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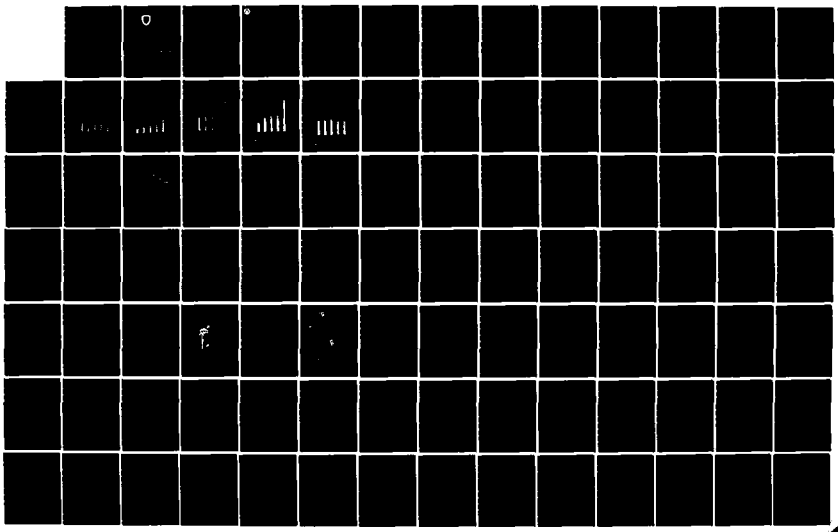

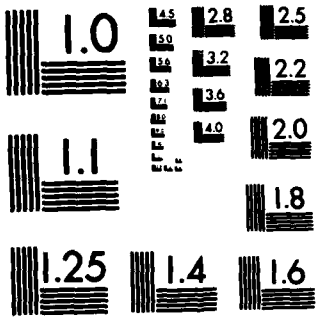

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U S ARMY MATERIEL COMMAND

MANUFACTURING METHODS & TECHNOLOGY

PROGRAM PLAN

CY 1984

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SEPTEMBER 1984

MANUFACTURING TECHNOLOGY DIVISION
U S ARMY INDUSTRIAL BASE ENGINEERING ACTIVITY
ROCK ISLAND, ILLINOIS 61299-7260

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This document briefly summarizes the technical work being executed or planned in the MMT Program for fiscal years 84 through 88.

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

AMCMT

19 OCT 1984

SUBJECT: 1984 AMC MMT Program Plan

SEE DISTRIBUTION (Appendix C)

1. Reference AR 700-90, Army Industrial Preparedness Program, para 3-4i(1), dated 15 March 1982.

2. This planning document, developed in accordance with the referenced regulation, describes the Army Materiel Command (AMC) Manufacturing Methods and Technology (MMT) Program for the period FY 84-88. This plan was completed by amending the 1983 Program Plan to take into account both programming actions which have occurred over the past year (i.e., FY 84 approvals, FY 85 apportionment submission, and FY 86 budget submission) and other command inputs reflecting FY 87 and 88 thrusts.

3. Because of the dynamic nature of military material requirements and the constant change 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 AMC community.

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

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MMT Program Plan

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FOREWORD

This document presents information for the AMC Manufacturing Methods and Technology (MMT) Program for Fiscal Years 1984-1988. 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, AMC and its sub-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.

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I. INTRODUCTION

The MMT Program Plan

The MMT Program Plan, CY 1984, provides within a single source a summary of current and near-term efforts included in the Army Materiel Command (AMC) 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 AMC's resources will be directed and the magnitude of the Army's commitment to this program.

Organization of the MMT Program Plan

This document contains a "Command Plan" for each AMC major subordinate command or other AMC activity that sponsors MMT projects during the fiscal years 1984-88 (FY 84-88). Each plan is introduced by a command summary that describes organizational responsibilities and major areas of technological endeavor. Following this summary is a list of all projects under the command's sponsorship. Projects are grouped according to broad "Categories" and then arranged into subgroups by "Components." The category/component descriptors are product related although a few describe manufacturing processes. Individual projects are identified by the four digit project number and title. Project information includes: a brief description of the manufacturing problem addressed by the project; the proposed solution; and, the proposed funding requirements.

In December 1983, questionnaires were distributed to the 600 industry recipients of the 1983 MMT Program Plan. This endeavor to solicit a frank reaction to the Plan had dual purposes. First, it measured the general effectiveness of the 1983 edition. Second, it identified industry's requirements for information. Over 200 questionnaires were returned and most of them contained suggestions for improving the Plan. The response prompted a reorganization of this year's edition and the expansion of the "Industry Guide." The industry feedback was appreciated. The criticisms were constructive in nature; and, many laudatory remarks indicated the Plan's value to potential contractors.

The MMT Program

The Manufacturing Methods and Technology (MMT) Program serves the US Army Materiel Command 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, the emphasis is also directed toward efforts reducing air and water pollution, increasing safety, conserving energy, reducing dependency on critical material, improving producibility and increasing productivity.

Need for MMT

The MMT Program is a major DOD tool for improving productivity and reducing end product and spare parts costs. Although the United States still leads in productivity, countries such as Japan and West Germany are rapidly closing the gap. With the real dollars available for defense production shrinking, the Army must achieve productivity growth to get more for each dollar invested. The following excepts illustrate the emphasis being given to the MMT Program.

Excerpt from the "Report of the Secretary of Defense Caspar W. Weinberger to the Congress," dated 1 February 1984:

> "The Manufacturing Technology Program is a broad-based program to improve the productivity and responsiveness of the defense industrial base by investing in advanced technologies for the production of DOD materiel. This program has been in existence for over 20 years, and we intend to continue to give it priority attention because of its demonstrated high-payoff record and its ability to improve industrial productivity on a broad national basis."

Excerpt from "The FY 85 Department of Defense Program for Research, Development and Acquisition" by Richard D. DeLauer, Under Secretary of Defense for Research and Engineering to the 98th Congress, Second Session, 1984:

> "This program will continue to receive priority attention because of its demonstrated high-payoff record in establishing new "factory floor" manufacturing processes which reduce lead times and their attendant costs and improve productivity on a very broad national base. Recent accomplishments include: (a) a new process to manufacture high purity Gallium Arsenide material used in integrated circuits in guidance control systems for several missile systems. Actual savings to date are $4.8 Million after an investment of $528 Thousand. Additional savings are expected to be another $6.6 Million; (b) a new process of electronically inspecting aircraft fastener holes is ten times faster than manual methods and is expected to provide $20 Million in savings on the C-5 wing modification alone."

Excerpts from a statement by Ms. Mary Ann Gilleece, Deputy Under Secretary of Defense for Acquisition Management, Office of the Under Secretary of Defense for Research and Engineering before the Subcommittee on Seapower and Strategic and Critical Materials of the Committee on Armed Services, House of Representatives, 8 March 1984:

> "....MANTECH projects are expected to result in a first case, "factory floor" application of productivity enhancing technologies. The investments are viewed as "seed money" necessary to reduce the technical and fiscal risk of follow-on implementation. They actually demonstrate that the technology is effective and should be considered by others throughout the industrial base. Investments which simply result in a report which may or may not be used are discouraged. This strategy has paid off over the years. Estimates of MANTECH payoff vary from 3:1 to 5:1 depending on the basis of the estimate.
>
> "Most MANTECH projects are executed by the private sector. The exceptions occur mainly in such areas as ammunition or large caliber weapons where the DOD owns the industrial base....
>
> "MANTECH has been predominantly funded from 12 separate procurement accounts for about 20 years. However, during the review of the FY 84 budget, the Congress provided guidance that the program should be funded from RDT&E appropriation. DOD disagreed with this view because MANTECH investments provide technology which is used on the "factory floor" and therefore, ultimately supports the procurement budget. There is no doubt in our minds that the individuals and organizations in DOD's production infrastructure are best able to identify, justify and manage MANTECH investments. They know where and how industrial productivity can and should be improved. We believe it is logically inconsistent to require them to use RDT&E funds and RDT&E administrative procedures to spend those funds for MANTECH investments when the rest of our industrial base investments are funded from the procurement appropriations."

While the program continues to receive strong support from top executives within DOD, recent actions by Congress have not been so favorable. The Army's FY 83 MMT budget request for procurement funding was deleted by the House Committee on Appropriations. The Army program was administratively transferred to the RDT&E appropriation where about half of the FY 83 money, $50 million, was eventually restored. The Navy and Air Force were not affected. A year later, Army again included most of its FY 84 request in the procurement budget; and, once again the committee rejected this approach. As a result, Army's FY 84 MMT Program as well as those sponsored by the other Services were funded from RDT&E. The FY 85 budget requests from all Services were submitted in the RDT&E appropriations to avoid the risk of losing the program entirely. It appears that future programs will continue to be a part of RDT&E. The House committee did grant special protection to FY 84 MMT funds so they could not be used for other purposes. The committee declared the MMT Program to be "of special interest" and no appropriated funds may be reprogrammed without prior approval.

The money saving and productivity enhancing aspects of the MMT Program have been under Congressional scrutiny for years. Congress' General Accounting Office (GAO) in its most recent audit, observes that DOD has taken positive steps toward improving its management of the program; however, only a limited number of these improvements have been fully achieved. They point to the imprecise methods used in accounting for financial benefits as a major weakness. They concluded that the three Services continue to have trouble assuring the implementation of successful projects into contractor and government facilities. In addition, well documented cost savings for implemented projects have been difficult to obtain. This difficulty is most apparent when the implementing facility has not been contractually required to report productivity and cost differences brought about by the new manufacturing method. Although the Army has developed a program control automated information system which includes a module to track and document the results of implementation, the House committee expects the establishment of well defined, uniform, tri-Service systems to manage the program.

II. PLANNED FUNDING

MMT Summary

Expenditures planned by the AMC Major Subordinate Commands approach $486 million during the five year period. Starting at approximately $73 million in FY 84, the planned annual funding level more than doubles at the end of the period.

The Army MMT Program is controlled by a standard accounting system which contains five different appropriations. In some cases, several of the commands share an appropriation. For example, the Weapons and Tracked Vehicles appropriation is used by three commands: AMCCOM, DESCOM, AND TACOM. The distribution of the appropriations among commands is shown on the following table. The level of planned expenditures within each appropriation is illustrated by the second table. The series of bar charts illustrate the tabular funding data graphically. These charts also compare the planned expenditures with the funding limits prescribed for the AMC "summer reviews" of the RDT&E Budget estimates and Apportionment requests.

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

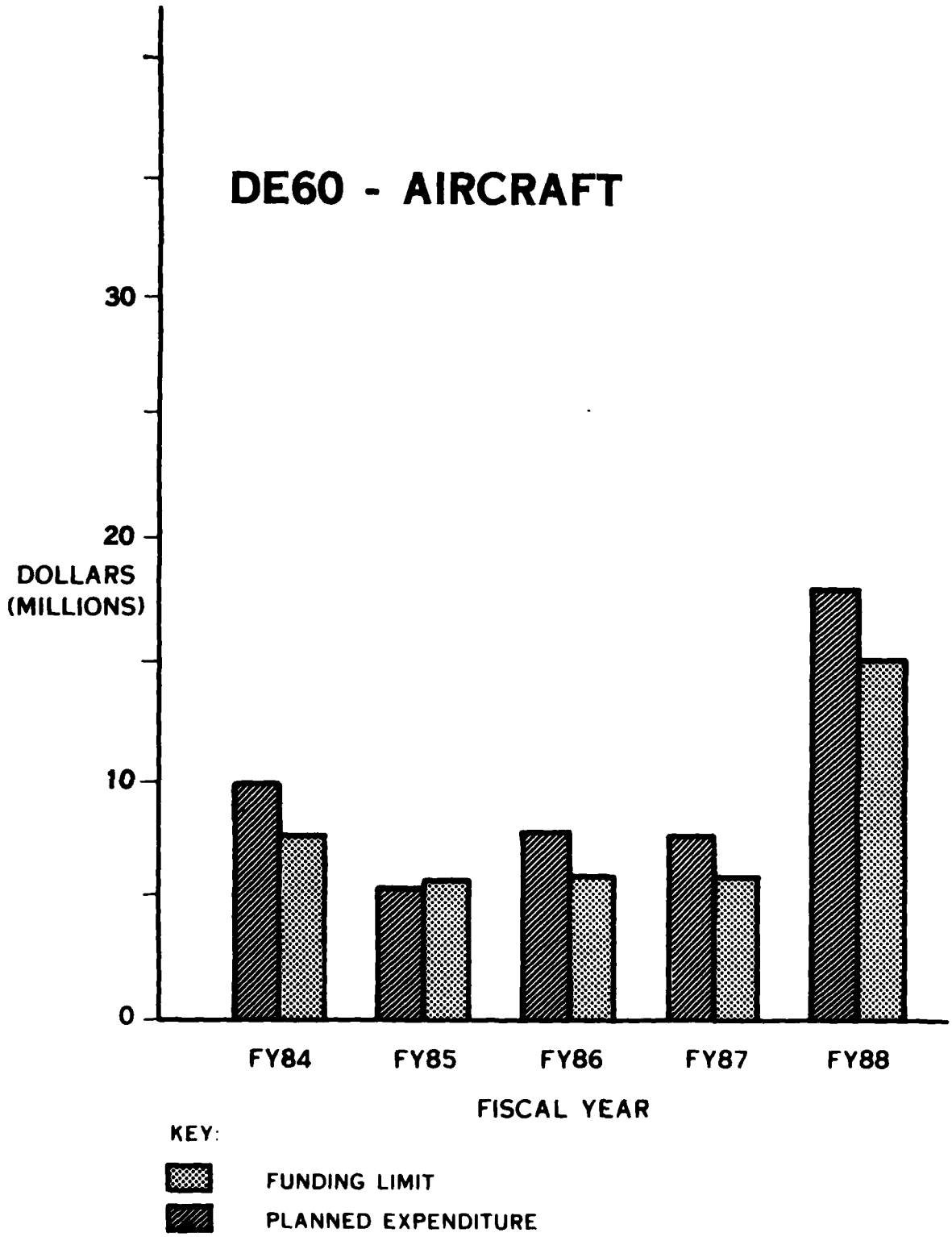
Command	Project Area	Project Code	FY 84	FY 85	FY 86	FY 87	FY 88
AMCCOM	Ammunition	DE63	18044	27128	29306	31303	58462
	Weapons	DE62	8981	7066	7267	10277	19589
	Other	DE64	5879	4881	8497	8783	7880
AVSCOM	Aircraft	DE60	9875	5625	6139	6748	18296
CECOM	Other	DE64	1602	2090	1807	1250	7455
DESCOM	Tracked Combat Vehicles	DE62	2500	2858	3029	200	1550
	Other	DE64	370	730	2596	200	0
	Aircraft	DE60	0	0	1950	1150	0
	Ammunition	DE63	0	0	470	245	0
ERADCOM	Other	DE64	9151	9025	4414	4526	0
AMMRC/AMC	Other	DE64	4437	5750	5500	6000	6500
MICOM/TMDE	Missiles	DE61	4025	6315	6950	9025	17200
	Other	DE64	1000	900	1000	0	0
TACOM	Tracked Combat Vehicles	DE62	1776	3644	2975	6075	12705
	Other	DE64	3470	2375	2300	144	350
TECOM	Other	DE64	1000	1100	1200	1300	1400
TROSCOM	Other	DE64	1158	1284	2310	3240	2040
		TOTAL	73,268	80,771	87,710	90,466	153,427

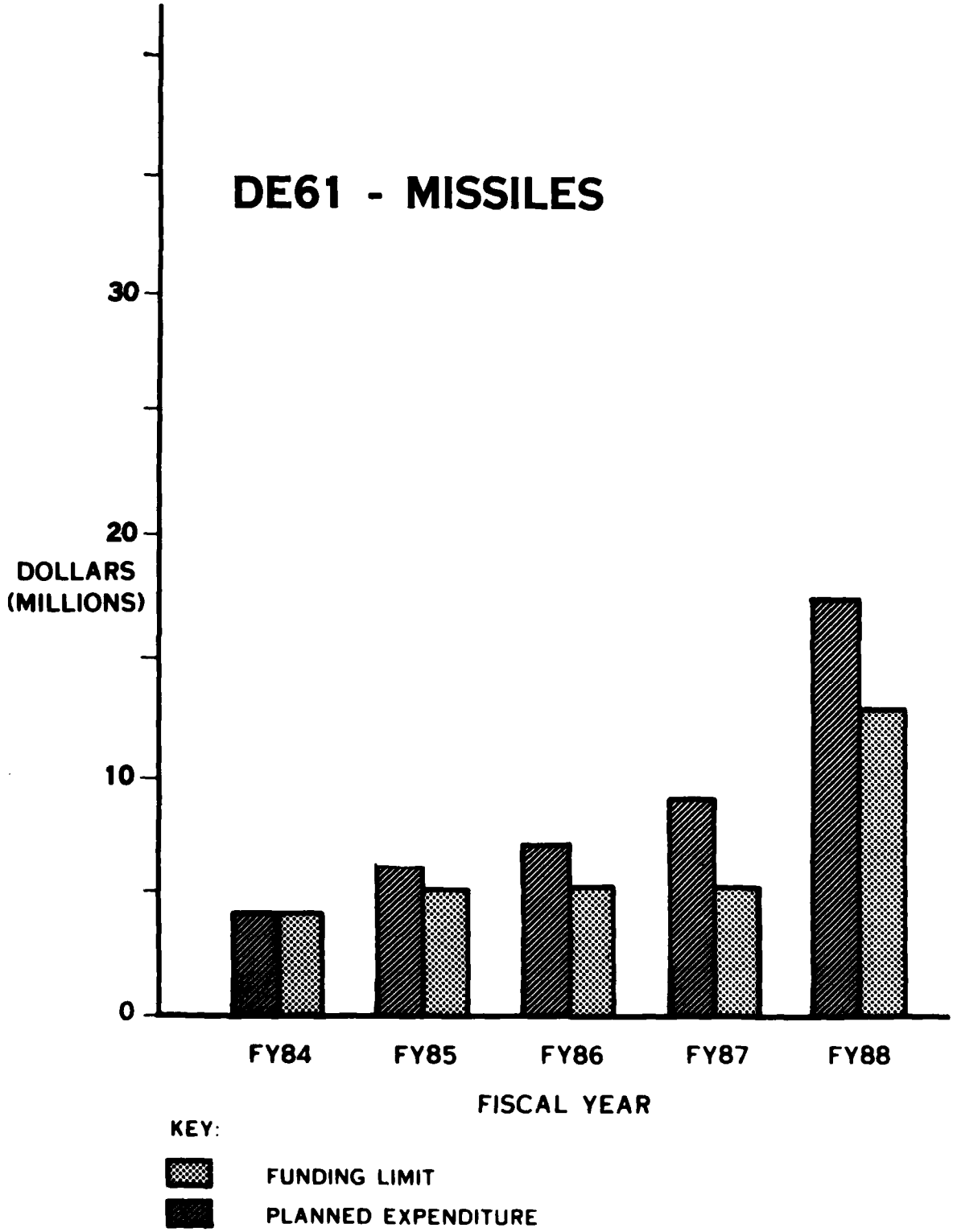
This table shows the planned expenditures for each fiscal year in the planning period. The "Command" column identifies the AMC Major Subordinate Commands and Activities which participate in the MMT Program.

