCE CASTINGS OF NEAR NET SHAPE WITH REINFORCEMENTS.						

		FUNDING ($000)				
	PRIOR	79	80	81	82	83
COMPONENT -- WHEELS						
(4559) TITLE - PRESSURE CASTING TECHNIQUES FOR ALUMINUM COMPONENTS					200	200
PROBLEM - ALUMINUM CASTINGS REQUIRE GATINGS AND RISERS WHICH UTILIZE LARGE AMOUNTS OF MATERIAL WHICH HAVE TO BE REMOVED FROM THE CASTINGS AND USED AS SCRAP REMELT. THIS CONTRIBUTES TO INCREASED COSTS OF COST ITEMS.						
SOLUTION - ESTABLISH MANUFACTURING PROCESSES UTILIZING LOW PRESSURE CASTING TECHNIQUES, THEREBY ELIMINATING THE NEED FOR EXCESS GATING AND TOTALLY ELIMINATING RISERS.						
(5007) TITLE - ADVANCED TECHNOLOGY BRAKE LINING MATERIALS		190	190			
PROBLEM - BRAKE LINING MATERIALS ARE SUBJECT TO THERMAL SHOCK AND MECHANICAL WEAR AND MUST HAVE GOOD DAMPENING CAPACITY. THIS IS DIFFICULT TO ACHIEVE. WEAR SYSTEMS ARE SACRIFICED. CONTAMINATION BY FOREIGN SUBSTANCES CAUSES BRAKE FAILURE.						
SOLUTION - VARIABLE DENSITY POWDERED MATERIAL COMPACTS CAN IMPROVE WEAR RESISTANCE WITHOUT LOSS OF IMPORTANT MATERIAL CHARACTERISTICS. TAILOR-MADE COMPOSITES WILL ELIMINATE THE NEED OF A CLOSED BRAKE SYSTEM.						
(5037) TITLE - FAB TECH FOR FIBER REINF LAMINATED PLASTIC ROADWHEELS				250	200	200
PROBLEM - METALLIC WHEELS ARE SUBJECT TO CORROSION HAVE DIFFICULTY IN FORMING AND ARE HEAVY.						
SOLUTION - DEVELOP PROCESSING TECHNIQUES FOR FABRICATED HIGH STRENGTH LIGHTWEIGHT REINFORCED PLASTIC WHEELS.						
(5038) TITLE - NON-PNEUMATIC COMBAT TIRE FABRICATION TECHNIQUES				200	200	200
PROBLEM - PNEUMATIC TIRES ON TACTICAL VEHICLES ARE SUBJECT TO COMBAT DAMAGE.						
SOLUTION - ESTABLISH PROCESSING TECHNIQUES TO ASSURE RELIABLE HIGH MOBILITY, NON-PNEUMATIC TIRES.						

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* CATEGORY *
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*TRACK *
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COMPONENT -- GENERAL						
(5043) TITLE - FABRICATION TECHNIQUES FOR NON METALLIC TRACK				250	250	200
PROBLEM - CURRENT METALLIC TRACK CONTRIBUTES A LARGE PERCENTAGE OF TOTAL VEHICLE WEIGHT.						
SOLUTION - INVESTIGATE FABRICATION FEASIBILITY TO BUILD AN ALL PLASTIC COMBAT VEHICLE TRACK.						