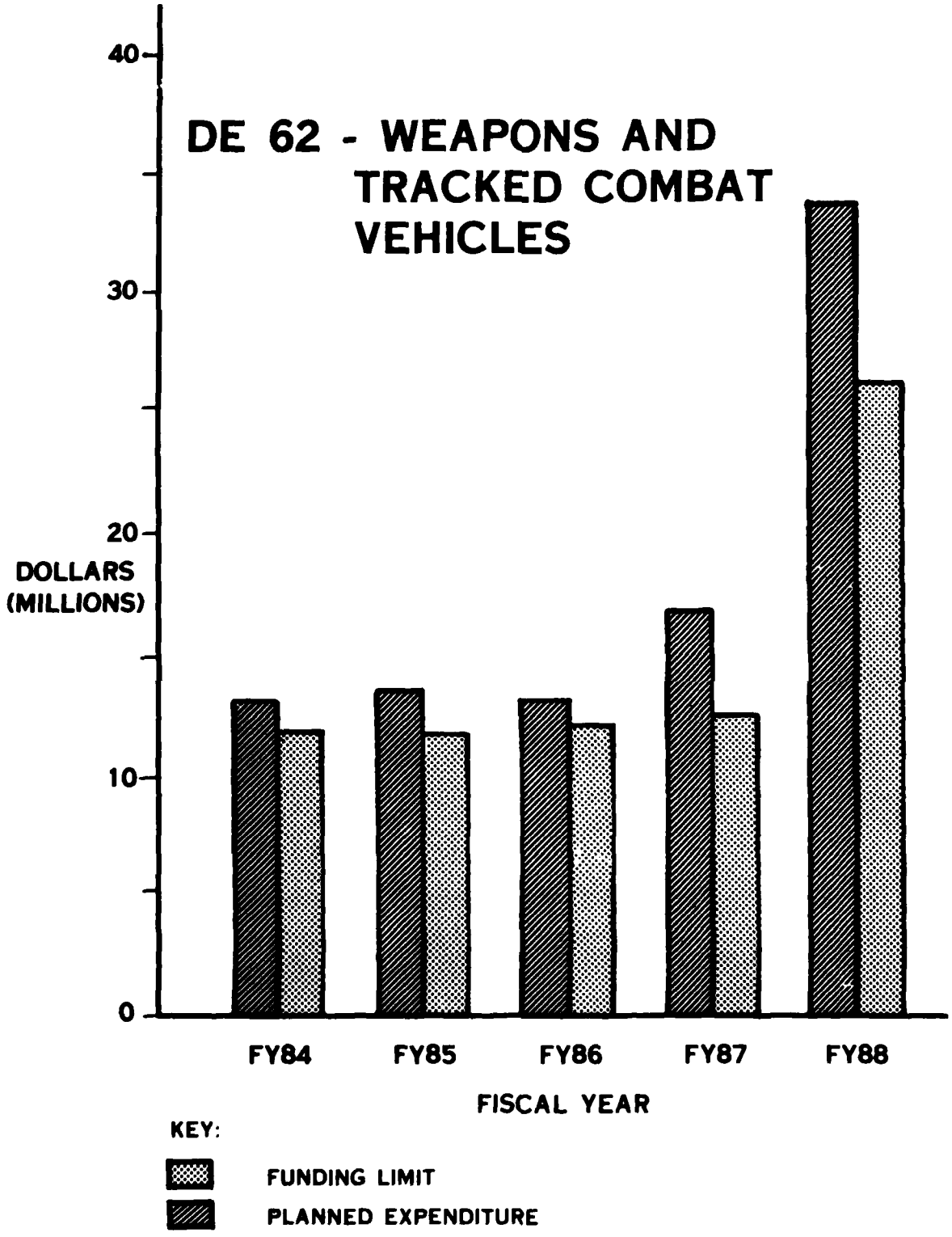
SUBMACOM SUBMISSION TO MMT PROGRAM
BY PROJECT AREA (Thousands of Dollars)

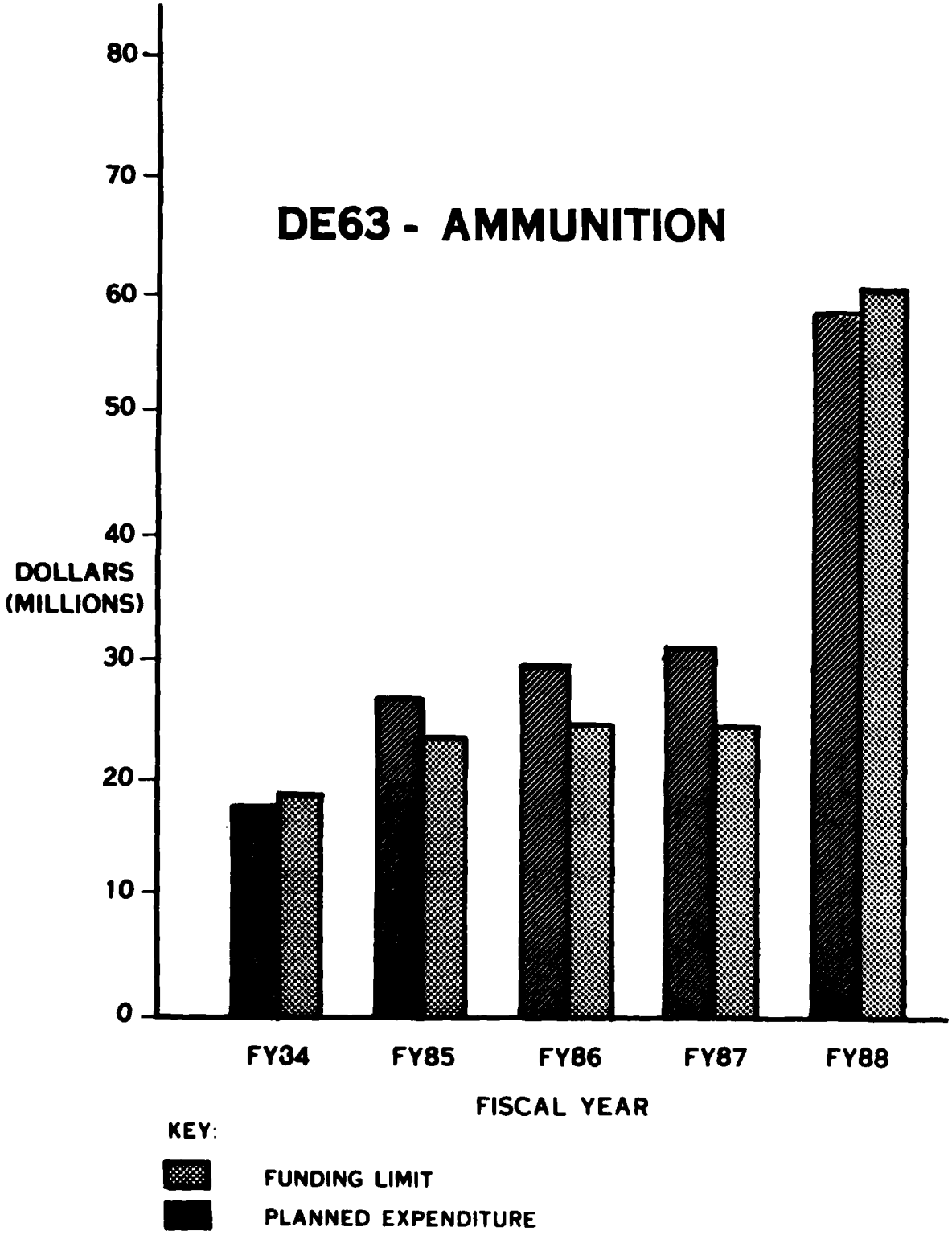
Project Area	Project Code	FY 84	FY 85	FY 86	FY 87	FY 88
Aircraft	DE60	9875	5625	8089	7998	18296
Missiles	DE61	4025	6315	6950	9025	17200
Weapons and Tracked Combat Vehicles	DE62	13257	13568	13271	16552	33844
Ammunition	DE63	18044	27128	29776	31548	58462
Other	DE64	28067	28135	29624	25443	25625
	TOTALS	73,268	80,771	87,710	90,466	153,427

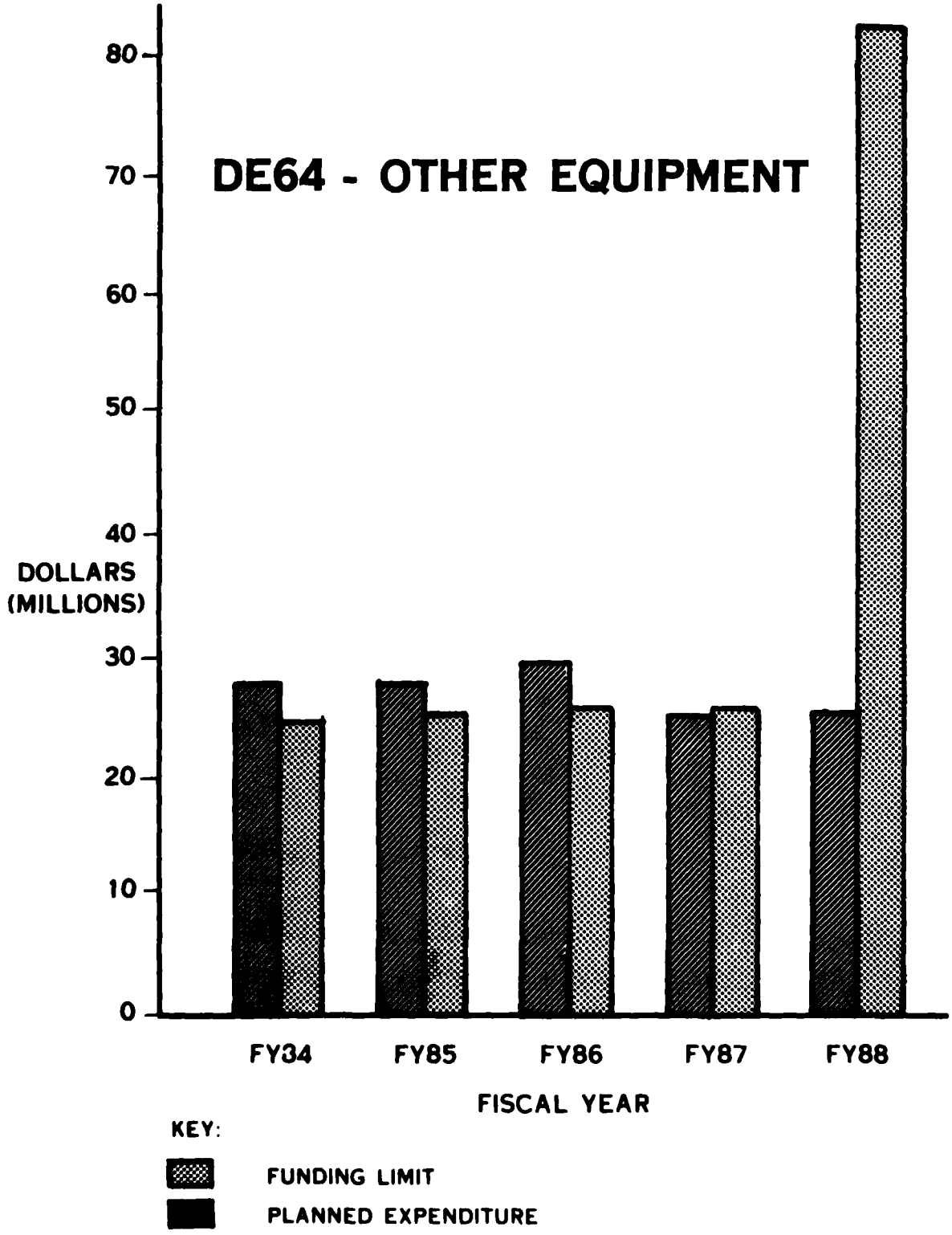
This table shows the planned expenditures for each fiscal year in the planning period. The "Project Code" column identifies the various RDTE project accounts established for the MMT Program.


DE60 - AIRCRAFT
30
20
DOLLARS
(MILLIONS)
10
0
FY84
FY85
FY86
FY87
FY88
FISCAL YEAR
KEY:
FUNDING LIMIT
PLANNED EXPENDITURE


DE61 - MISSILES
30
20
DOLLARS
(MILLIONS)
10
0
FY84
FY85
FY86
FY87
FY88
FISCAL YEAR
KEY:
FUNDING LIMIT
PLANNED EXPENDITURE


DE 62 - WEAPONS AND TRACKED COMBAT VEHICLES
40
30
20
10
0
DOLLARS (MILLIONS)
FY84
FY85
FY86
FY87
FY88
FISCAL YEAR
KEY:
FUNDING LIMIT
PLANNED EXPENDITURE


DE63 - AMMUNITION
80
70
60
50
40
30
20
10
0
DOLLARS
(MILLIONS)
FY34
FY85
FY86
FY87
FY88
FISCAL YEAR
KEY:
FUNDING LIMIT
PLANNED EXPENDITURE


DE64 - OTHER EQUIPMENT
80
70
60
50
40
DOLLARS
(MILLIONS)
30
20
10
0
FY34
FY85
FY86
FY87
FY88
FISCAL YEAR
KEY:
FUNDING LIMIT
PLANNED EXPENDITURE

Military Adaptation of Commercial Items (MACI)

The MACI Program encompasses those projects that explore the feasibility of adapting commercially available products to meet Army requirements. These products could be used as replacements for standard items in the Army inventory. Or, they might be used to meet either new or increased performance requirements.

A MACI project is a cost saving alternative to an Army sponsored developmental program. With MACI, the Army searches the commercial market for nondevelopmental end items or components which might meet requirements. These items have built-in advantages: RDT&E has been done independently by the manufacturer and an operational history is usually available.

A sample item is purchased and evaluated. The evaluation typically includes minor engineering modifications and testing of the item which leads to the preparation of performance specifications. At this point, the MACI project draws to a close and procurement of the item, in quantity, begins.

In recent years, the MACI Program has provided standardized technical parameters and tests to guide the acquisition of less costly commercial hydraulic systems and replacement components. It has also evaluated an amphibious system capable of delivering 30 tons of cargo over land, water, surf and marshland at speeds up to 60 mph. The system currently being analyzed is called the Lighter Air Cushion Vehicle (LACV-30).

The approximate dollar sizes of the past, current and planned annual budgets are listed below:

Fiscal Year	Dollars (Millions)
1982	17.1
1983	9.0
1984	10.0
1985	11.8
1986	12.2
1987	12.1

MACI projects, like MMT projects, are funded by the RDT&E appropriations. The Tank-Automotive Command (TACOM) and the Troop Support Command (TROSCOM) are AMC's most active sponsors of MACI projects. TACOM's evaluations focus on the commercial vehicle market while those of TROSCOM are in the areas of commercial generators, construction equipment and climate control systems.

Analysis of Previous Planning Data

FISCAL REVIEW CYCLE	NUMBER OF PROJECTS	Percent of Projects Previously Planned and Published in the: 1981 PLAN (FY 81-85)	1982 PLAN (FY 82-86)	1983 PLAN (FY 83-87)
FY 85 APPORTIONMENT	143	34.3	58.0	81.8
FY 86 BUDGET	319	----	31.7	50.5

This table shows the number of projects that currently remain in each of the two most recent fiscal review cycles. It also shows the percentage of those projects that appeared in previous editions of the MMT Program Plan. This illustrates the improved planning accuracy that naturally occurs as the planning process and the budgeting process converge.

III. NEW WEAPON SYSTEMS

Today, the United States has the finest technological capability and one of the highest industrial capacities in the world. The MMT Program serves to preserve and enhance the productivity and readiness of the defense production facilities, sources for weapons systems, components, and repair services. These weapons will modernize the forces by performing a variety of combat missions, from the nation's command center to the front line of battle. Selected systems that illustrate the direction and importance of our equipment modernization programs follow:

The Abrams tank and the Bradley fighting vehicle are new systems that the Army is procuring to improve the combat effectiveness of the forces which may be challenged by Soviet T-64 and T-72 tanks and BMP fighting vehicles. The speed, mobility and shoot-on-the-move capability of the Abrams tank have added a new dimension to combat capabilities. Because a mix of armor and infantry forces is necessary for mutual support on the modern battlefield, the Bradley fighting vehicle has been developed. This system provides the cross-country mobility and armor protection necessary to keep pace with the Abrams tank. The Bradley fighting vehicle's 25-millimeter cannon can defeat Soviet armored infantry fighting vehicles at battlefield ranges. With the TOW (tube-launched, optically-tracked, wire-guided) system, the Bradley crews can defeat modern Soviet tanks at long ranges.

New and improved weapons systems will bring about a synergistic effect on the battlefield. The Abrams tank and BFV complement each other and are a highly effective team. The M9 Armored Combat Earthmover, a vehicle designed specifically for our combat engineers, further increases the combat effectiveness of tanks, fighting vehicles, and other systems on the modern battlefield. In the hands of the engineers, the M9 is used to prepare fighting positions for all types of equipment and units, and is also employed to create obstacles when and where needed. Additionally, it has the speed and mobility to keep pace with combat forces and it provides its crew with armor and chemical agent protection to improve survivability on the lethal battlefield of today and tomorrow. A multi-year, competitive procurement contract for nearly 1,400 vehicles is planned.

Another major component in the combat arsenal, which complements the capabilities of ground forces, is the attack helicopter. This weapon plays a major role in any situation which requires a rapid response to an enemy threat or an opportunity to exploit a developing tactical advantage. The AH-1 Cobra helicopter, a proven system, is being upgraded to enhance its survivability on the modern battlefield. The Cobra however, is essentially a daylight aircraft with limited performance capabilities in some altitudes and climates. These limitations make it less than optimal for the many environments in which the Army may be called upon to fight.

In addition to upgrading the Cobra attack helicopter, procurement of the new Apache attack helicopter is continuing. The Apache's agility enables its crew to take maximum advantage of the environment to avoid detection. A target-acquisition-and-designation sight and a night-vision sensor enable the Apache to attack regardless of visibility restrictions. The Hellfire missile, with which the Apache will be equipped, is a laser-guided missile capable of delivering both direct and indirect fire. Hellfire is faster, has greater range, and is more lethal than the TOW missile. Armed with the Hellfire missile and a 30-millimeter chain gun, the Apache brings an awesome combination of lethality and versatility to the modern battlefield. The Apache attack helicopter procurement program is in its third year.