		FUNDING ($000)					
		PRIOR	79	80	81	82	83
COMPONENT -- GENERAL (CONTINUED)							
(5075)	TITLE - RUBBER FOR MILITARY TRACK	200		200	200	200	
	PROBLEM - TRACK LIFE IS HELD AT ITS PRESENT LEVEL BY FAILURE OF RUBBER COMPONENTS SUCH AS BUSHINGS, PADS AND BLOCKS.						
	SOLUTION - ESTABLISH PRODUCTION PROCESSES FOR NEWLY DEVELOPED ELASTOMER COMPOUNDS FOR TRACKS.						
(5089)	TITLE - INJECTION MOULTING RUBBER FOR IMPROVED TRACK BUSHINGS	200			200	200	200
	PROBLEM - TRACK BUSHINGS ARE SUBJECTED TO HIGH LOADS AND STRESSES WHOSE FAILURE RESULTS IN TRACK FAILURE.						
	SOLUTION - ESTABLISH PROCESS TO ASSURE BUSHING RUBBER WITH THE CORRECT PHYSICAL CONSISTENCIES TO PERFORM SATISFACTORILY.						
(6013)	TITLE - FILAMENT WOUND TRACK AND DRIVE						225
	PROBLEM - PRESENT TRACK AND DRIVE SYSTEMS ARE LIMITED IN LIFE DUE TO FATIGUE OR WEAR CAUSED BY MASS INERTIA OF COMPONENT PARTS.						
	SOLUTION - DEVELOP PROCESSING TECHNIQUES TO FABRICATE COMPLEX TRACK AND DRIVE COMPONENTS FROM FILAMENT ORIENTED FIBERS TO REDUCE WEIGHT AND IMPROVE WEAR.						
(6016)	TITLE - FABRICATION TECHNIQUES FOR REINFORCED METAL MATRIX COMPONENT						400
	PROBLEM - METAL MATRIX FABRICATION TECHNIQUES ARE REQUIRED WHICH WILL PROVIDE THE OPTIMUM METAL AND REINFORCEMENT RELATIONSHIPS.						
	SOLUTION - UPSCALE LABORATORY TECHNIQUE FOR MIXING ORIENTING AND INTEGRATING REINFORCING MATERIAL FOR LARGE COMPLEX PARTS.						
COMPONENT -- RUBBER PADS							
(4264)	TITLE - INSERTS AND FRICTION FILLERS FOR TRACK RUBBER PADS			125	200		
	PROBLEM - TRACK PADS CUT AND CHUNK IN ROCKY OR FROZEN GROUND RESULTING IN REDUCED PAD LIFE AND INCREASED COSTS AND MAINTENANCE.						
	SOLUTION - ESTABLISH PROCESS TO INCORPORATE FILLER FRICTION MATERIALS IN EXISTING FORMULATIONS WHICH WILL REDUCE CUTTING AND CHUNCKING.						
(4270)	TITLE - CAST IN PLACE TRACK SHOE BACKING INSERTS				200		
	PROBLEM - TRACK COSTS ARE ESCALATED BY EXCESSIVE METAL SHIPPING HANDLING AND CAPITAL EQUIPMENT FOR MOLDING RUBBER.						
	SOLUTION - ESTABLISH PROCESSES AND RECIPE MODIFICATIONS REQUIRED TO PROVIDE A REMOTE RUBBERIZING SYSTEM.						

(CONTINUED)

	PRIOR	FUNDING ($000) 79	80	81	82	83
COMPONENT -- RUBBER PADS						
(6371) TITLE - FABRICATION TECHNIQUES FOR TRACK ELASTOMERIC COMPOUNDS	225			225		
PROBLEM - TRACK FAILURES ARE CAUSED, TO A LARGE DEGREE, BY DEGRADATION OF ITS RUBBER COMPONENTS.						
SOLUTION - INVESTIGATE NEWLY DEVELOPED MATERIALS AND PROCESSING FOR APPLICATION TO PRODUCTION TRACKS.				250	200	200
(5041) TITLE - MFR TECH FOR LONG LIFE PLASTIC TRACK SHOE PADS						
PROBLEM - CURRENT RUBBER PADS HAVE RELATIVELY SHORT LIFE.						
SOLUTION - ESTABLISH A PROCESS FOR A LAMINATED FIBER REINFORCED PLASTIC TRACK SHOE PAD.	250			100	100	100
(5087) TITLE - IMPR PROD TECH FOR MOLDING IMPROVED RUBBER PADS						
PROBLEM - RUBBER PARTS REPRESENT HIGH COST ITEM WHICH REQUIRE UTILIZING A NEW FORMULATION TO INCREASE LIFE.						
SOLUTION - ESTABLISH PROCESSING TECHNIQUES FOR NEW RUBBER COMPOUNDS.			200	150		
COMPONENT -- SHOES						
(5006) TITLE - PRODUCTION OF LIGHTWEIGHT STEEL CAST TRACK SHOES						
PROBLEM - THE MOST COSTLY ITEM TO MAINTAIN PER MILE OF TRACKED VEHICLE OPERATION IS THE TRACK.						
SOLUTION - PRODUCT CAST TRACK SHOES WHICH WILL INCREASE LIFE OVER PRESENT SHOES.				200	200	150
COMPONENT -- TREADS						
(6514) TITLE - PRODUCTION OF HARD FACE COATINGS						
PROBLEM - PRESENT HARD FACE COATINGS DO NOT HAVE ADEQUATE BOND STRENGTH.						
SOLUTION - INVESTIGATE APPLICATION OF DIFFUSION BONDING TECHNIQUE.			175	175	200	
(5054) TITLE - LASER SURFACE HARDENING COMBAT VEHICLE COMPONENTS						
PROBLEM - PRESENT METHODS OF SURFACE HARDENING INPUTS HEAT OVER LARGE SURFACE AREA.						
SOLUTION - ESTABLISH LASER BEAM HARDENING PROCEDURES WITH ITS ATTENDANT FINE BEAM SMALL AREAS RAPID HEATING.						

	FUNDING ($000)				
	PRIOR	79	80	81	82	83
COMPONENT -- WEDGES						
(45131 TITLE = HIGH DENSITY POWDER METAL PARTS FOR COMBAT VEHICLES					300	250

PROBLEM = TRACK WEDGES WEAR EXCESSIVELY REQUIRING THE TRACK TO BE ADJUSTED AND/OR THE WEDGES REPLACED FREQUENTLY.

SOLUTION = FABRICATE THE WEDGE BY COMPACTING A HIGH MANGANESE WORK HARDENABLE POWDER.

TEST & EVALUATION COMMAND

CATEGORY	TESTING
Testing	211

US ARMY TEST AND EVALUATION COMMAND

(TECOM)

TECOM, with headquarters at Aberdeen Proving Ground, MD, is the primary developmental testing agency for the US Army. TECOM plans, conducts, and reports on development tests performed during the life cycle of Army materiel, and evaluates foreign materiel for possible US acquisition. Additional testing is performed as a service to the commodity commands upon their request. The testing organization consists of the aircraft development test activity, three environmental testing activities, five proving grounds (one of which serves as the third testing activity), and a national missile range. Facilities are located in the continental United States, the Panama Canal Zone and Alaska.

Individual investigations into production test procedures and evaluation techniques are accomplished through TECOM's MMT program. In view of TECOM's mission and the intended results of the MMT efforts (to improve test procedures), the majority of the work is accomplished in-house.

TECOM's MMT efforts are grouped under three general headings: documentation, resource conservation, and improvement of test capability. Individual efforts are funded from these "parent programs". Current funding constrains TECOM to an annual program that supports approximately one-half of their planned efforts.

TECOM

COMMAND FUNDING SUMMARY
(THOUSANDS)

CATEGORY	FY79	FY80	FY81	FY82	FY83
TESTING	881	822	1000	1100	1300
TOTAL	881	822	1000	1100	1300

CATEGORY	FUNDING ($000)					
TESTING	PRIOR	79	80	81	82	83
COMPONENT -- DOCUMENTATION						
(5071) TITLE - TECOM PRODUCTION TEST METHODOLOGY ENGINEERING MEASURES	344	353	325	350	400	500
PROBLEM - STANDARD TEST PROCEDURES ARE REQUIRED TO INSURE THAT TEST ACTIVITIES COLLECT DATA AND CONDUCT TESTS IN A UNIFORM MANNER TO SUPPORT THE DT EVALUATION PROCESS. ACCEPTANCE TEST PROCEDURES ARE REQUIRED TO VERIFY PRN HARDWARE SPECIFICATION COMPLIANCE.						
SOLUTION - MAINTAIN TEST OPERATIONS PROCEDURES AND ACCEPTANCE TEST PROCEDURES TO TEST SYSTEMS FOR SPECIFICATION COMPLIANCE.						
COMPONENT -- RESOURCE CONSERVATION						
(5071) TITLE - TECOM PRODUCTION TEST METHODOLOGY ENGINEERING MEAS	282	513	305	400	425	500
PROBLEM - ARTILLERY, VEHICLE AND ELECTRONIC CONVENTIONAL TEST CAPABILITIES NEED TO BE UPGRADED TO PROVIDE MORE TIMELY ACCURATE TEST DATA FOR THE TEST AND EVALUATION PROCESS.						
SOLUTION - DEVELOP A PROGRAM TO UPGRADE CONVENTIAL TEST CAPABILITIES AT THE TEST ACTIVITIES.						
(5071) TITLE - TECOM PRODUCTION TEST METHODOLOGY ENGINEERING MEASURES	49	15	192	250	275	300
PROBLEM - FIELD TESTING COMPLEX WEAPON SYSTEMS IS COST PROHIBITIVE. SIM TECHNIQUES MUST BE DEVELOPED TO REDUCE THE COST AND MANPOWER REQUIRED TO PERFORM GOVT TESTS ROUTINE. PDN TEST PROCESSES MUST BE AUTOMATED BECAUSE OF PERSONNEL REDUCTIONS AT TEST ACTIVITIES						
SOLUTION - DEVELOP SIMULATION TECHNIQUES TO TEST COMPLEX WEAPON SYSTEMS AND AUTOMATE PRODUCTION TEST PROCESSES.						