Our land forces must be able to shoot deep into the enemy's rear areas with great accuracy and massive firepower, while simultaneously striking enemy targets which are engaging our front-line units. Procurement of artillery systems will continue to provide indirect fire support for committed land forces. This procurement is not limited to firing systems but also includes target acquisition and fire control systems.

The Army's longest range weapon is Pershing II, a solid-fueled, two stage, ballistic missile designed to strike high-threat, time-sensitive enemy targets. Its sophisticated radar terminal guidance system, which automatically makes in-flight corrections, will result in pinpoint accuracy and permits use of smaller nuclear warheads than were required with older, less efficient systems. Truck-mounted and highly mobile, the Pershing II will be a survivable and powerful addition to deterrent posture and fighting capability.

For direct support of our front line forces, the Army is procuring the Multiple Launch Rocket System (MLRS). A free-flight, area fire weapon system, the MLRS will fill a void in current indirect fire capability. Designed to suppress enemy defenses and provide artillery counter-fire, the MLRS delivers large volumes of munitions against time-sensitive targets in a minimum amount of time. MLRS was developed in cooperation with the United Kingdom, France, Italy, and Germany. This joint program is achieving cost effectiveness while enhancing modernization and near-term combat readiness of the NATO forces through procurement of common systems. Acquisition of the MLRS remains on schedule with a proposed total program acquisition systems cost projected to be below the original 1978 planning estimate.

The Battery Computer System (BCS) increases the speed and accuracy with which artillery fire can be delivered on target, and procurement of this system is proceeding under the terms of a multi-year contract. The Ground Laser Locator Designator which enables first round fire-for-effect on targets with both conventional and precision guided munitions is being distributed to European combat units.

Tactical nuclear weapons, a major force-multiplier in deterrence and warfighting capabilities, need modernization. Weapons incorporating technology which is more than 20-years old must be replaced to assure reliability and effectiveness. Programs for theater nuclear force modernization include continued procurement of the 8-inch nuclear artillery projectile as well as development of a new 155-millimeter nuclear projectile. These programs will continue to provide a credible theater nuclear force.

Survival on the battlefield of the future will require extensive protection against chemical weapons. Efforts will continue to develop improved chemical defense material and to reduce the significant degradation of military performance in a chemical warfare environment. Long-term research and development programs are required to develop follow-on protective systems for armored vehicles, new protective masks, secure command and control facilities, and rest areas for soldiers. Additionally, more reliable and advanced chemical detectors are needed as well as improved methods of decontamination.

Interdiction of high-value second echelon targets is of great concern. To facilitate accomplishment of this interdiction mission, the Army is developing a combination of mutually supporting sensor and computer based display devices which can detect and classify movement of personnel and wheeled and tracked vehicles at ranges up to 100 kilometers. The Remotely Monitored Battlefield Sensor System (REMBASS), with the use of data relays, will provide targeting data at extended ranges so that enemy formations can be engaged before they reach the front-line battle area.

The Army of the future requires for its survival the capability to detect and locate ground-moving targets, command posts, assembly areas, and low-flying helicopters and fixed-wing aircraft. In conjunction with the Air Force, the Army is developing the Joint Surveillance and Target Attack Radar System (JOINT STARS), which is based on a merger of technology developed for the Army Battlefield Data System and the Air Force PAVE MOVER program. A primary advantage of the system will be the simultaneous broadcast of intelligence data to multiple ground stations throughout the battle area.

The Army's future reconnaissance and target acquisition capability will be enhanced by the remotely piloted vehicle (RPV). Because a potential enemy's air defense capability could make manned flights penetrating into his rear area risky, an RPV with low-light television and a forward-looking infrared night vision sensor is the ideal platform for providing real time information on front line and second echelon enemy troop dispositions. The RPV also will have the capability to adjust artillery fire and designate targets for laser-terminated precision-guided munitions.

Another area which has great potential for future development is that of artificial intelligence and robotics. Five primary areas employing this relatively undeveloped technology are being explored. The thrust of this research is to develop nearly autonomous robot operation of vehicles or equipment for ground reconnaissance, ammunition loading, information interpretation, training and maintenance, and medical diagnostics. Robots will possess extremely sophisticated decision-making microelectronic software. While some minimal human control will be required, the potential for human and cost savings as a result of this technology is enormous. Robot manned weapons systems which would have the capability to "recognize" and engage an enemy without direct and immediate human support represents just one possible application of this new technology.

While the Army's materiel acquisition philosophy recognizes the importance of improving fielded systems whenever feasible, it also recognizes that the potential for improvement of a given system is limited. Air defense systems illustrate this situation.

On the battlefields of today and tomorrow, Soviet fixed and rotary wing aircraft present a significant threat to our land forces. Some of our current air defense systems were not designed to function in today's electronic countermeasures environment, nor are they capable of multiple target track and engagement. The technology that provides these capabilities today did not exist 20 years ago. Patriot, the SGT York division air defense (DIVAD) gun, and Stinger--products of more modern technology--are ready to fill the gaps where older systems are inadequate and where the potential for product improvement has been exhausted.

The Patriot is the Army's new all-weather, long-range, surface-to-air missile system. This weapon can simultaneously attack and destroy several enemy aircraft while tracking scores more. Capable of operating under intense electronic jamming conditions which will characterize the battlefield of the future, the Patriot has sophisticated radar guidance features and a proximity fuzed warhead. In comparison with the systems it is replacing, Patriot has greater reliability and achieves a dramatic increase in operational effectiveness.

An important system in the air defense family of weapons is the Improved Hawk (IHAWK) missile which provides large area coverage for air bases and facilities in NATO's rear areas. Improved spare parts availability and the Army's program to apply product improvements to this already developed and proven system will assure its effectiveness against the evolving threat well into the 1990s.

The self-propelled Chaparral, the Army's short-range air defense missile system, was first fielded in 1969. It will remain in the Active Army inventory through the 1990s and is being provided to Reserve Components. A towed version, which enhances strategic mobility, is being developed for light forces. Chaparral has already undergone significant modifications to maintain its effectiveness, and further development will provide increased engagement range while reducing its vulnerability to enemy countermeasures.

Complementing the capabilities of the Chaparral is the 40-millimeter SGT York DIVAD gun. This system provides our heavy divisions with a modern anti-aircraft weapon which can maneuver with front line units and engage sophisticated aircraft. The SGT York is a survivable, radar-controlled system, which is capable of defeating high-performance aircraft as well as the Soviet HIND attack helicopter.

Fielding of the Stinger air defense missile, the Army's first new manportable air defense system since the late 1960s, adds a significant capability to the land forces. Development of a second generation of this missile with an improved guidance system designed to overcome enemy countermeasures has been completed. Called Stinger-POST (passive optical seeker technique), this improved weapon has entered production.

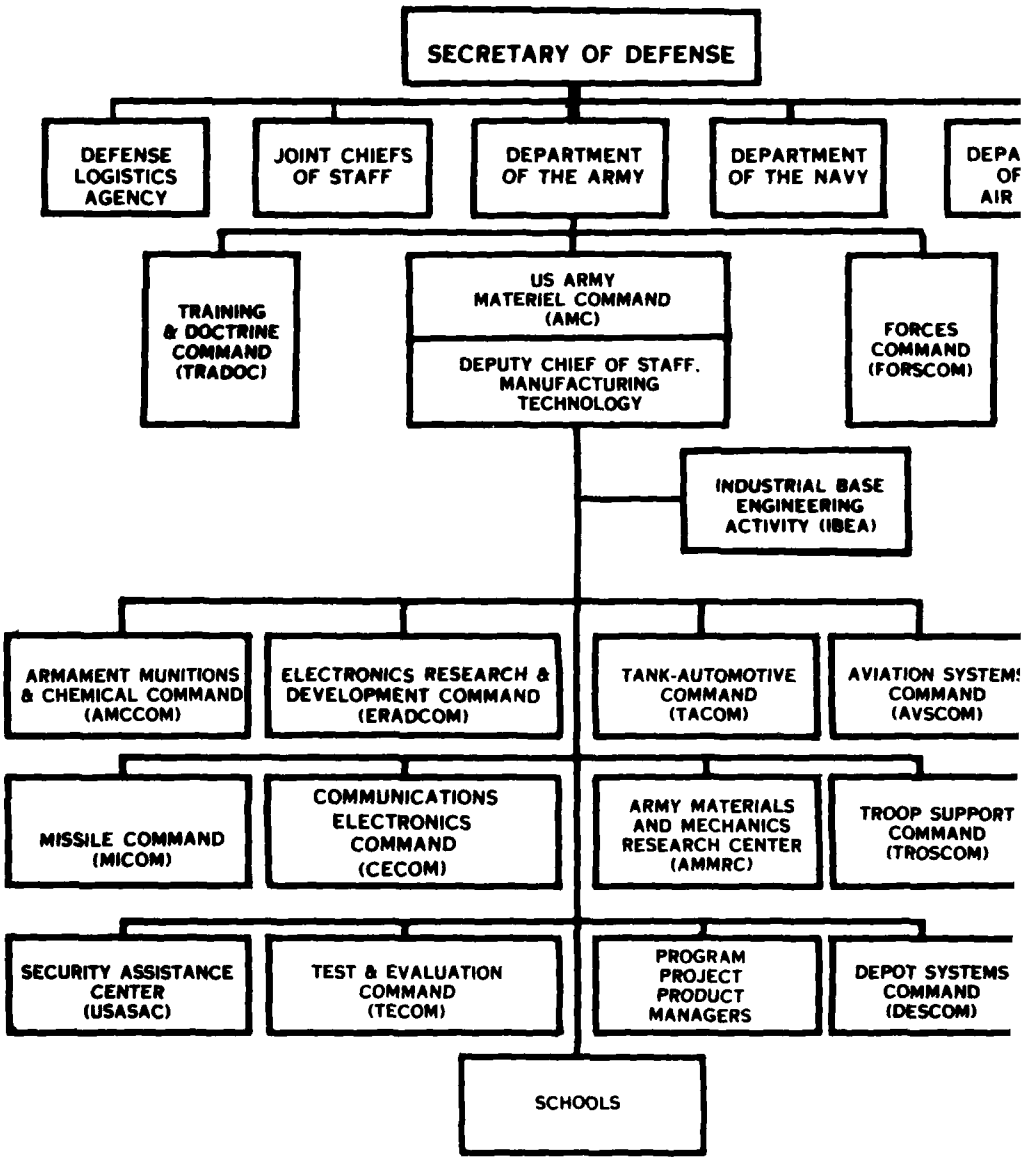
Long-term economies can be achieved by the Army through development and acquisition of battlefield simulators. Interest and investment in training simulators is increasing. Simulators conserve fuel, ammunition and space. They also reduce wear and tear on weapons and equipment and generally decrease training and operating costs. Further, simulators offer training that cannot be duplicated because of safety and cost limitations. Malfunctions can be simulated, events frozen and procedures demonstrated until competence is developed. In FY 84, the Army will procure a variety of simulators to enhance our overall training and readiness.

IV. INDUSTRY GUIDE

This section explains how projects are selected for the Plan, how they are developed and submitted for funding and how contracts are awarded to industry.

The objective of the MMT Program is to develop new manufacturing methods and processes that will reduce the cost of weapons systems production. Within the AMC, the Deputy Chief of Staff for Manufacturing Technology is the office established and charged with overall program responsibility. The functional responsibility is assigned to the commodity oriented, major commands that are subordinate to AMC. These Major Subordinate Commands (SUBMACOMs) plan, formulate, budget, and execute individual projects. The Industrial Base Engineering Activity (IBEA) assists AMC on the technical aspects of the program. The chart on the next page depicts the hierarchical relationship of these organizations.

UNITED STATES ARMY MATERIEL COM
(AMC)



Identification of manufacturing problems is the first step in developing an annual program. Problem areas are conceptualized by the SUBMACOMs and sent to IBEA for the compilation of a five-year planning document (the Program Plan). At the date of publication, the 1984 Program Plan, for example, contains one funded year (FY 84), two programmed years (FY 85-86), and two planned years (FY 87-88).

As the program cycle proceeds, out-year plans are refined and project proposals are prepared and submitted for evaluation during the budget review phase. These proposals are documented in what is known as a P-16. A P-16 is simply a format used to document estimated project cost, economic justifications, and a description of work. The budget submission represents the first bid for inclusion in the program.

Industry has the opportunity to participate in the technical evaluation of the budget program during the annual Manufacturing Technology Advisory Group (MTAG) conference. The MTAG conferees can also discuss the out-year concepts contained in the Program Plan and suggest technical adjustments to the current program.

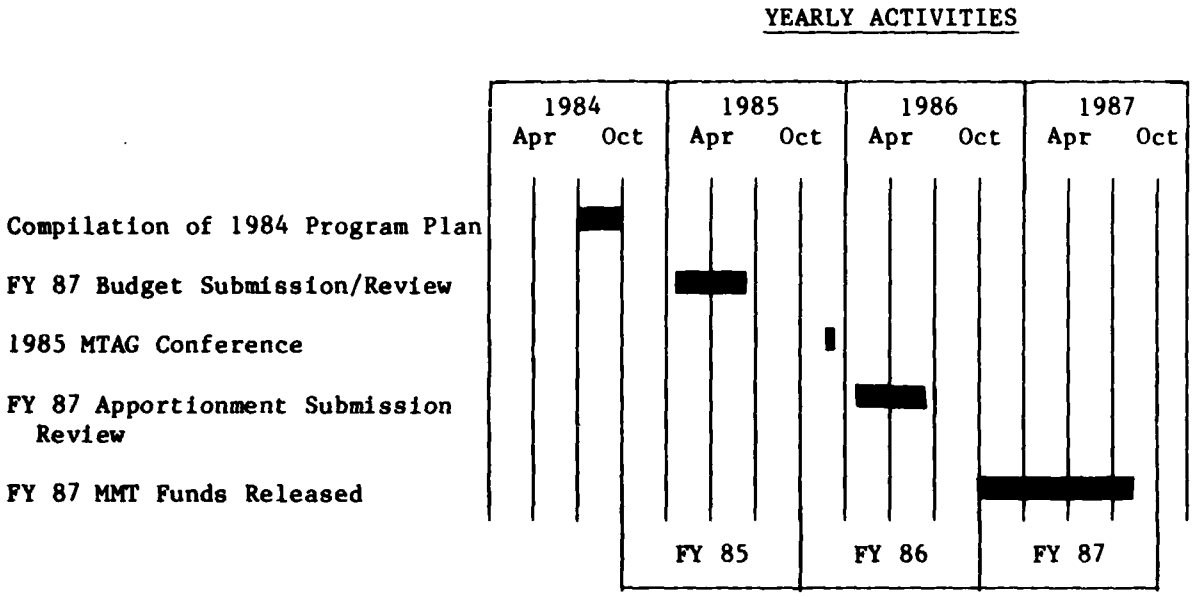
The budget submission is followed about twelve months later by a second, and more definite, submission which involves another evaluation leading to the apportionment of available funds. Criteria for funding individual projects include technical, operational, and economic feasibility. Evaluation includes the potentials for technical success, implementation of results, and return on investment. The interrelationships between these factors are also considered. Approximately 300 projects enter the budget review phase each year and about 170 of them are funded when the new fiscal year begins. Although this is the normal cycle, a project can enter it at any point in time. Such a project is known as a late start submission and funding is usually granted at the expense of another project.

A calendar depicting the program cycle is shown on the next page. The federal Government budgets and spends on a fiscal year basis. The fiscal year starts on the first of October and ends on the following thirtieth of September. For example, FY 85 begins on 1 October 1984.

Throughout the Program Plan reference is made to various appropriations. These appropriations are established by the US Congress as a standard accounting system. Most MMT efforts are funded through the Research, Development, Test and Evaluation (RDTE) Appropriations which include (1) Aircraft, (2) Missiles, (3) Weapons and Tracked Vehicles, (4) Ammunition, and (5) Other.

A substantial portion of the annual program is placed on contract. In recent years, about 60 percent of the funding has been awarded to the private sector. Much emphasis is placed on free competition for MMT contracts, with equal opportunity given to all interested, qualified business firms.

MMT Planning/Budgeting/Review Cycle



Services and materiel are acquired from industry by two basic methods - formal advertising and negotiation.

Congress has established formal advertising as the preferred method of contracting for military supplies and services. The Army derives price and other benefits that result from a full and free competition for contracts. Formal advertising also provides all bidders with an equal opportunity to develop and submit bids based on the same set of Army specifications. Procedures are prescribed by law and are detailed and rigidly written to assure equal treatment for all bidders.

The prerequisites for formal advertising are quite specific; and they are critical, because absence of any one of them will preclude successful use of the method. The prerequisites are as follows:

1. Army specifications must be complete, explicit, available to all potential bidders, and unrestricted because of security.

2. Two or more capable sources must be available to assure competition.

3. There must be enough time to conduct the procedures as prescribed. The Army must develop and assemble a complete statement of needs, terms, and conditions of contract into a proper Invitation for Bid. Bid invitations must be distributed; bids prepared and submitted by bidders, opened and evaluated by the Army, and a contract awarded. This process may span 60 to 120 days.

4. The Army must select the successful bidder on the basis of price alone, provided the bidder is otherwise qualified as responsive and responsible.

A variant procedure, closely approximating formal advertising, is referred to as "two-step formal advertising." This method is used when existing specifications are inadequate for use. Although not as preferable as formal advertising, "two-step formal" is clearly preferable to negotiation, and its use is required where the following prerequisites exist:

1. Specifications are not definitive. Technical discussions and evaluations must insure mutual understanding between Army and prospective contractors.

2. Definite criteria for evaluating proposals from prospective contractors exists.

3. More than one technically qualified source is expected to compete.

4. There must be enough time to conduct the two-step procedure; normally 100 to 150 days.

5. A "firm fixed price" or a "fixed price" contract will be used.

The first step of the process is initiated by the Army's request for technical proposals based upon performance specifications. These proposals are evaluated and discussed by both parties as necessary, but price is not a subject for these discussions. The Army then makes a determination as to the technical acceptability of the supplies or services offered and may summarily reject some outright, or make provisions for modification and acceptance of proposals that are marginal.

The second step of the procedure is conducted as a formally advertised procurement, except that advertising is limited to those who have submitted technically acceptable proposals during the first step. Each bidder must then bid on the basis of meeting the performance specification and providing the exact supply or service proposed by him and approved by the Army during the first step. Although products or services of the bidders may vary, award of contract is based on price alone.