APPENDICES

INDUSTRY GUIDE

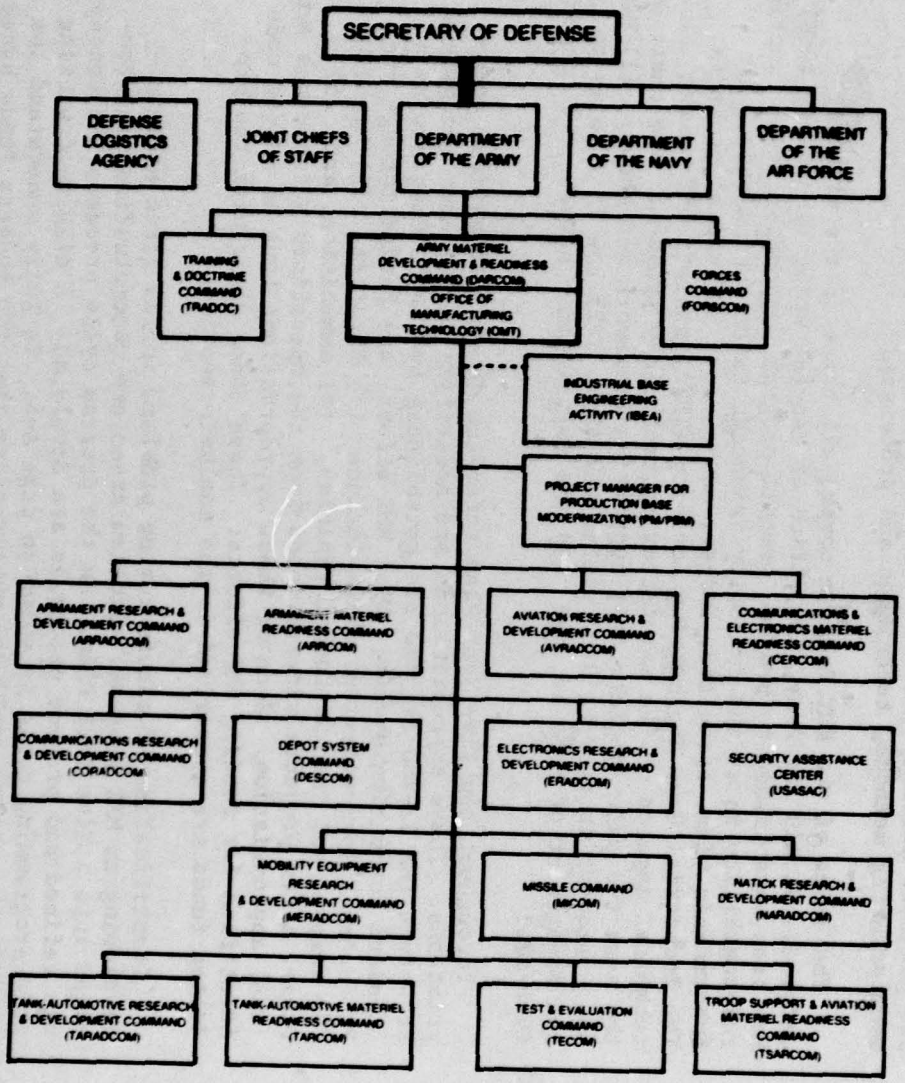
This section of the Five Year Plan was added to explain the Army programming cycle for the MMT Program. The objective of the MMT Program is to develop new manufacturing methods and processes that will reduce the cost of producing weapon systems. The program is made up of over 300 projects annually that concentrate on improving and/or developing manufacturing methods, techniques and processes.