Not all requirements can be obtained through the advertising processes. As a third alternative, acquisition by negotiation is permitted. The development of new systems or production of complex equipment, for example, demands much discussion, clarification, exploration, or modification of proposals between both parties. Under specific circumstances prescribed by Congress, negotiation is generally preferable when:

1. The item is critical or complex.

2. Delivery is urgent.

3. Few suppliers exist and competition is impractical.

4. Specifications are incomplete or unstable.

5. Emergency conditions exist.

6. The item required may demand a sizable investment by industry in fixed assets.

7. Security classification precludes advertising.

8. Total interchangeability of parts with existing supplies is absolutely necessary; no compromise is justified.

9. Industry experience is lacking. Responses to formal advertising will be replete with contingency costs.

10. The Army must deal with sole or limited sources.

The negotiation process resembles the purchasing process used in industry. Not all industry practices, however, are accepted in the negotiation process. For example, companies that buy from each other often develop long term understandings. In contrast, this relationship between the Army and a private company is not permitted.

Formal advertising is conducted in full public view with the bids of all firms known to all competitors prior to award of contract. This is not true in negotiation. Negotiation is a process closed to the public. Proposals submitted by a company are not disclosed and subsequent bargaining on the basis of these proposals are conducted individually. In this way, the spirit of competition is maintained among the few suppliers that may be participating. Only after the award of a contract is the successful company made known and the terms and conditions of the contract disclosed.

In recent years, more than one-half of all Department of Defense requirements have been purchased by "two-step" procedures and negotiation. Most MMT contracts have been reached through the same methods.

A business firm seeking to participate in the MMT Program should inform Army procurement offices of the capabilities it has to offer and request that the firm be placed on appropriate bidders' mailing lists. Copies of Standard Form 129, "Bidders Mailing List Application," are available at most federal agency procurement offices. A copy of this form is included in the publication "Selling to the Military." This

publication also contains a comprehensive list of procurement offices and it may be purchased from the Superintendent of Documents, US Government Printing Office, Washington, DC, 20402.

Each procurement office has unique supplemental instructions for the Bidders Mailing List Application; therefore, individual requests should be directed to each office. These instructions should be followed carefully to assure prompt processing. After a firm is placed on the list, it will receive all solicitations covering any requirements that could be met by its stated capabilities.

The "Commerce Business Daily," published by the Department of Commerce, is a valuable source of information to businessmen in identifying products and services which individual military procurement offices are currently buying. The publication also lists subcontract opportunities offered by Defense prime contractors, recent contract awards which could lead to imminent subcontract opportunities, surplus sales information, and other pertinent information on procurement actions. The "Daily" is available for inspection at each of the procurement offices; the field offices of the Small Business Administration, Department of Commerce, and General Services Administration; and, other cooperating offices, including many local chambers of commerce. It can also be purchased through subscription. To order, send $175 for 1st class postal delivery or $100 for 2nd class along with a full mailing address to the Superintendent of Documents, US Government Printing Office, Washington, DC, 20402. Credit card orders are accepted: telephone (202) 783-3238.

NOTE: Various government publications were used as sources for the preceding information.

V. PROCESS TECHNOLOGY INDEX

The projects fully described in the body of this document are grouped into "Categories" and "Components" which are end item type descriptors. This index lists all the projects, less Problem and Solution statements, and groups them by technical areas. The primary grouping of this index is by the primary Manufacturing Technology Advisory Group (MTAG) subcommittee designator (i.e., CAD/CAM, Electronics, Metals, Non-Metals, Munitions, and Test & Inspection). Within each MTAG group, projects are further grouped alphabetically by process.

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CAD/CAM	28
Electronics	30
Metals	34
Munitions	40
Non-Metals	46
Test & Inspection	48

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* NMT PROCESS TECHNOLOGY INDEX - CADCAM *
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PROCESS	COMMAND	EFFORT	EFFORT TITLE	FY	COST	PAGE
ASSEMBLY	AMCCOM	8468	IMPR MFG PLUS HANDLING TECHNIQUES FOR SMALL CAL WEAPONS	88	325	129
	DESCOM	7007	ENGINE CONTAINER SEALING-CAM	86	200	162
				87	200	
	MICOM	1109	ROBOTIZED WIRE HARNESS ASSEMBLY SYSTEM	84	1000	189
	TACOM	4032	ROBOTIC ASSEMBLY TECHNOLOGY	88	200	207
	TACOM	4041	AUTOMATED ASSEMBLY GRAPHICS	88	250	207
CASTING	AMCCOM	8509	COMPUTERIZED FOUNDRY MELT COMPOSITION CONTROL (CAM)	87	125	111
				88	369	
	AMCCOM	8704	ROBOTICS FOR CLEANING CASTINGS	88	420	107
	TACOM	6086	CAD/CAM PROCESSES FOR ALUMINUM CASTINGS (PHASE I)	88	550	208
CLEANING	DESCOM	2005	ENHANCED PAINT REMOVAL PROCESS THRU CAVITATION	88	750	163
COATING	DESCOM	0002	CAM APPLICATION OF ROBOTICS TO SHELTER REFINISHING	84	370	162
	DESCOM	6002	APPLICATION OF ROBOTIC PAINTING TO ROTARY WING AIRCRAFT	86	800	161
	TROSCOM	3833	HIGH POWER GENERATOR STATOR COIL INSULATION	87	180	222
				88	230	
DRILLING	DESCOM	1002	ROBOTIC VAN DRILLING AND RIVITING	86	110	164
FABRICATION	CECOM	3161	AUTOMATED PROCESSING OF LITHIUM (CAM)	87	75	154
				88	225	
GENERAL	AMCCOM	0929	DARCOM LIFE CYCLE ENGINEERING MANAGEMENT SYSTEM	85	307	75
				87	861	
				88	681	
	AMCCOM	8532	ARMCAM FOR FUTURE CAM ACTIVITIES	88	275	107
	DESCOM	0050	PORTABILITY OF DATA ACROSS ALL CAD/CAM RESOURCES	87	200	163
				88	300	
GRINDING	AMCCOM	8120	ADAPTIVE CONTROL TECHNOLOGY (CAM)	86	200	110
GROUP TECHNOLOGY	AMCCOM	4464	COMPUTER/GROUP TECHNOLOGY FOR SMALL CAL AMMO	88	228	97
	AMCCOM	8525	GROUP TECHNOLOGY FOR S/C COMPONENT	88	160	129
	DESCOM	6001	APPLICATION OF GROUP TECHNOLOGY TO ROTARY WING AIRCRAFT	86	150	163
HEAT TREATMENT	AMCCOM	8403	DESIGN CRITERIA FOR HARDENING (CAM)	84	261	111
				86	154	
INSPECTION	AMCCOM	1802	AUTOMATED OPTICAL MICROELECTRONICS INSPECTION	84	496	74
				85	556	
	AMCCOM	8415	ROBOTIC EMPLACEMENT DEVICE FOR INSPECTION BY X-RAY (REDIX)	88	180	125
	AMCCOM	8638	CONTROL OF SEQUENTIAL MACHINING OPERATIONS (CAM)	86	269	114
				87	269	
				88	200	
IMIP	DESCOM	6003	CCAD ANALYSIS FOR INTEGRATED MODERNIZATION PROGRAM	86	1000	164
				87	900	
MACHINING	AMCCOM	8416	FLEXIBLE MACHINING SYSTEM-RIA (CAM)	84	399	106
				85	178	
	TACOM	4033	ROBOTIC TURRET DRILLING TECHNOLOGY	87	500	204
MOLDING, INJECTION	DESCOM	4003	RUBBER INJECTION MOLDING OF DOUBLE PIN TRACK	85	412	165
				86	200	

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CADCAM (Cont)
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PROCESS	COMMAND	EFFORT	EFFORT TITLE	FY	COST	PAGE
PLATING	DESCOM	1001	AUTOMATION OF PLATING OPERATIONS	86	471	164
PROCESS CONTROL	AMCCOM	8132	PERFORMANCE MEASUREMENT PARAMETERS FOR GOGO MFG.	88	100	108
	AMCCOM	8154	COMPUTER INTEGRATION MFG FOR CANNON (CIM)	84	450	106
	AMCCOM	8241	COMPUTER APPLICATIONS TO BORE GUIDANCE	84	85	120
	AMCCOM	8305	INTEGRATED MANUFACTURING SYSTEM (ICAM)	84	1677	108
				85	950	
				86	1500	
				87	2084	
				88	2000	
	AMCCOM	8306	ON-LINE PRODUCTION INFORMATION SYSTEM (CAM)	84	571	108
	AMCCOM	8327	COMPUTER INTEGRATED MFG (CIM F/FC MATERIAL) (CAM)	88	530	105
	AMCCOM	8417	FACTORY INFORMATION MANAGEMENT - RIA (CAM)	84	280	109
	AMCCOM	8559	CIM FOR CANNON CAD/CAM/COMM	85	1010	109
				86	769	
				87	780	
				88	620	
	AMCCOM	8616	BINARY CUTTER LOCATION EXCHANGE (CAM)	87	75	108
	AMCCOM	8635	PROCESS CONTROL + INFORMATION SYSTEM (CAM)	86	150	109
				87	150	
	CECOM	3167	DESIGN BASE FOR FABRICATION OF MICROWAVE SYSTEMS	88	150	150
	TACOM	6121	CAD/CAM FOR THE BRADLEY FIGHTING VEHICLE	84	600	208
				85	875	
SIMULATION	AMCCOM	8637	SIMULATION + MODELING OF PROTO MFG - WEAPONS + FIRE CONTROL	88	380	108
WELDING	AMCCOM	1502	COMPUTER AIDED MFG OF ARTILLERY MUNITIONS	85	265	83
	AMCCOM	8424	AUTOMATIC/ROBOTIC WELDING OF WEAPON COMPONENTS (CAM)	87	438	107
				88	328	
	AMCCOM	8603	ROBOTIC WELDING	85	185	113
				86	158	
				87	50	
	TACOM	4031	CAD GENERATION AND STORAGE OF WELDING PROCEDURES	87	65	202

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ELECTRONICS
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PROCESS	COMMAND	EFFORT	EFFORT TITLE	FY	COST	PAGE
ADJUSTMENT	CECOM	3111	AUTOMATIC ADJUSTMENT OF IMPEDANCE	87	75	153
				88	250	
ASSEMBLY	AMCCOM	4626	AUTO ASSEMBLY OF MILLIMETER WAVE TRANSDUCER	84	180	71
				85	3183	
				86	602	
				87	507	
	AMCCOM	4629	AUTO ASSEMBLY + TEST OF IR TRANSDUCER	85	1845	74
				86	817	
				87	617	
	AMCCOM	4634	AUTO ASSEMBLY OF ELEC MODULE + TOP SENSOR	87	1019	72
				88	696	
	AMCCOM	4692	INFRARED SEEKER FIBER OPTICS ASSY COST REDUCTION	87	200	73
				88	300	
	AMCCOM	4752	INTEGRALLY MACH OPTICAL ASSY FOR INFRARED SEEKER	86	825	75
				87	820	
	AMCCOM	8321	ADHESIVE BONDING FC SYSTEMS	88	340	105
	AVSCOM	7470	HAND HELD AUTOMATIC POWER CRIMPER	84	250	136
	CECOM	3169	MONOLITHIC FREQUENCY SYNTHESIZERS CIRCUITS	88	250	153
	ERADCOM	5059	LINEAR RESONANCE COOLERS - PHASE I	85	485	171
				86	533	
	ERADCOM	5162	EXJAM BATTERY MANUFACTURING TECHNOLOGY, PHASE I	84	235	174
				85	485	
				86	185	
	MICOM	2004	MFG LWIR FIBER OPTICS	88	200	191
BONDING	ERADCOM	5057	3-5 MICRON TE COOLED FOCAL PLANE MODULES	86	778	171
				87	1458	
	ERADCOM	5272	TAPE AUTOMATED BONDING (TAB)	85	800	173
BRAZING	MICOM	1123	IMPROVED MFG PROCESSES STARING FOCAL PLANE ARRAY DETECTORS	88	2000	192
CLEANING	CECOM	3135	SURFACE-MOUNTED COMPONENT BOARD CLEANING PROCESS	88	250	152
COATING	AMCCOM	8329	FIRE CONTROL OPTICAL DEVICES NEW PROCESS PRODUCTION TECH	84	424	105
				85	275	
				86	550	
				87	296	
	MICOM	1143	LASER SYSTEM E-GUN IMPROVEMENT	88	300	193
	MICOM	1150	LITHIUM NIOBATE LASER Q-SWITCHES	85	750	189
				86	600	
	MICOM	2001	TAB/GLASS ENCAPSULATED INTEGRATED CIRCUITS	88	800	193
	MICOM	2002	CHEAP RAPID OPTICAL FABRICATION TECHNOLOGY (CROFT)	88	700	191
CRYSTAL GROWTH	CECOM	3108	CONTROL OF GAAS BOULE DIAMETER	85	195	155
				86	250	
				87	100	
	ERADCOM	5066	1 TO 3 MICRON AVALANCHE DETECTORS	85	250	172
				86	225	
	MICOM	1120	DETECTOR GRADE CADMIUM SULFIDE	85	550	191
				86	250	

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ELECTRONICS (Cont)
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PROCESS	COMMAND	EFFORT	EFFORT TITLE	FY	COST	PAGE
DEGAUSSING	TROSCOM	3796	COMBAT VEHICLE DEPERMING PRODUCTION FACILITY	84	1158	221
				85	1284	
	AMCCOM	8365	RADIAL GRADIENT INDEX OPTICS	88	520	105
	CECOM	3138	CHEMICAL VAPOR DEPOSITION OF HGCDTE ON NON-HGCDTE SUBSTRATES	88	900	149
DEPOSITION	CECOM	3170	SINGLE MODE LASER DIODE MODULES	87	320	153
				88	430	
	MICOM	1131	AN INTEGRATED 94 GHZ SUBMUNITIONS TRANSCEIVER	86	725	190
				87	750	
DIFFUSION	CECOM	9290	AUTOMATIC MICROWAVE SEMICONDUCTOR DEVICE TESTING (CAM)	85	190	151
				86	200	
				87	100	
	CECOM	3068	INCREASE PRODUCIBILITY OF VARACTORS AND PIN DIODES	84	250	155
	ERADCOM	3010	MILLIMETER-WAVE SOURCES FOR 60 AND 94 GHZ	84	209	175
				85	650	
EPITAXIAL GROWTH	ERADCOM	5111	VAPOR GROWTH FOR 3RD GEN. PHOTOCATHODES	84	574	172
				85	316	
	ERADCOM	5151	LIQUID PHASE EPITAXIAL HGCDTE	84	2526	171
	ERADCOM	6009	94 GHZ MILIMETER WAVE MONOLITHIC RECEIVER SYSTEM	86	1000	174
				87	1000	
	MICOM	1124	IMPROVED MFG PROC F/8-10 MICRON SCANNING TDI FPA DETECTORS	84	800	192
				85	750	
				86	1000	
				87	1000	
FORMING	MICOM	2003	AUTOMATED LSI PLACE/CARRIER SYSTEM	87	500	193
				88	1500	
GENERAL	AMCCOM	3716	SENSOR TECHNOLOGY	88	1500	70
	CECOM	3152	VIDEO DISC PRE-MASTER	88	500	151
	CECOM	3141	MATERIALS SELECTION FOR ND-YAG BOULE	88	450	151
INSPECTION	CECOM	3153	VIDEO DISK PRE-MASTER QUALITY ASSESSMENT	88	125	150
	MICOM	1148	MILLIMETER WAVE MONOLITHIC/INTEGRATED RECEIVER	85	750	190
				86	450	
				87	550	
ION IMPLANTATION	AMCCOM	8262	PRODUCTION METHODS FOR OPTICAL WAVE GUIDES	84	155	105
				85	470	
				87	105	
	CECOM	3112	WAFER CORRECTION BY ION IMPLANT	88	600	155
	CECOM	3094	COMMUNICATIONS TECHNOLOGY TECHMOD FOR JTIDS	84	1352	152
				85	785	
				86	882	
IMIP	ERADCOM	5196	INDUSTRIAL PRODUCTIVITY IMPROVEMENT (ELECTRONICS)	84	1096	172
	MICOM	1075	ELECTRONICS COMPUTER AIDED MANUFACTURING (ECAM)	84	1000	190
				85	215	
				86	1200	
				87	1000	
				88	4000	

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ELECTRONICS (Cont)
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PROCESS	COMMAND	EFFORT	EFFORT TITLE	FY	COST	PAGE
MACHINING	AMCCOM	8467	DIAMOND POINT TURNING OF GLASS OPTICS	87	500	106
				88	380	
MATERIALS HANDLING	CECOM	3139	AUTOMATED INTEROVEN TRANSFER OF GLASS PREFORMS	85	200	149
METALLIZATION	ERADCOM	5187	TUNABLE MILLIMETER WAVE INP GUNN SOURCES	85	299	175
				86	400	
				87	150	
	ERADCOM	5271	PROD OF PLANAR GATE HI POWER SILICON FIELD EFFECT TRANSISTOR	86	285	176
				87	425	
MODELING	MICOM	2007	LOW COST MMW COMPONENT MFG	88	450	194
PACKAGING	CECOM	3168	MILLIMETER FREQUENCY PACKAGING TECHNIQUES	88	175	153
	ERADCOM	5273	FIRST LEVEL PACKAGING AND INTERCONNECTIONS (VHSIC)	85	1200	173
	ERADCOM	5274	MULTICHIP PACKAGES (VHSIC)	85	200	173
PHOTOLITHOGRAPHY	ERADCOM	5168	AUTOMATIC RETICLE INSPECTION SYSTEM, PHASE I	84	600	173
				85	700	
	ERADCOM	5248	ADVANCED WAFER IMAGING SYSTEM (AWIS)	84	1000	173
				85	1800	
PLATING	AMCCOM	1803	IMPROVED LEAD DIOXIDE ELECTROPLATING TECHNOLOGY	84	346	73
	MICOM	1066	ADDITIVE SINGLE AND MULTILAYER HYBRID CIRCUITRY	85	450	190
				86	450	
PROCESS CONTROL	ERADCOM	6005	LOW COST RECHARGEABLE LITHIUM-T152 BATTERIES	86	225	174
				87	600	
	ERADCOM	6006	IMPROVED, HIGH CAPACITY BATTERY BA-5598/U + BA-5590/U	86	493	174
				87	493	
PROCESS SELECTION	AMCCOM	4624	AUTOMATED MFG OF MILLIMETER WAVE DIODES (CAM)	85	2843	71
				86	816	
				87	976	
	AMCCOM	4625	AUTO MFG OF SILICON IF AMPLIFIER IC (CAM)	87	285	71
				88	1191	
	AMCCOM	4628	AUTO MFG IR DETECTORS + REFLECTORS	85	1670	74
				86	1211	
	AMCCOM	4632	LEADED CHIP CARRIERS	87	740	72
				88	98	
	AMCCOM	4751	AUTO COMP ASSY + THICK FILM COPPER TECH F/PROD ELECTRONICS	87	55	74
				88	220	
	AMCCOM	4753	LO COST PROC TECH F/PHOTOCONDUCTIVE INFRARED DETECTORS	87	600	73
				88	770	
REPAIR	DESCOM	1005	MULTILAYER PRINTED CIRCUIT BOARD REPAIR	86	1575	163
SEALING	MICOM	1095	AUTOMATIC SEALING OF HYBRIDS	85	750	190
				86	700	
				87	800	

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ELECTRONICS (Cont)
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PROCESS	COMMAND	EFFORT	EFFORT TITLE	FY	COST	PAGE
SINTERING	ERADCOM	5045	THERMOELECTRIC COOLER MATERIALS	86	290	171
				87	400	
SOLDERING	CECOM	3137	LASER SOLDER/INSPECTION SYSTEM FOR PWB	88	350	152
	MICOM	2006	LASER SOLDERING SURFACE MOUNTED DEVICES TO PWB	87	500	193
				88	1000	
SPUTTERING	CECOM	3090	GAINASP LIGHT EMITTING DIODES	85	275	154
				86	275	
	ERADCOM	5174	AUTOMATIC SPUTTERING PROCESS CONTROL F/PRODUCING ZNO PHASE	84	200	175
				85	222	
TESTING	AMCCOM	4627	AUTO TESTING OF MILLIMETER WAVE TRANSDUCER	85	1943	71
				86	1088	
	AMCCOM	4630	AUTOMATED METHOD FOR BORESIGHTING IR (CAM)	85	1407	72
				86	676	
				87	391	
	AMCCOM	4631	AUTO TEST OF SIGNAL PROCESSOR ASSEMBLIES	87	835	72
				88	451	
	AMCCOM	4633	AUTO SENSOR SYSTEMS TEST F/MMW + IR SENSOR	87	639	72
				88	595	
	CECOM	3048	MICROPROCESSOR COMPENSATED CRYSTAL OSCILLATOR	88	500	149
	CECOM	3124	AUTOMATIC OPTICAL MEASUREMENTS	88	1500	154
	CECOM	9289	AUTOTEST OF MICROWAVE DEVICE WAFERS (CAM)	85	195	151
				86	200	
				87	50	
	ERADCOM	5107	EHF SOLID STATE AMPLIFIER	84	567	175
				85	407	
	ERADCOM	5251	AUTOMATIC SEM WAFER INSPECTIN AND METROLOGY SYSTEM	85	1000	176
	MICOM	1132	SINGLE MODE FIBER FOR FOG LINK	86	375	190
				87	475	
	MICOM	1142	PROCESS VALIDATION FOR SEMICONDUCTOR DEVICES	88	400	196
	MICOM	2005	AUTO HYBRID MICRO CIRCUIT ASSY CHIP INSPECTION	88	450	196
VACUUM BAKEOUT	ERADCOM	5180	MMT FOR METAL DEWAR AND UNBONDED LEADS	84	2144	171
				85	211	
VACUUM DISTILLATION	CECOM	3101	AUTOMATIC PURIFICATION OF TELLURIUM	85	250	149
WINDING	MICOM	1147	OPTICAL FIBER WINDING	85	500	191
				86	500	

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METALS
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PROCESS	COMMAND	EFFORT	EFFORT TITLE	FY	COST	PAGE
ASSEMBLY	AMCCOM	8474	APPL OF PARTIAL REFRACTORY LINERS TO CANNON TUBES	84	389	122
				85	290	
	AMCCOM	8607	AUTOMATED FLUSHING OF RECOIL SYSTEMS TO REDUCE CONTAMINATION	87	200	119
	AMCCOM	8703	AUTOMATED RECOIL MECHANISM ASSEMBLY	88	300	119
	DESCOM	4010	AUTOMATED DIESEL ENGINE DISASSEMBLY INSPECTION AND ASSEMBLY	88	750	166
CASTING	AMCCOM	3712	PRODUCTION BASE FOR NOVEL SHAPED CHARGE LINERS	88	500	82
	AMCCOM	8231	IMPROVED CASTING TECHNOLOGY (CAM)	84	122	110
	AMCCOM	8437	DENSIFICATION OF WEAPON CASTINGS (HIP)	84	108	117
				86	87	
	AMCCOM	8440	PRECISION CAST BREECH BLOCKS	88	335	116
	AMCCOM	8511	CASTING OF ANTIFRICTION METAL COMPONENTS	85	200	119
				86	85	
	AMCCOM	8513	MICROWAVE CURING OF FURAN BONDED SAND	88	250	112
	AMCCOM	8608	STATE-OF-THE-ART LADLE/FURNACE REFINING	86	117	107
	AMCCOM	8706	INVESTMENT CASTING OF LARGE WEAPON COMPONENTS	88	225	114
	AMCCOM	8709	NEAR NET SHAPE MOLDING	88	160	114
	AVSCOM	7300	IMPROVED LOW CYCLE FATIGUE CAST ROTORS	84	350	144
				85	106	
	AVSCOM	7362	ENG DESIGN HANDBOOK FOR TITANIUM CASTINGS	86	125	141
				87	125	
				88	232	
	AVSCOM	7416	ADVANCED TURBINE AIRFOIL CASTINGS	84	512	143
				85	425	
				86	412	
	TACOM	6085	IMPROVED CASTING PROCESSES	88	375	203
COATING	AMCCOM	2742	LASER APPLIED DURABLE COATINGS	88	200	75
	AMCCOM	8230	NON SOLVENT BASED PAINTING PROCESSES	88	250	110
	AMCCOM	8323	SPRAY-AND-FUSE PROCESSING OF ARMAMENT COMPONENTS	84	200	117
				85	48	
	AMCCOM	8326	APPLICATION OF CORROSION RESISTANT GALVANIC COATINGS	84	185	117
	AMCCOM	8360	ESTABLISHMENT OF ZINC ION VAPOR DEPOSITION PROCESS	88	235	111
	AMCCOM	8473	APPL FUSED SALT PROCESS TO COAT TANTALUM ON L CAL LINERS	84	245	122
				85	250	
				86	128	
	AMCCOM	8524	REFRACTORY METAL COATING FOR GUN TUBES	87	320	127
				88	350	
	AMCCOM	8533	TECHNOLOGY FOR ERROSION RESISTANT COATING FOR GUN BARRELS	88	260	127
	AMCCOM	8553	APPLICATION OF REFRACTORY + OTHER COAT BY THE SPUTT TECH	87	225	123
				88	363	
	AMCCOM	8711	CERAMIC GUN TUBE PROCESSING	88	485	124
	AMCCOM	8715	APPLICATION OF METALLIDING	88	87	115
	AVSCOM	7475	ONE PART SEALANT FOR WATER INTEGRITY	84	390	137
	AMCCOM	2726	LASER CUTTING SLOTS IN HARDENED STEEL STRUCTURES	88	190	81

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METALS (Cont)
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PROCESS	COMMAND	EFFORT	EFFORT TITLE	FY	COST	PAGE
CUTTING	AMCCOM	2731	ULTRASONIC ASSISTED MACHINING	88	350	81
	TACOM	5091	HEAVY ALUMINUM PLATE FABRICATION	87	100	203
DRAWING	AMCCOM	4542	ULTRASONIC DEEP DRAWING OF CANNON STEEL CARTRIDGE CASES	88	232	81
EXTRUSION	AMCCOM	8536	MOLYBDENUM ALLOY GUN BARREL LINERS	88	645	128
	TROSCOM	3803	EFFICIENT FABRICATION OF EXTRUDED MAT PANELS.	87	300	221
				88	125	
FORGING	AMCCOM	7615	AUTOMATED FORGING OF WEAPON COMPONENTS (CAM RELATED)	88	270	106
	AMCCOM	8153	INCREASING GUN TUBE HEAT TREATMENT CAPACITY	84	250	120
	AMCCOM	8402	WARM FORGING OF WEAPON COMPONENTS (CAM)	84	227	111
				85	127	
	AMCCOM	8471	MFG OF SC WPNS COMPONENTS BY THIXO FORGING	88	210	128
	AMCCOM	8560	APPLICATION OF COUNTER HOLDER EQUIPMENT TO ROTARY FORGING	85	190	123
	AMCCOM	8670	PROCESS CONTROL IMPROVEMENT IN SMALL CAL WEAPON FAB	87	320	128
	AVSCOM	7457	APPLICATION OF FINE GRAINED PREFORMS	88	975	142
	AVSCOM	7469	NEAR NET SHAPE FORGED SPIRAL BEVEL GEARS	86	450	139
				87	686	
				88	3062	
	AVSCOM	7485	AXIAL COMPRESSOR ROTORS BY ISOTHERMAL FORGING	88	915	142
	TACOM	6092	AUSROLLED GEARS FOR TACTICAL VEHICLES	88	350	206
FORMING	AMCCOM	4583	IMPROVED PROCESS FOR CAL .50 CORE MANUFACTURE	88	580	83
	AMCCOM	4585	SABOT LAUNCHED ARMOR PENETRATOR (SLAP) AMMO MFG PROCESSES	88	1092	98
	AMCCOM	4597	MFG PROC F/CANNON CALIBER DU PENETRATOR (20MM, 25MM, 30MM)	84	374	84
				87	446	
	AMCCOM	8422	HONE FORMING OF RECOIL CYCLINDERS	88	250	119
	AMCCOM	8621	SPRAY FORMING FOR TUBE MANUFACTURE	88	750	123
	AVSCOM	7377	SPF/DB STATIC STRUCTURE FOR TURBINE ENGINES	86	250	142
				87	516	
				88	975	
	AVSCOM	7389	SUPERPLASTIC FORMING OF ALUMINIUM COMPONENTS	84	450	138
				85	256	
	MICOM	1135	LOW COST HEMISPHERICAL SHAPED CHARGES	87	2900	189
				88	3900	
GENERAL	AMCCOM	7985	SMALL ARMS WEAPONS NEW PROCESS PRODUCTION TECHNOLOGY	84	728	127
				85	890	
				86	813	
	AMCCOM	8535	DETERMINATION OF AREAS WITHIN MANTECH FOR FUTURE R+D	88	95	110
	AMCCOM	8671	INCLUSION CONTROL TECHNOLOGY APPLIED TO RAPID FIRE WEAPONS	88	400	114

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METALS (Cont)
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PROCESS	COMMAND	EFFORT	EFFORT TITLE	FY	COST	PAGE
HEAT TREATMENT	AMCCOM	8249	SHORT-CYCLE HEAT TREATING OF WEAPON COMPONENTS	84	132	117
				85	165	
	AMCCOM	8426	APPLICATION OF LASERS TO CANNON MANUFACTURE	84	622	117
				86	128	
	AMCCOM	8433	IN PROCESS CONTROL OF SELAS HEAT TREAT SYSTEM (CAM)	84	125	121
	AMCCOM	8534	CONSERVATION OF ENERGY IN PROCESSING OF WEAPONS COMPONENTS	88	350	112
	AVSCOM	7472	SURFACE HARDENING GEARS BY LASER	84	706	140
				85	56	
				86	250	
				87	250	
	TACOM	4035	LASER PROCESSING OF STEEL COMPONENTS	87	230	207
INSPECTION	AMCCOM	4659	AUTOMATIC INSPECTION FOR ROTATING BAND CHEMISTRY	85	410	84
	AMCCOM	4765	AUTOMATED NDT OF M509 PROJECTILE BODIES	88	730	81
IMIP	TACOM	6057	M-1 COMBAT VEHICLE-MFG TECHNOLOGY	84	1176	202
				85	1569	
				86	1100	
				87	300	
	TACOM	6079	AGT-1500 ENGINE	85	750	206
				86	1795	
				87	3280	
	TACOM	6095	ABRAMS TRANSMISSION PRODUCTIVITY IMPROVEMENTS	87	595	209
JOINING	AVSCOM	7480	DUAL PROPERTY COMPRESSOR IMPELLER	88	1600	144
	TACOM	4037	AUTOMATED ROBOTIC WELDING PARAMETER DEVELOPMENT	86	80	205
	TROSCOM	3801	FREE PISTON STIRLING ENGINE GENERATOR SET	86	400	222
				87	600	
				88	600	
MACHINING	AMCCOM	3703	WASP SHAPED CHARGE LINER	88	500	81
	AMCCOM	4519	OUTLINE AUTOMATIC DETECTION OF TOOL WEAR	88	40	82
	AMCCOM	4637	AUTOMATED MANUFACTURE + INSPECTION OF SFF WARHEAD LINERS	85	980	84
				86	1075	
				87	882	
	AMCCOM	8103	HIGH VELOCITY MACHINING	84	160	120
				87	100	
	AMCCOM	8206	APPLICATION OF HIGH-RATE ABRASIVE MACHINING	88	105	110
	AMCCOM	8351	IMP MFG OF QUADRANT FLATS + MUZZLE BRAKE	87	60	120
	AMCCOM	8449	OPTIMAL RIFLING CONFIGURATION FOR CHROME PLATING	85	140	122
				87	180	
	AMCCOM	8544	WIRE E.D.M. MACHINING OF RIFLING BROACHES	85	70	122
	AMCCOM	8546	MACHINERY CONDITIONS SURVEILLANCE SYSTEM	85	253	118
				86	70	
				87	27	
	AMCCOM	8625	MANUFACTURING OF MULTI-LUG BREECH MECHANISMS	85	80	116
				86	200	
				87	100	

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METALS (Cont)
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PROCESS	COMMAND	EFFORT	EFFORT TITLE	FY	COST	PAGE
MACHINING	AMCCOM	8710	AUTOMATED CONTROL OF CUTTING FLUID CONCENTRATION LEVEL	88	400	115
	AMCCOM	8717	IMPROVED UTILIZATION OF NEW GENERATION MACHINE TOOLS	87	50	115
	AMCCOM	8720	CUTTING TOOL TECHNOLOGY	87	100	116
	AVSCOM	7471	PROCESS CONTROL SYSTEM FOR N/C AND CNC MACHINES	84	250	143
				85	550	
	DESCOM	7004	AUTOMATED ENGINE BLOCK MACHINING	85	730	162
				86	240	
METAL REMOVAL	AMCCOM	8439	IMPROVED RIFLING PROCEDURES	84	80	122
	TACOM	4024	CUTTING FLUID SELECTION/CONTROL SYSTEM	88	250	207
	TACOM	4025	HIGH SPEED MACHINING FOR TANK COMPONENTS	88	180	207
	TACOM	4036	ADVANCED BALANCING MACHINING OF AGT-1500 IMPELLERS/ROTORS	87	520	205
				88	520	
PLATING	AMCCOM	8611	AUTOMATED ANALYSIS AND CONTROL OF PLATING BATHS	87	150	113
	AMCCOM	8712	DISPOSITION OF SPENT CHROMIC ACID PLATING SOLUTION	88	200	115
POWDER METALLURGY	AMCCOM	S021	HOT FORMING OF P/M PROJ BODIES	88	127	98
	AMCCOM	8324	PROCESS CONTROLS FOR P/M WEAPON COMPONENTS	84	160	129
				85	300	
				86	257	
	AMCCOM	8423	P/M FABRICATION OF GUN TUBES	87	350	121
				88	350	
	AMCCOM	8530	LIGHTWEIGHT P/M WEAPON COMPONENTS	87	300	129
				88	320	
	AMCCOM	8613	POWDERED METALS FOR NONFERROUS COMPONENTS	88	120	113
	AMCCOM	8662	FABRICATION OF PM WEAPON COMPONENTS	88	200	130
	AVSCOM	7187	POWDER MET GEARS FOR GAS TURBINE ENGINES	84	500	139
				85	688	
				88	400	
	AVSCOM	7417	LOW COST DISKS BY CAP	84	375	144
				85	538	
				86	450	
	AVSCOM	7453	CERAMIC-FREE ATOMIZATION OF SUPERALLOY POWDER	86	270	144
				87	269	
				88	825	
PROCESS CONTROL	AMCCOM	8716	ENVIRONMENTAL AND ENERGY MONITORING SYSTEM	87	200	124
PROCESS SELECTION	AMCCOM	4397	FABRICATION OF ADVANCED WARHEADS	88	350	82
	AMCCOM	4535	PRECISION TOOLING FOR SMALL CALIBER AMMUNITION	88	270	85
	AMCCOM	4563	XM833 METAL PARTS PRODUCTIVITY	84	2350	83
				86	650	
	AMCCOM	4653	PRE-IMPREGNATED FIBERGLASS ON PROJECTILE BODY	86	539	84
	AMCCOM	4667	CONTINUOUS ELECTROSLAG REMELT OF DU CHIPS FOR RECYCLE	86	672	84
	AMCCOM	4678	LO COST PROD TECH F/SGL MOTION DBL ARTIC WING/FIN DEV SYS	88	100	85

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METALS (Cont)
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PROCESS	COMMAND	EFFORT	EFFORT TITLE	FY	COST	PAGE
PROCESS SELECTION	AMCCOM	4681	IMPROVED CALIBER .50 CASE MANUFACTURE	86	500	99
				87	700	
	AMCCOM	4682	IMPROVED BULLET MFG FOR CALIBER .50 AMMUNITION	86	350	99
				87	450	
	AMCCOM	4769	CERAMIC CRUCIBLES IN MELTING DU MATERIAL F/PENETRATORS	87	825	85
	AMCCOM	4770	MACHINING LONG ROD DU PENETRATORS	85	672	82
				86	1050	
				87	425	
	AMCCOM	8526	PROCESSING OF HIGH STRENGTH/LIGHT WEIGHT WEAPONS COMPONENTS	88	310	129
	TACOM	5074	PRODUCTION TECHNIQUES FOR COMBAT VEHICLE SUSPENSION SYSTEMS	88	1250	209
	TACOM	6403	ADVANCED CERAMIC/COMPOSITE ARMOR	88	1250	203
REPAIR	DESCOM	6004	AUTOMATED CONTAINER REFURBISHMENT	87	250	161
ROLLING	AMCCOM	8605	RING ROLLING OF WEAPON COMPONENTS	88	190	113
	TACOM	4007	ROLLER STRAIGHTENING OF TRACK FINS	88	425	210
SKIVING	AMCCOM	8352	SKIVING OF GUN TUBE BORES	86	440	121
				87	135	
SURFACE TREATMENT	AMCCOM	8522	LASER SURFACE ALLOYING PROCESS FOR IMPROVED WEAR RESISTANCE	88	300	112
	AMCCOM	8523	ION IMPLANTATION OF WEAPON COMPONENTS	88	375	112
	AMCCOM	8552	ELECTROPOLISHING TO IMPROVE TUBE FATIGUE LIFE	85	150	123
				87	150	
	AMCCOM	8606	APPLICATION OF FLUIDIZED BED HEAT TREATMENT	85	74	118
	AMCCOM	8713	INDUCTION HARDENING BY THE SCANNING PROCESS	88	150	115
	AVSCOM	7298	EVALUATION OF HIGH TEMPERATURE CARBURIZING	84	475	139
	TACOM	4038	ADVANCED COATING TECHNOLOGY FOR AGT-1500 ENG COMPONENTS-PH	87	285	205
				88	235	
	TACOM	4514	HARD FACING OF TRACK SHOES	88	200	210
WELDING	AMCCOM	3707	WELDING TECHNOLOGY ADVANCEMENTS (AF83-7)	88	200	85
	AMCCOM	8430	AUTOMATED WELDING OF ROTARY FORGE HAMMERS	84	137	121
	AMCCOM	8431	AUTOMATED WELDING OF BORE EVACUATORS	84	215	121
	AMCCOM	8501	NON-ROTATION METHODS OF FRICTION WELDING	88	460	107
	AMCCOM	8503	ELECTRO-MECHANICAL JOINING TECHNIQUES	88	200	111
	AMCCOM	8545	GAS SHIELDED METAL POWDER ARC WELDING	86	250	113
				87	200	
				88	200	
	AMCCOM	8615	ROBOTIZED WELDING OF BASE PLATE (CAM)	87	150	114
	AMCCOM	8718	WELD REPAIR AND MAINTENANCE OF HSS TOOLING	87	125	116
	AVSCOM	7378	STAINLESS STEEL FABRICATED HOUSING	84	500	140
				85	450	
				86	450	
				87	685	
				88	400	
	TACOM	4011	PULSED HIGH CURRENT RESISTANCE WELDING OF ARMOR PLATE	87	200	201