The scope of the MMT Program covers all three of the military services. Within the Army, the Office of Manufacturing Technology (OMT), has been established to provide overall program responsibility. Functional responsibility is at the commodity oriented, Major Subcommands. The Subcommands plan, formulate, budget, and execute individual projects. The Industrial Base Engineering Activity (IBEA) assists OMT on the technical aspects of the manufacturing technology program. The chart on the next two pages depicts this supporting framework and shows; (1) how the framework is interrelated within the Army, (2) how it relates to the Department of Defense, and (3) the relationship between the commodity commands.

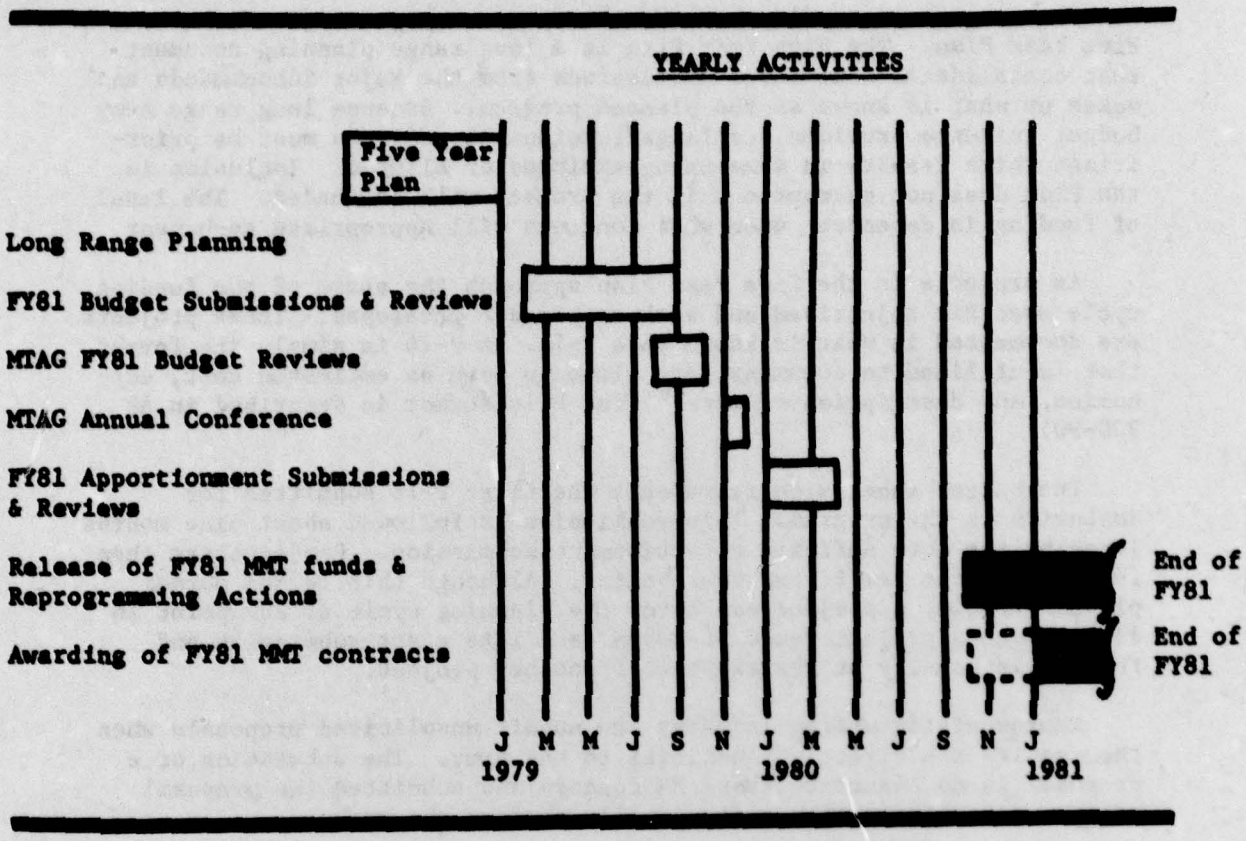
Throughout the Five Year Plan reference is made to various appropriations. These appropriations are identified in the Army Management Structure (AR 37-100-FY) and are established by the US Congress as a standard accounting system. Most MMT efforts are funded through the Procurement Appropriations which include (1) Aircraft, (2) Missile, (3) Weapons and Tracked Combat Vehicles, (4) Ammunition, and (5) Other. A few projects receive funds from the Operations Maintenance Army (OMA) appropriation. Each of these appropriations have an unique code identified for funding MMT efforts. These codes along with the projected funds are summarized in the analysis section.