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METALS (Cont)

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PROCESS	COMMAND	EFFORT	EFFORT TITLE	FY	COST	PAGE
WELDING	TACOM	4577	ATTACHMENT OF COMBINATION ARMOR TO COMBAT VEHICLES	88	1880	202
	TACOM	6038	HIGH DEPOSITION WELDING PROCESSES FOR ARMOR	88	250	202
	TACOM	6099	MANUFACTURING METHODS FOR SPECIALIZED ARMOR MATERIALS	88	2500	203
	TACOM	6125	WELD PROCESS PLANNING AND CONTROL	88	650	202

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MUNITIONS
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PROCESS	COMMAND	EFFORT	EFFORT TITLE	FY	COST	PAGE
ASSEMBLY	AMCCOM	0904	CHEMICAL REMOTE SENSING SYSTEMS	84	1910	62
				85	1441	
				86	425	
				87	75	
	AMCCOM	0924	MANUFACTURING PROCESS FOR GAS MASK CANISTERS	84	800	65
				85	250	
	AMCCOM	0926	MMT FOR XM22 CHEMICAL AGENT ALARM SYSTEM	84	700	62
				85	848	
				86	2892	
				87	412	
	AMCCOM	0927	COMPUTER-AIDED PROCESS PLANNING FOR CB FILTERS	85	200	64
				86	196	
	AMCCOM	0932	PROD PROCESSES F/THE INDIVIDUAL EQUIP DECONTAMINATION KIT	87	880	62
				88	487	
	AMCCOM	4251	AUTO MANU OF DELAY FOR M549 AND XM650 PROJECTILES	88	968	77
	AMCCOM	4510	AUTO ASSY OF ADDITIVE LINER TO TANK CTG	84	295	79
				85	217	
	AMCCOM	4534	MODERNIZED PROCESSES FOR MANUFACTURE OF NATO 5.56MM AMMO	84	1858	97
				85	557	
	AMCCOM	4550	AUTO ASSY OF M22 FLASH SIMULATOR	84	465	77
				86	750	
				87	200	
	AMCCOM	4595	AUTOMATED ASSEMBLY OF M21 FLASH SIMULATOR	86	550	76
				87	750	
				88	200	
	AMCCOM	4606	AUTOMATED ASSEMBLY OF BLU 97/B COMBINED EFFECTS MUNITION	84	1418	76
	AMCCOM	4642	CAL .50 CARTRIDGE FEEDING	88	388	98
	AMCCOM	4643	AUTO LINKING OF CAL .50 AMMUNITION	85	700	99
				86	1300	
	AMCCOM	4760	AUTOMATIC HI-DENSITY ASSEMBLY OF AMMUNITION COMPONENTS	86	500	73
				87	100	
	AMCCOM	5650	INTERIOR SURFACE DECON SYSTEM	87	750	62
				88	700	
BLENDING	AMCCOM	1914	PROCESS ENGINEERING FOR EAK EXPLOSIVE	84	495	68
				85	250	
	AMCCOM	4547	PROCESS TECHNOLOGY FOR IR XM76 GRENADE	84	301	64
	AMCCOM	4548	SAFETY IMPROVEMENTS OF PYROTECHNIC MIXING	84	347	66
				85	114	
	AMCCOM	4573	COMBINED CPD, MIX AND EXTRUSION FOR S.B. PROPS	88	1478	92
	AMCCOM	4615	IMPROVED SOLVENTLESS PASTE BLENDING	85	600	89
				86	753	
				88	200	
	AMCCOM	4660	AUTOMATED BLENDING OF STICK PROPELLANT	85	723	89
				86	1600	
				87	1365	
				88	375	

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MUNITIONS (Cont)
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PROCESS	COMMAND	EFFORT	EFFORT TITLE	FY	COST	PAGE
BLENDING	NAVSEA	1913	PBX CONT CAST FOR BOMB LOADING	87	1000	68
COATING	AMCCOM	4540	CALCIUM CARBONATE COATING OF 7.62MM BALL PROPELLANTS	84	322	88
CRYSTALIZATION	AMCCOM	4566	RDX/HMX RECRYSTALLIZATION PARTICLE SIZE CONTROL	88	350	69
	AMCCOM	4578	MODIFICATION + IMPROVEMENT OF DMSO PILOT PROCESS FOR RDX/HMX	84	435	67
				85	200	
				86	341	
DEHYDRATION	AMCCOM	4690	IMPROVED DEHYDRATION OF NITROCELLULOSE	88	701	91
DRYING	AMCCOM	4027	SOLVENT RECOVERY/DRYING OF SINGLE BASE PROPELLANTS	87	569	66
	AMCCOM	4145	CONTROL DRYING IN AUTO SB AND BALL PROP MFG	85	300	89
	AMCCOM	4449	PROCESS IMPROVEMENT FOR COMPOSITION C-4	85	179	67
				86	185	
ENERGY CONSERVATION	AMCCOM	3714	ALTERNATIVE AZEOTROPIC SOLVENT FOR ACETIC ACID CONCENTRATION	87	25	66
	AMCCOM	4281	CONSERVATION OF ENERGY AT AAPS	84	180	66
				85	95	
				86	286	
	AMCCOM	4699	DEWATERING OF WASTE PROPELLANT INCINERATOR FEED	87	220	89
	AMCCOM	4767	COMBINED SOLVENT RECOVERY + DRYING OF SINGLE BASE PROPELLANT	88	517	93
EXTRUSION	AMCCOM	4572	IMPROVED BATCH PROCESSING OF MULTI BASE PROPELLANTS	87	440	90
				88	547	
	AMCCOM	4656	NITRAMINE PROPELLANT PROCESSING	85	398	90
				86	652	
				87	585	
				88	486	
GENERAL	AMCCOM	3713	EQUIP IDENT + ASSESSMENT TO MAINTAIN A RESPONSIVE PDN BASE	88	750	82
	AMCCOM	3721	MFG PROCESS F/LAP OF IMPROVED MINE SYSTEM	88	750	78
	AMCCOM	3722	MFG PROCESSES F/LAP OF OFF-ROUTE ANTITANK MINE SYSTEM	88	1500	78
	AMCCOM	3723	MFG PROCESS F/LAP OF THE GUIDED ANTIARMOR MORTAR PROJECTILE	88	1500	78
	AMCCOM	3725	MFG PROCESSES F/LAP OF ADVANCED CONCEPT MINE SYSTEMS	88	1500	78
	AMCCOM	3727	MFG PROCESSES FOR VARIABLE TIME FIRING DEVICES	88	250	75
	AMCCOM	3728	MFG PROCESSES F/WIDE AREA SPRAY SYSTEM (SPRAY FAE)	88	750	78
	AMCCOM	3729	MFG PROCESSES F/SPEC CONCRETE STRUCTURE DEMOLITION CHARGES	88	200	70
	AMCCOM	3730	MFG PROCESSES F/SENSOR OFF-ROUTE MINE SYSTEM (STORMS)	88	750	75
	AMCCOM	3731	MFG PROCESSES F/XM742 AND XM762 ELECTRICAL TIMER	88	1000	70
	AMCCOM	3733	MFG PROCESSES F/ADV DET DESIGNS	88	850	79
	AMCCOM	3734	MFG PROCESSES F/SPEED, SAFE PREEMPLOYED EXPLOSIVE DEVICE	88	500	70
	AMCCOM	3735	MFG PROCESS F/WALL BREAKING CHARGE	88	250	79
	AMCCOM	3740	MFG PROCESSES F/IMPROVED STANDOFF DUAL PURPOSE ICM	88	1000	83
	AMCCOM	3741	MFG PROCESSES F/ADV DESIGN ARTILLERY TRAINING AMMUNITION	88	1000	83
	AMCCOM	3745	IMPRVD TECH F/MFG OF 8 IN FIN STABILIZED ART PROJ (CHAMP)	88	1000	83
	AMCCOM	3746	TECHNOLOGY F/LAP OF DIRECT SUPPORT WEAPON SYS (DSWS) AMMO	88	1000	79

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MUNITIONS (Cont)
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PROCESS	COMMAND	EFFORT	EFFORT TITLE	FY	COST	PAGE
GENERAL	AMCCOM	3747	TECHNOLOGY F/MFG OF ADVANCED 75MM AMMUNITION	88	1000	83
	AMCCOM	4452	REPROCESSING DEMILLED EXPLOSIVES	88	325	70
GRINDING	AMCCOM	4574	IMPROVED PROCESS FOR RDX/HMX FINES MANUFACTURE	84	150	67
				85	232	
				86	688	
				87	630	
INSPECTION	AMCCOM	4427	ON-LINE ANALYZERS FOR NITROGUANIDINE PLANT	87	498	92
				88	689	
LOADING	AMCCOM	D001	60MM SMOKE PDN TECH F/IMPROVED SMOKE MUNITION	88	450	77
	AMCCOM	L308	PRESS/INJECTION LOADING OF INSENSITIVE HE	88	200	77
	AMCCOM	P244	MODERNIZATION OF TRACER LOADING	88	750	78
	AMCCOM	1712	FILL AND PRESS TECHNOLOGY F/M8 RP GRENADE	88	340	78
	AMCCOM	2703	THREAD CLEANING/INSPECTION OF HE LOADED MUNITIONS	88	150	77
	AMCCOM	2707	IMPROVED PROCESS FOR HE CAVITY FORMING	88	650	78
	AMCCOM	3710	DEVELOP MANUFACTURING TECHNOLOGY FOR 40MM CS MUNITIONS	88	450	65
	AMCCOM	3724	MFG PROCESSES F/LAP OF THE UNIVERSAL MINE DISPENSING SYSTEM	88	750	78
	AMCCOM	4078	UPGRADE SAFETY READINESS AND PRODUCTIVITY OF EXIST MELT POUR	84	621	79
				87	814	
	AMCCOM	4200	TNT CRYSTALLIZER FOR LG CAL	84	570	80
				85	235	
	AMCCOM	4373	SILK SCREEN DEPOSITION OF PRIMARY EXPLOSIVES	88	1408	79
	AMCCOM	4520	PRESS LOADING OF HMX COMPOSITIONS FOR TANK ROUNDS	84	589	79
				86	618	
	AMCCOM	4522	AUTO CARRIER CLEANING STATION FOR DET FAC	86	400	77
	AMCCOM	4524	AUTO MELT-POUR EQUIP FOR LOADING AP MINES	84	385	80
				86	740	
				87	245	
	AMCCOM	4561	FILL/CLOSE + LAP TECHNOLOGY FOR BINARY IVA MUNITIONS	88	344	80
	AMCCOM	4584	LOADING EQUIPMENT FOR CAL .50 AMMUNITION	86	650	98
				87	1760	
	AMCCOM	4593	60/81MM INCREMENT CONTAINER PACK-OUT SYSTEM	88	800	80
	AMCCOM	4596	PRODUCTION PROCESSES FOR CALIBER .50 PLASTIC BLANK AMMO	88	760	98
MATERIALS HANDLING	AMCCOM	4773	120MM COMBUSTIBLE CASE BODY REMOVAL SYSTEM	84	200	91
				85	230	
NITRATION	AMCCOM	P124	ELECTROCHEMICAL REDUCTION OF DNT AND TNT ISOMERS	88	275	70
PACKAGING	AMCCOM	4351	IMPROVED STORAGE TECHNOLOGY FOR PRODUCTION MACHINE	87	421	96
				88	330	
POLLUTION ABATEMENT	AMCCOM	4348	NOISE POLLUTION ABATEMENT F/SCAMP IN LCAAP	88	264	86
	AMCCOM	4489	ADVANCED POLLUTION ABATEMENT FOR DARCOM FACILITIES	84	917	86
	AMCCOM	4511	DISPOSAL OF FINAL SLUDGE FROM ACID RECOVERY OPERATIONS	84	164	86
				85	275	
				86	370	
				87	47	

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MUNITIONS (Cont)
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PROCESS	COMMAND	EFFORT	EFFORT TITLE	FY	COST	PAGE
POLLUTION ABATEMENT	AMCCOM	4556	ON-LINE MONITORS F/WATER POLLUTANTS GENERATED BY MFR OF EXPL	84	458	87
	AMCCOM	4579	WHITE WATER POLLUTION ABATEMENT	84	374	88
	AMCCOM	4689	EAK EXPLOSIVE WASTEWATER TREATMENT	87	350	87
				88	250	
	AMCCOM	4691	DESTRUCT/REMVL OF EXPLOS FROM WASTEWTR USING SUPERCRIT FLUID	88	275	87
	AMCCOM	4697	SOLVENT REGENERATION OF NITROBODY LADEN ACTIVATED CARBON	88	250	88
	AMCCOM	4758	SOLID WASTE (SLUDGE) DISPOSAL TECHNOLOGY	88	300	86
	AMCCOM	4612	NITRAMINE (LOVA) PROPELLANT WASTEWATERS ABATEMENT	85	250	87
				86	250	
PROCESS CONTROL	AMCCOM	0923	VELOCITY TRAVERSE MAPPER FOR ANNULAR CHARCOAL FILTERS	85	350	63
				86	366	
	AMCCOM	1906	ADAPTIVE CONTROL OF EXPLOSIVES LINES	88	2230	68
	AMCCOM	4613	METHOD F/PROCESS ANALYSIS OF RDX/HMX SLURRY	85	319	69
				86	375	
	AMCCOM	4623	CALCIUM CYANAMIDE PROCESS CONTROL	85	263	92
	AMCCOM	4693	REMOTE AUTOMATIC SAMPLING OF NITROGLYCERINE	87	305	68
				88	380	
	MICOM	3449	OPTIONAL PROPELLANT INGREDIENTS	84	150	195
PROCESS SELECTION	AMCCOM	C012	MULTI-PURPOSE CHEMICAL-BIOLOGICAL DECONTAMINANT	87	500	61
				88	500	
	AMCCOM	C015	IMPROVED CHEMICAL-BIOLOGICAL DECONTAMINANT (ICBD)	88	1138	61
	AMCCOM	D002	IMPROVED AUTOMATED LAP MATERIAL HANDLING TECH	88	1500	80
	AMCCOM	P015	DEVELOP TECHNOLOGY FOR MFG OF DELAY TRAINS	88	400	76
	AMCCOM	0905	MANUFACTURE OF IMPREGNATED CHARCOAL (WHETLERITE)	84	456	63
				85	453	
	AMCCOM	0928	PROC TECH FOR VEHICLE ENGINE EXHAUST SYSTEM	86	418	61
				87	287	
	AMCCOM	0931	MMT FOR ANTIBODIES F/THE CB DETECTION SYSTEMS	86	2000	62
				87	2768	
				88	2169	
	AMCCOM	1348	SUPER TROPICAL BLEACH	84	389	64
	AMCCOM	1367	DEVELOP MFG TECHNOLOGY FOR XM96 CS ROCKET	88	450	78
	AMCCOM	2743	IMPROVED TECH FOR SMALL CALIBER AMMUNITION	88	1000	97
	AMCCOM	3036	INSENSITIVE HIGH EXPLOSIVES FOR LARGE CALIBER SHELLS (NEAK)	87	455	69
				88	545	
	AMCCOM	4491	TECHNOLOGY DATA BASE FOR PINACOLYL ALCOHOL	87	1320	64
				88	597	
	AMCCOM	4594	NITROCELLULOSE (NC) PAPER MANUFACTURING TECHNOLOGY	87	458	91
	AMCCOM	4694	IMPROVED SOLVENT RECOVERY IN RDX/HMX MANUFACTURE	88	325	69
	AMCCOM	4695	AUTOMATED PACKAGING OF RDX/HMX EXPLOSIVES	88	240	69
	AMCCOM	4698	MULTI-PRESSING OF 155MM COMBUSTIBLE CASE COMPONENTS	86	625	75
	AMCCOM	4754	VOLUME PROD OF FLUIDIC REACTION JET CONTROL FRJC SYSTEM	87	550	83
				88	510	

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MUNITIONS (Cont)
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PROCESS	COMMAND	EFFORT	EFFORT TITLE	FY	COST	PAGE
PROCESS SELECTION	AMCCOM	4761	MFG METHODS FOR ALTERNATE MATERIAL CHEMICAL ENERGY WARHEADS	86	775	82
	AMCCOM	4763	MFG PROCESSES FOR CASELESS PROPELLANTS	86	400	92
				87	700	
				88	1000	
	AMCCOM	4771	IMPROVED DF PROCESSES TECHNOLOGY FOR BINARY MUNITIONS	88	208	65
RECLAMATION	AMCCOM	4651	EXPLOSIVE RECLAMATION FACILITY	86	335	87
				87	231	
	DESCOM	7008	LASER MELTING OF EXPLOSIVES IN BOMBS AND PROJECTILES	86	470	165
				87	245	
SAFETY	AMCCOM	4071	EXPLOS PREVENTION IN DRY DUST COLLECTION SYSTEMS	88	194	96
	AMCCOM	4318	ENVIRONMENTAL IMPROVEMENT TO OSHA - NITRIC ESTER	88	100	96
	AMCCOM	4696	ROBOTIC SAMPLING OF IN-PROCESS ENERGETIC MATERIALS	88	175	96
SEALING	AMCCOM	4368	DEVELOP AUTOMATED EQPT FOR SEALING M55 DETONATORS	87	500	76
				88	341	
SEPARATION	AMCCOM	4406	IMPROVE YIELD OF HMX DURING RDX NITROLYSIS	84	217	67
				85	1147	
				86	582	
SOLVENT STICK MFG	AMCCOM	4273	AUTO PRODUCTION OF STICK PROPELLANT	84	1028	89
				85	712	
				86	300	
STICK PROPELLANT MFG	AMCCOM	4531	AUTOMATED PRODUCTION OF MULTI-BASE STICK PROPELLANT ON CAMBL	85	754	90
				86	760	
				87	670	
	AMCCOM	4688	SOLVENT STICK PROPELLANT PROCESSING CHARACTERIZATION	88	527	91
	AMCCOM	4768	SINGLE BASE STICK PROPELLANT PROCESSING	88	1776	93
TESTING	AMCCOM	P001	LEAK STANDARDS FOR DOP PENETRAMETER TESTING	88	210	63
	AMCCOM	P002	LEAK TEST STANDARDS FOR FILTER TESTING OPERATIONS	88	195	63
	AMCCOM	P003	LEAK STANDARDS FOR PROTECTIVE MASK	88	250	65
	AMCCOM	0930	ACCEPTANCE EQUIPMENT FOR XM21 ALARM	86	600	94
				87	600	
				88	600	
	AMCCOM	3718	CONTINUOUS EVALUATION OF THE PROTECTIVE COATINGS	87	2100	93
	AMCCOM	4423	ON-LINE MOISTURE ANALYZER FOR RDX/HMX MFG	88	410	67
	AMCCOM	4523	RAPID MOISTURE ANALYSIS OF EXPLOSIVE MIXES	84	200	76
	AMCCOM	4544	DEVELOP A THIRD GENERATION DYNAGUN TO SIMULATE TANK GUNS	84	416	90
				85	317	
	AMCCOM	4657	BINARY FACILITY MONITORING AND DETECTION SYSTEM	84	290	64
TESTING, CHEMICAL	AMCCOM	0918	MODERNIZATION OF FILTER PENETRATION EQUIPMENT	84	300	63
				85	202	
				86	350	
				87	350	

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MUNITIONS (Cont)
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PROCESS	COMMAND	EFFORT	EFFORT TITLE	FY	COST	PAGE
TESTING, CHEMICAL	AMCCOM	1295	MOD OF CHARCOAL FILTER TEST EQUIPMENT	84	600	64
				85	600	
				86	1250	
				87	1300	
				88	950	
	AMCCOM	4473	AUTO LEAK DETECTION OF WP MUNITIONS	84	410	94
				85	230	
				86	220	

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NON-METALS
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PROCESS	COMMAND	EFFORT	EFFORT TITLE	FY	COST	PAGE
ASSEMBLY	AMCCOM	8538	CERAMIC LINERS FOR GUN TUBE APPLICATIONS	88	450	128
BONDING	AVSCOM	7468	INTEGRATION OF ADVANCED REPAIR BONDING	84	693	136
BRAIDING	AVSCOM	7473	FIBER REINFORCED THERMOPLASTIC STRUCTURES	84	187	138
				85	407	
				86	531	
				87	500	
CASTING	AVSCOM	7484	TITANIUM ALUMINIDE ENGINE COMPONENTS	88	1010	143
COATING	AMCCOM	8464	OPTICAL COATING/MOUNTING PLASTICS F/MILITARY OPTICS	87	490	109
	MICOM	1134	RF/LASER HARDENING OF DOMES FOR DUAL MODE SYSTEMS	85	1000	192
				86	500	
	MICOM	2008	FIELD DEPOT REPAIR OF COMPOSITE COMPONENTS	87	550	194
				88	550	
	TACOM	4021	AUTOMATED PAINT SYSTEM M1 TANK	88	200	204
	TACOM	6107	IMPROVED MBT TRACK	85	450	210
COMPOUNDING	MICOM	1051	REPLACEMENT OF ASBESTOS IN ROCKET MOTOR INSULATIONS	84	150	195
CURING	AVSCOM	7474	SINGLE CURE TAIL ROTOR	84	166	142
				85	68	
				86	106	
CUTTING	AVSCOM	7302	PROD OF TIB2 COATED LONG LIFE TOOLS	84	420	137
				85	112	
FORMING	AVSCOM	7538	RIGID FOAM IN HELICOPTER STRUCTURES	88	530	141
	CECOM	3162	EQUIPMENT HOUSING/ANTENNA OF COMPOSITE MATERIAL	88	150	151
	MICOM	1122	PRODUCTION OF HIGH PERFORMANCE LOW COST CERAMIC IR DOMES	88	450	192
	TACOM	5053	MANUFACTURE OF ENGINE COMPONENTS OF CERAMIC	84	720	206
				85	315	
GENERAL	AVSCOM	7418	COMPOSITE ELECTRO-OPTICAL SYSTEM(EOS)	88	800	138
	AVSCOM	7462	IMPROVED AIRFRAME MANUFACTURING TECHNOLOGY	85	681	136
				86	885	
				87	943	
				88	2142	
	AMC	5052	ARMY ENGINEERING DESIGN HANDBOOK FOR PRODUCTION SUPPORT	84	500	182
				85	750	
				86	875	
				87	875	
				88	875	
IMIP	DESCOM	2002	LONG RANGE DEPOT PRODUCTIVITY IMPROVEMENT PROGRAM - LEAD	84	2500	164
				86	1500	
				85	100	
	TACOM	6090	TOOELE ARMY DEPOT PRODUCTIVITY IMPROVEMENT PROGRAM	84	2500	208
				85	400	
				86	1500	
				87	144	

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NON-METALS (Cont)
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PROCESS	COMMAND	EFFORT	EFFORT TITLE	FY	COST	PAGE
LAY-UP	AVSCOM	7456	LOW COST TOOLING FOR AIRFRAME AND ROTOR COMPONENTS	84	375	137
				85	112	
				86	755	
				87	1325	
				88	1000	
LAY-UP	AVSCOM	7465	ADVANCED COMPOSITE SENSOR SUPPORT STRUCTURE	84	400	136
				85	232	
MOLDING	AVSCOM	7383	USE OF MOLDED PLASTIC HARDWARE IN TWO AXIS DRY GYROSCOPES	84	316	139
				85	238	
	TACOM	6000	LIGHTWEIGHT TILT-UP HOOD/FENDER ASSEMBLY	85	300	204
				86	200	
MOLDING, INJECTION	AVSCOM	7344	RIM URETHANE MOLDING FOR SECONDARY STRUCTURES	84	207	138
				85	256	
	TACOM	4008	RUBBER INJECTION MOLDING OF ROADWHEELS	85	550	205
				86	125	
	TACOM	6123	CERAMIC TURBOCHARGER ROTOR	85	250	206
				86	250	
PROCESS SELECTION	TROSCOM	3815	LOW VULNERABILITY TRACK + ROADWHEELS	86	620	222
				87	770	
				88	1085	
	TACOM	4001	MANUFACTURING FOR CORROSION PREVENTION IN TACTICAL VEHICLES	84	250	204
				85	500	
PULTRUSION	AVSCOM	7539	ULTRASONIC ACTIVATION OF PROCESS HARDWARE F/ADV COMPOSITES	86	200	137
				87	138	
STORAGE	AMCCOM	0913	SPIN COATING OF DECON AGENT CONTAINERS	84	124	61
WEAVING	MICOM	1080	LOW COST CARBON/CARBON NOSETIPS	88	500	194
	TROSCOM	3802	HIGH STABILITY TRUSS CHORD	86	300	221
				87	400	
	AMCCOM	8631	ESTABLISH A PREPREG FACILITY FOR ORGANIC MATRIX COMPOSITES	88	250	120
	AVSCOM	7382	LOW COST COMPOSITE MAIN ROTOR BLADE FOR THE UH-60A	84	925	141
	AVSCOM	7384	PDN OF COMPOSITE PITCH HOUSING	84	862	140
				85	450	
				86	250	
				87	475	
WINDING	AVSCOM	7467	ADVANCED COMPOSITE ROTOR HUB	88	2280	141
	MICOM	1089	INTEGRAL ROCKET MOTOR COMPOSITE POLE PIECES AND ATTACHMENTS	84	475	195
				85	600	
				86	200	
	TACOM	4008	COMPOSITE DRIVE SHAFTS	85	250	205
				86	350	
	TROSCOM	3804	COMPOSITE BOTTOM CHORD FOR MILITARY BRIDGES	86	990	221
				87	990	
WINDING, STRIP	MICOM	1126	WOUND ELASTOMER INSULATOR PROCESS	84	450	195

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TEST AND INSPECTION
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PROCESS	COMMAND	EFFORT	EFFORT TITLE	FY	COST	PAGE
INSPECTION	AMCCOM	4358	AUTO LINE - PROCESS INSPECTION OF NEW EED (ALPINE)	84	250	93
				85	490	
				86	310	
	AMCCOM	4471	CONICAL SURFACE INSPECTION	88	197	94
	AMCCOM	4658	AUTO INSPECTION OF FIBERGLASS WRAP ON ARTILLERY	88	457	95
	AMCCOM	8370	AUTOMATED INSPECTION OF WEAPONS COMPONENTS	84	300	125
				85	225	
				86	250	
	AMCCOM	8434	EDDY CURRENT INSPECTION OF GUN TUBES	84	118	125
	AMCCOM	8510	AUTOMATED INSPECTION OF RECOIL COMPONENTS	86	140	125
				87	300	
	AMCCOM	8561	DIGITAL IMAGE DIAGNOSTIC TECHNIQUES	88	150	124
	AMCCOM	8636	IMPROVE BOLT MFG PROCESSES + BARREL INSP TECH FOR THE MIG	87	200	128
	AMCCOM	8719	AUTOMATED INSPECTION OF MINOR COMPONENTS	87	80	127
	CECOM	3104	AUTO INFRARED SCANNING OF HGCDTE WAFERS	88	200	149
	TACOM	4026	LASER INSPECTION OF INTERNAL THREADS	88	80	209
METROLOGY	TACOM	6054	ADVANCED METROLOGY SYSTEMS INTEGRATION	88	1000	208
SIMULATION	AMCCOM	0925	PROTECTIVE MASK LEAKAGE TESTING	84	600	65
				85	230	
	AMCCOM	2856	SHOCK IMPULSE HYDROSTATIC TESTING	88	205	95
	AMCCOM	8573	GENERIC GUN GYNMASTICATOR	85	105	126
				86	552	
				87	500	
				88	350	
	DESCOM	3001	POWER AND INERTIA SIMULATOR (PAISI) COMBAT VEHICLE TESTING	85	1796	161
				86	1204	
	DESCOM	4009	ADVANCED PAISI SYSTEM	88	500	161
	TECOM	5073	TECOM PRODUCTION TEST METHODOLOGY ENGINEERING MEASURES	84	175	215
				85	193	
				86	208	
				87	228	
				88	247	
SOFTWARE	CECOM	3132	SOFTWARE TOOLS FOR PROGRAMMING ATE	87	230	150
				88	300	
	CECOM	3157	TPS GENERATION TOOLS AND METHODS	87	300	150
				88	150	
TESTING	AMCCOM	4164	ANALYSIS FOR PREDICTING FAILURE OF MFG TOOLING	86	230	85
	AMCCOM	4570	IMPR MFS PRO TES PROC F/XM762 ARTY ELECT TIME FUZE	84	387	71
				85	970	
				86	780	
	AMCCOM	4588	SMALL CAL AUTOMATED NON-DESTRUCTIVE TEST - SCANT	88	1415	88

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TEST AND INSPECTION (Cont)
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PROCESS	COMMAND	EFFORT	EFFORT TITLE	FY	COST	PAGE
TESTING	TECOM	5072	TECOM PRODUCTION TEST METHODOLOGY ENGINEERING MEASURES	84	375	
				85	413	215
				86	452	
				87	488	
				88	523	
TESTING, CHEMICAL	AMMRC	6350	MATERIALS TESTING TECHNOLOGY (MTT)	85	650	182
				86	700	
				87	700	
				88	780	
TESTING, ELECTRICAL	AMMRC	6350	MATERIALS TESTING TECHNOLOGY (MMT)	84	807	182
				85	1100	
				86	1500	
				87	1700	
				88	1920	
	TMDE	3115	ENGINEERING FOR CALIBRATION EQUIPMENT	84	1000	196
				85	900	
				86	1000	
TESTING, MECHANICAL	AMMRC	6350	MATERIALS TESTING TECHNOLOGY (MTT)	84	550	183
				85	750	
				86	750	
				87	800	
				88	800	
TESTING, NDT	AMCCOM	1805	IMPROVED PRODUCTION VIBRATION TESTS-M732 (PIP) FUZE	85	200	74
				86	250	
	AMCCOM	3719	APPLICATION OF X-RAY SYSTEM SCANNER 100 PCT	87	2200	94
	AMCCOM	4539	AUTOMATIC CARTRIDGE CASE HARDNESS MEASUREMENT	84	182	97
				85	397	
	AMCCOM	4541	AUTO PRIMER INSERT LACQUER AND ANVIL PRESENCE INSPECT SYS	84	374	97
	AMCCOM	4545	DIGITAL IMAGE AMPLIFICATION X-RAY SYSTEM	86	936	95
				87	383	
	AMCCOM	4598	AUTO NON-DEST DENSITY DETERMINATION EXPLOSIVE PROJECTILES	86	415	94
	AMCCOM	4645	AUTOMATED CUP INSPECTION	86	509	99
	AMCCOM	8436	QUENCH CYCLE PROFILE MEASUREMENT SYSTEM	84	148	125
				85	147	

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TEST AND INSPECTION (Cont)
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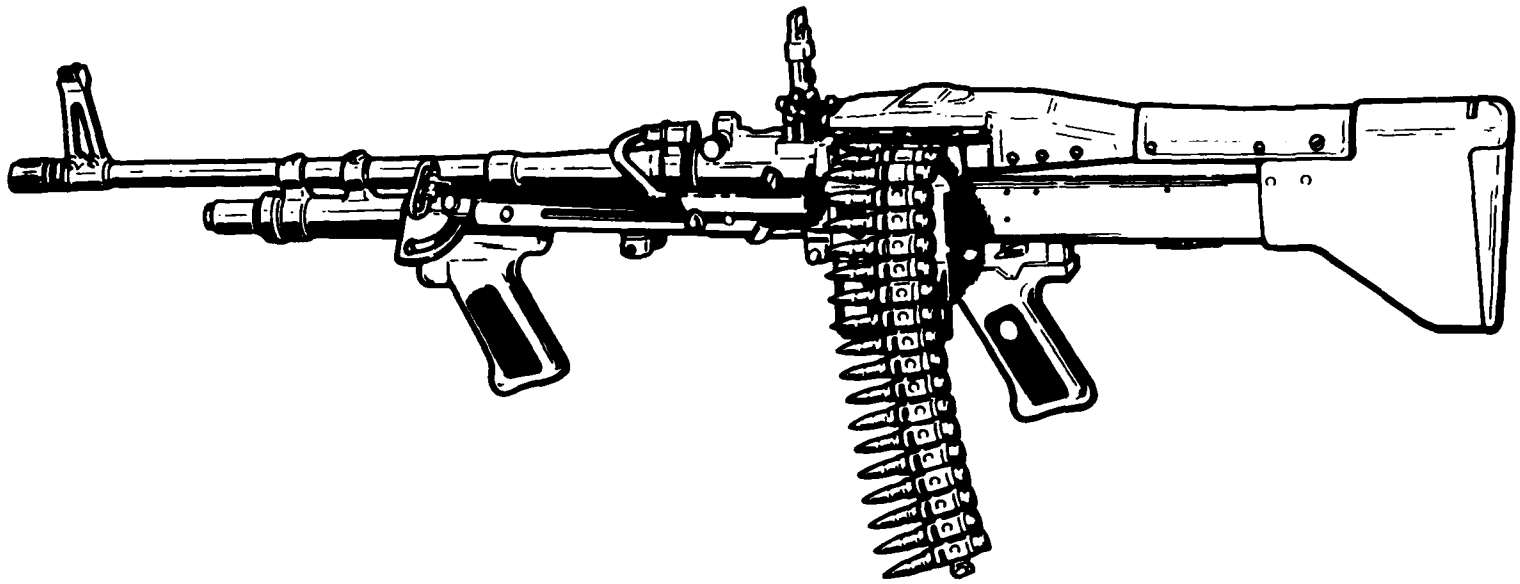
PROCESS	COMMAND	EFFORT	EFFORT TITLE	FY	COST	PAGE
TESTING, NDT	AMMRC	6350	MATERIALS TESTING TECHNOLOGY (MTT)	84	1830	183
				85	2500	
				86	2550	
				87	2800	
				88	3000	
	AVSCOM	7371	INTEGRATED BLADE INSPECTION SYSTEM (IBIS)	84	566	143
	TACOM	4010	AUTOMATED ROADWHEEL TEST MACHINE	88	160	210
	TACOM	4012	LASER VIBRATION DEPOT INSPECTION SYSTEM	85	360	206
	TACOM	4034	ADVANCED NDT INSPECTION TECHNOLOGY	88	300	203
	TECOM	5071	TECOM PRODUCTION METHODOLOGY ENGINEERING MEASURES	84	450	215
				85	494	
				86	540	
				87	584	
				88	630	

VI. COMMAND PLANS



ARMAMENT, MUNITIONS AND CHEMICAL COMMAND (AMCCOM)

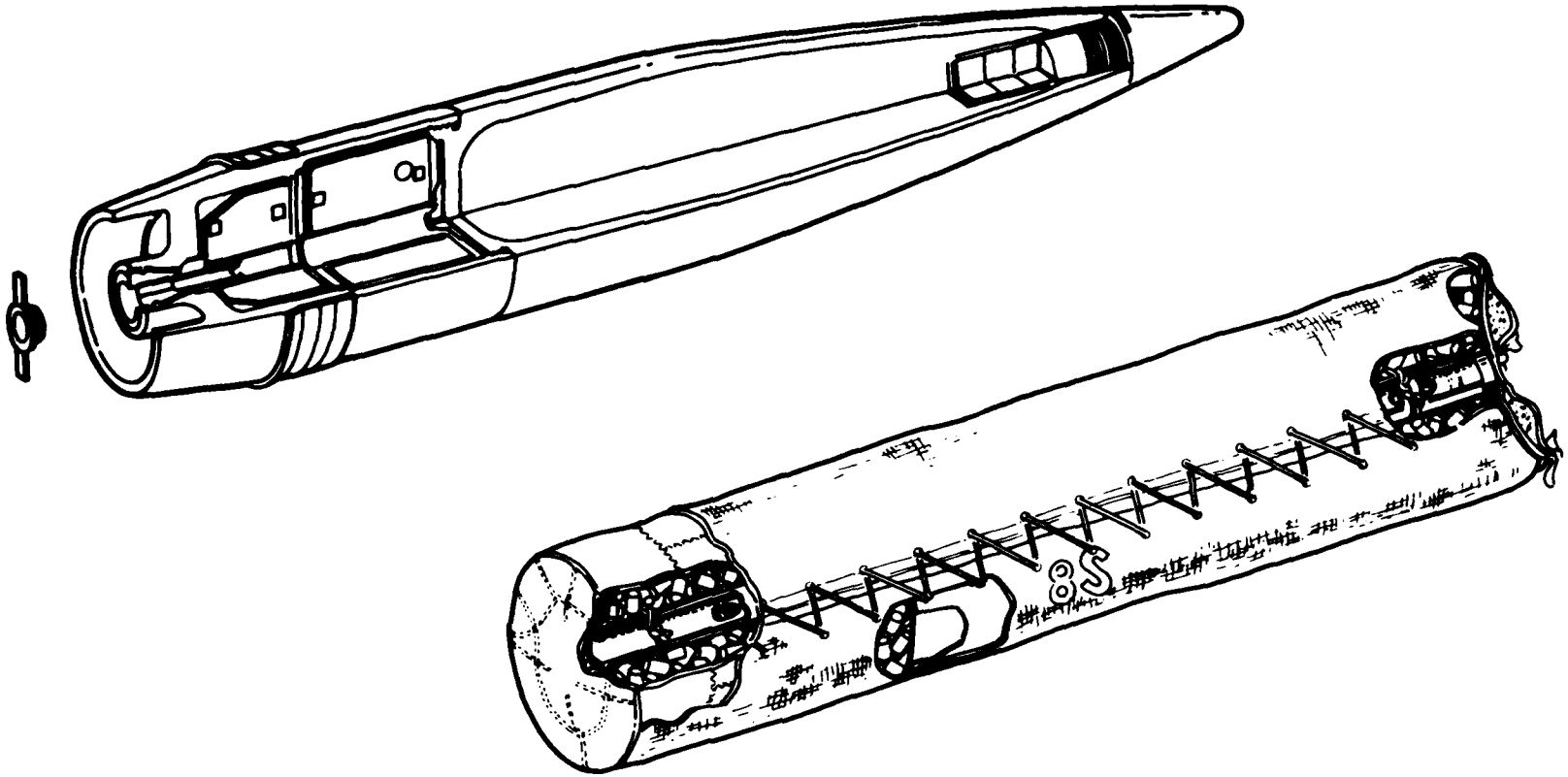
US ARMY ARMAMENT, MUNITIONS AND CHEMICAL COMMAND (AMCCOM)

AMCCOM, with headquarters at Rock Island, IL, provides and performs life-cycle management over the accomplishment of total research, development, engineering, procurement, and materiel readiness functions for conventional and nuclear weapons; ammunition (artillery, infantry, gun type air defense, surface vehicle mounted and aircraft mounted); fire control systems; chemical warfare and chemical biological defensive systems/materiel; Ammunition Peculiar Equipment (APE); Test Measurement, and Diagnostic Equipment (TMDE); and tools and maintenance equipment.