Identification of manufacturing problems is the first step in developing an MMT Program. Problem areas are conceptualized and compiled into a Five Year Plan. As the program cycle proceeds the concepts are refined and project proposals are developed. A diagram depicting this programming cycle is shown on page A-4. To fully understand the entire programming cycle one must realize that DOD budgets funds based upon a Fiscal Year. The FY starts on 1 October and ends the last day of the following September. For example, on 1 October 1979, the Army will begin the first quarter of FY80.

UNITED STATES ARMY MATERIEL DEVELOPMENT & READINESS COMMAND (DARCOM)



MMT Planning/Budgeting/Review Cycle
(Example for a FY81 Project)



This chart depicts the various activities and stages that MMT projects go through. Concepts are first identified in the five year plan according to the projected year funding is expected. Each year these concepts are reevaluated and move forward until they reach the budget phase. At that time the concept is further refined and a project prepared. Industry has the opportunity to participate during the annual MTAG conference. At this gathering the current program, the latest budget project and the five year plan are discussed. Approximately one year later, the Apportionment reviews are completed. Actual funding starts in October 1980 which is the beginning of FY81.

The programming cycle shown on the previous page starts with the Five Year Plan. The Five Year Plan is a long range planning document that consolidates individual submissions from the Major Subcommands and makes up what is known as the planned program. Because long range Army budget guidance provides "ceilings", potential projects must be prioritized which results in some being excluded or slipped. Inclusion in the Plan does not guarantee that the project will be funded. The level of funding is dependent upon what Congress will appropriate each year.

As projects in the Five Year Plan approach the start of the funding cycle specific objectives and work scopes are developed. These projects are documented in what is known as a P-16. A P-16 is simply the format that is utilized to document data elements such as estimated cost, economics, and description of work. (The P-16 format is described in AR 700-90).

The budget submission represents the first P-16 submitted for inclusion in the program. This submission is followed about nine months later by the more definite apportionment submission. Projects are then funded when the new fiscal year begins. Although this is the normal planning cycle, a project can enter the planning cycle at any point in time. Such a project would be known as a late start submission and funding is usually at the expense of another project.

Representatives from industry can submit unsolicited proposals when the results are directly beneficial to the Army. The submission of a proposal is no assurance that the concern who submitted the proposal will be given the contract to actually perform the work.

Criteria for actually funding individual projects include technical, operational, and economical feasibility. The potential for technical success, the means by which the results will be implemented, the potential payback or return on investment and the interrelationships that exist between factors are all evaluated.

For a more comprehensive understanding of the MMT program, the following list of documents are provided for reference:

DOD Instruction 4200.15, Manufacturing Technology Program

AR 700-90, The Army Industrial Preparedness Program

AR 37-100, The Army Management Structure

AR 11-28, Economic Analysis and Program Evaluation for Resources Management

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Cdr, DARCOM, Attn: DRCDE
Cdr, DARCOM, Attn: DRCMT (20 cys)
Chf, Office of Project Management, Attn: DRCPM-PBM-P (5 cys)

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PM, Advanced Attack Helicopter, Attn: DRCPM-AAH (AVRADCOM)
PM, Armored Combat Vehicle Technology (ACVT), Attn: DRCPM-CVT (TARADCOM)
PM, Blackhawk, Attn: DRCPM-BH (AVRADCOM)
PM, CHAPARRAL/FAAR, Attn: DRCPM-CF (MICOM)
PM, General Support Rocket System, Attn: DRCPM-RS (MICOM)
PM, HAWK, Attn: DRCPM-HA (MICOM)
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PM, XM-1 Tank System, Attn: DRCPM-GCM (TARADCOM)

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Cdr, Navajo Army Depot Activity, Attn: DRXTE-N
Cdr, Pueblo Army Depot Activity, Attn: DRXPU

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Cdr, Savanna Army Depot Activity, Attn: DRSAC
Cdr, Umatilla Army Depot Activity, Attn: DRXTE-UM
Cdr, Fort Wingate Army Depot Activity, Attn: DRXFW

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