AMCCOM is also the single manager for the procurement, production, supply, maintenance and transportation of conventional ammunition for the Department of Defense.

The AMCCOM complex includes the Headquarters, two research and development centers, three project managers, four arsenals, 30 ammunition plants and activities, Defense Ammunition Center and School, and various other field and support activities. The two research and development centers (Chemical and Armament) are located at Aberdeen Proving Ground, Maryland and Dover, New Jersey respectively. The Armament Research and Development Center includes the Large Caliber Weapon Systems Laboratory, the Fire Control and Small Caliber Weapon Systems Laboratory and the Ballistic Research Laboratory. These two research and development centers are responsible for research, design, development and life cycle engineering for assigned materiel. Rock Island Arsenal in Illinois is best known for the production and assembly of gun mounts, receivers and recoil mechanisms, and for its tool set assembly mission. Watervliet Arsenal has the unique mission of producing gun and cannon tubes for the Army, Navy and Marines. Pine Bluff Arsenal is responsible for defensive chemical munitions and equipment and is the only current site at which white phosphorous-filled items are loaded. Rocky Mountain Arsenal performs demilitarization of obsolete chemical agent identification sets.

The command is staffed by approximately 22,000 military and civilian personnel. Also, 18,000 persons are employed by contractors at AMCCOM plants.



ARMAMENT, MUNITIONS AND CHEMICAL COMMAND
(AMCCOM)
(AMMUNITION)

CATEGORY	PAGE
Camouflage	61
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Small Arms	96

AMMUNITION PROGRAM

Bridging the technology gap, particularly in those areas that have no civilian counterpart, is a challenging task for the Ammunition MMT Program. In many respects, the Ammunition program presents unique problems which require innovative solutions. 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.

The primary objective of the Ammunition 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.

In response to the Warsaw Pact's formidable offensive capability to wage chemical warfare, our capability to produce chemical and biological defense systems are being upgraded. Improved manufacturing techniques are required for decontamination kits, chemical agent detection/warning systems and protective gear. The most sophisticated of these systems are first generation sensors which can detect the presence of toxic agents at remote distances. Hand fabrication methods used during initial development are unsuitable for quantity production. The MT program will develop new techniques for fabricating sterling cycle coolers, optics, interferometers and cyrogenic detectors. These detection system components will be processed in pilot facilities where the new techniques can be evaluated prior to full-scale production.

High rate production is scheduled, late in the 1980s, for a new precision guided munition for the 8-inch howitzer. It is called sense and destroy armor (SADARM). The SADARM projectile is fuzed to eject submunitions over the target area. While each submunition descends, its fuze detects the infrared signature of a target such as an armored vehicle. The fuze also selects the exact moment to fire the warhead which strikes and penetrates the relatively soft top of the target. SADARM fuze production will benefit from the automated manufacturing, assembly and testing techniques being developed for millimeter wave devices during this five-year period.

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.

AMCCOM

COMMAND FUNDING SUMMARY
(THOUSANDS)

CATEGORY	FY84	FY85	FY86	FY87	FY88
CAMOUFLAGE	0	0	418	287	0
CHEMICAL	6817	4688	7479	8355	7854
ENERGY CONSERVATION	180	95	286	594	0
EXPLOSIVES	1297	2327	2171	2390	5780
FUZES	1409	14617	6740	6964	6821
GENERAL	0	307	1450	1681	1881
LAP	4543	452	3058	2509	17801
METAL PARTS	2724	2327	4991	3128	9302
POLLUTION ABATEMENT	1913	525	955	628	1339
PROPELLANTS	1966	4297	4465	4936	9711
QUALITY CONTROL/TESTING	660	720	2481	5283	1459
SAFETY	0	0	0	0	469
SMALL ARMS	2414	1654	3309	3331	3925
TOTAL	23923	32009	37803	40066	66342

CATEGORY
CAMOUFLAGE

FUNDING ($000)

	PRIOR	84	85	86	87	88
COMPONENT -- GENERAL						
(0928) TITLE - PROC TECH FOR VEHICLE ENGINE EXHAUST SYSTEM				416	267	

PROBLEM - AN URGENT NEED WAS ESTABLISHED BY TRADOC FOR AN M-1 TANK SMOKE SYSTEM THAT WILL BLIND DEVICES WHICH DETECT IN THE IR SPECTRUM. A VEHICLE ENGINE EXHAUST SYSTEM USED AS THE MEANS TO DISSEMINATE THE IR SCREENING AGENT PRESENTS PRODUCTION PROBLEMS.

SOLUTION - PROCESS STUDIES WILL INCLUDE, IR AGENT PREPARATION AND TREATMENT, MATERIAL HANDLING, AND LOADING TECHNOLOGY FOR THE CONTAINERS.

CATEGORY
CHEMICAL

COMPONENT -- DECONTAMINATION						
(C012) TITLE - MULTI-PURPOSE CHEMICAL-BIOLOGICAL DECONTAMINANT					500	500

PROBLEM - PRODUCTION PROCESS ENGINEERING PROBLEMS MUST BE IDENTIFIED DURING R+D USING PEP FUNDS. PROCESS TECHNOLOGY REQUIRED UNDER PRODUCTION CONDITIONS FOR COMPLEX AREAS MUST BE INVESTIGATED.

SOLUTION - AS A RESULT OF PEP, ESTABLISH PILOT FACILITIES AND PROVE OUT THE MASS PRODUCTION FEASIBILITY OF COMPLEX PROCESSES AND FABRICATION. PROVIDE D OF M AND PROCESS TOOLING DESIGN DATA.

(C015) TITLE - IMPROVED CHEMICAL-BIOLOGICAL DECONTAMINANT (ICBD)						1138

PROBLEM - PRODUCTION PROCESS ENGINEERING PROBLEMS MUST BE IDENTIFIED DURING R+D USING PEP FUNDS. PROCESS TECHNOLOGY REQUIRED UNDER PRODUCTION CONDITIONS FOR COMPLEX AREAS MUST BE INVESTIGATED.

SOLUTION - AS A RESULT OF PEP ESTABLISH PILOT FACILITIES AND PROVE OUT THE MASS PRODUCTION FEASIBILITY OF COMPLEX PROCESSES. PROVIDE D OF M AND PROCESS TOOLING DESIGN DATA.

(0913) TITLE - SPIN COATING OF DECON AGENT CONTAINERS	345	124				

PROBLEM - CURRENT METALLIC DECON AGENT CONTAINERS CORRODE BEFORE THE REQUIRED SHELF LIFE OF THE AGENTS IS REACHED. ALTERNATIVE CONTAINERS ARE NOT AVAILABLE, BUT PLASTIC LINERS HAVE BEEN SHOWN TO EXTEND THE LIFE OF CURRENT CONTAINERS SIGNIFICANTLY.

SOLUTION - ESTABLISH THE SPIN COATING,OR ROTATIONAL MOLDING, TECHNIQUE FOR COATING THE INSIDE OF CURRENT METALLIC CONTAINERS WITH CHEMICALLY RESISTANT POLYMERS FOR THE PRODUCTION ENVIRONMENT.

	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- DECONTAMINATION (CONTINUED)						
(0932) TITLE - PROD PROCESSES F/THE INDIVIDUAL EQUIP DECONTAMINATION KIT					680	487
PROBLEM - PRODUCTION PROBLEMS HAVE BEEN ENCOUNTERED WITH THE PERSONAL DECONTAMINATION KIT. AREAS OF CONCERN ARE THE HEAT SEALING OF THE PACKETS, AMPULE MANUFACTURING, AND CHLORAMINE B DUSTING.						
SOLUTION - ACQUIRE AND PROVE OUT STATE-OF-THE-ART PRODUCTION EQUIPMENT OPERATIONS, WITH EMPHASIS ON PROCESS AUTOMATION.						
(0650) TITLE - INTERIOR SURFACE DECON SYSTEM					750	700
PROBLEM - PRODUCTION PROCESS ENGR PROBLEMS MUST BE IDENTIFIED DURING R+D USING PEP FUNDS. PROCESS TECHNOLOGY REQD UNDER PRODUCTION CONDITIONS FOR COMPLEX AREAS WILL HAVE TO BE INVESTIGATED.						
SOLUTION - AS A RESULT OF PEP, ESTABLISH PILOT FACILITIES AND PROVE OUT THE MASS PRODUCTION FEASIBILITY OF COMPLEX PROCESSES AND FABRICATION. PROVIDE D OF M AND PROCESS TOOLING DESIGN DATA.						
COMPONENT -- DETECTION/WARNING						
(0904) TITLE - CHEMICAL REMOTE SENSING SYSTEMS	300	1910	1441	425	75	
PROBLEM - FIRST GENERATION CHEMICAL REMOTE SENSING SYSTEMS HAVE HIGH PRIORITY. THEY REQUIRE COMPLEX, UNIQUE, SOPHISTICATED COMPONENTRY WHICH IS NOT AVAILABLE TOO MEET PRODUCTION REQUIREMENTS. COMPONENTS WILL BE HAND FABRICATED FOR INITIAL DEVELOPMENT.						
SOLUTION - IN ORDER FOR PRODUCTION TO BEGIN AS SOON AS POSSIBLE IT IS NECESSARY THAT APPROPRIATE MANUFACTURING TECHNOLOGY START BEING DEVELOPED NOW. CONTRACTORS WITH NECESSARY EXPERIENCE WILL BE UTILIZED TO ESTABLISH PROCEDURES, ETC. FOR QUANTITY MANUFACTURING.						
(0926) TITLE - MMT FOR XM22 CHEMICAL AGENT ALARM SYSTEM		700	848	2892	412	
PROBLEM - A CHEMICAL AGENT ALARM SYSTEM, XM22 IS CURRENTLY UNDER DEVELOPMENT TO PROVIDE CAPABILITY OF CHEMICAL DEFENSE. COMPLEX COMPONENTS IN THE ALARM ARE DIFFICULT TO PRODUCE AND LACK AVAILABLE HIGH PRODUCTION TECHNIQUES.						
SOLUTION - ESTABLISH METHODS TO PRODUCE THE COMPLEX COMPONENTS OF THE XM22 ALARM AND INSURE MASS PRODUCTION AND DOCUMENT THE DESCRIPTION OF MANUFACTURE.						
(0931) TITLE - MMT FOR ANTIBODIES F/THE CB DETECTION SYSTEMS				2000	2705	2169
PROBLEM - THE USE OF ANTIBODIES TO DETECT CHEMICAL AND BIOLOGICAL AGENTS HAS NOT BEEN ESTABLISHED AS A PRODUCTION PROCESS.						
SOLUTION - A PRODUCTION BASELINE WILL BE ESTABLISHED FOR ANTIBODIES TO SUPPORT THE PRODUCT IMPROVED M272 AND M256 KITS.						

MMT FIVE YEAR PLAN
RCS DRCMT 126

	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- FILTERS						
(F001) TITLE - LEAK STANDARDS FOR DOP PENETRAMETER TESTING						210
PROBLEM - THE SCALE FOR PASSING A CANISTER FLASH FILTER REQUIRES ACCURATE READING OF INITIAL MASS FLOW AND THE DOWN STREAM MASS FLOW OF THE DOP AEROSOL.						
SOLUTION - IN ORDER TO READ INSTANTANEOUS MASS FLOW, ONE MUST BE ABLE TO COUNT AND MEASURE PARTICLE SIZE WITHIN A SHORT TIME FRAME.						
(F002) TITLE - LEAK TEST STANDARDS FOR FILTER TESTING OPERATIONS						195
PROBLEM - IN ORDER TO CONDUCT RELIABLE FILTER LEAK TESTING PROCEDURES, AN INDEPENDENT LEAK STANDARD IS REQUIRED TO AFFECT CALIBRATION OF THE TEST EQUIPMENT AND AID IN THE VERIFICATION OF FAILURES.						
SOLUTION - STANDARD FILTERS WITH BUILT-IN CALIBRATED LEAKS SHOULD BE FABRICATED TO PROVIDE KNOWN LEAK RATES ABOVE AND BELOW THE FILTER BREAK POINT. THESE STANDARDS CAN THEN BE UTILIZED TO EVALUATE PROPER OPERATION OF THE TESTING SYSTEM.						
(0905) TITLE - MANUFACTURE OF IMPREGNATED CHARCOAL (WHETLERITE)	282	456	453			
PROBLEM - ONLY ONE COMPANY (CALGON, INC) SUPPLIES WHETLERIZED CHARCOAL AND CONSIDERS ITS PROCESS PROPRIETARY. THIS MATERIAL IS VITAL FOR NEW PROTECTIVE MASKS. A PROCESS MUST BE DEVELOPED TO DIVERSIFY PRODUCTION BASE AND REDUCE COST THROUGH COMPETITION.						
SOLUTION - MMT PROJECT 5 76 1296 DEMONSTRATED THAT, USING DILUTE SOLUTIONS OF IMPREGNANTS AND MULTI-STAGE SOAKING AND DRYING OF CHARCOAL, SEVERAL CHARCOALS SHOWED DRAMATIC PROTECTION IMPROVEMENT. THIS PROJECT WILL USE THESE RESULTS TO ESTABLISH A PROCESS DESIGN						
(0918) TITLE - MODERNIZATION OF FILTER PENETRATION EQUIPMENT		300	202	350	350	
PROBLEM - CURRENTLY, ALL PROTECTIVE PARTICULATE FILTERS ARE TESTED WITH THREE TYPES OF EQUIPMENT. THIS EQUIPMENT IS OBSOLETE, INEFFICIENT, AND UNRELIABLE.						
SOLUTION - DEVELOP PROTOTYPE TESTERS WITH SOLID STATE COMPONENTS UTILIZING STATE OF ART TECHNOLOGY.						
(0922) TITLE - VELOCITY TRAVERSE MAPPER FOR ANNULAR CHARCOAL FILTERS			350	366		
PROBLEM - GAS FILTERS MUST BE MONITORED DURING THE MANUFACTURING PROCESS TO ASSURE THE INTEGRITY OF THE CHARCOAL BED BEFORE ASSEMBLY.						
SOLUTION - A VELOCITY TRAVERSE TECHNIQUE WILL BE ADAPTED TO MEASURE AIR VELOCITIES THROUGH ANNULAR CHARCOAL FILTERS.						

		FUNDING ($000)					
		PRIOR	84	85	86	87	88
COMPONENT -- FILTERS (CONTINUED)							
(0927)	TITLE - COMPUTER AIDED PROCESS PLANNING FOR CB FILTERS			200	196		
	PROBLEM - ALTHOUGH AN EXTENSIVE AMOUNT OF INFORMATION ON CHEMICAL AND BIOLOGICAL GAS FILTERS (FILTER PERFORMANCE DATA, PROCESS DESIGN INTEGRITY, PRODUCIBILITY, ETC.) EXISTS, A STRUCTURED DATA BASE IS NOT AVAILABLE.						
	SOLUTION - DEVELOP A COMPUTER AIDED PROCESS PLANNING SYSTEM FOR CB FILTERS. THIS SYSTEM WILL THEN BE MADE AVAILABLE TO INDUSTRY THROUGH APPLICABLE PROCUREMENTS.						
(1295)	TITLE - MOD OF CHARCOAL FILTER TEST EQUIPMENT	821	600	600	1250	1300	950
	PROBLEM - CHARCOAL FILTER TESTING EQUIPMENT NEEDED TO PROVIDE TESTING CAPABILITY FOR VARIOUS CHEMICAL AGENTS DOES NOT EXIST.						
	SOLUTION - DESIGN A MODULAR TESTING SYSTEM FOR VARIOUS FILTER SYSTEMS.						
COMPONENT -- PROCESSES							
(1348)	TITLE - SUPER TROPICAL BLEACH	1364	389				
	PROBLEM - THERE IS A MAJOR SHORTFALL BETWEEN THE FY78 REQUIREMENTS FOR THIS ITEM AND THE QUANTITY OF IMPORTED CHLORINATED LIME KNOWN TO BE AVAILIABLE.						
	SOLUTION - THIS PROJECT WILL PROVIDE THE BASIC DESIGN OF A SUPER TROPICAL BLEACH FACILITY. STUDIES WILL INCLUDE POLLUTION ABATEMENT AND CONTROL EQUIPMENT TO ASSURE COMPLIANCE WITH OSHA AND EPA STANDARDS.						
(4451)	TITLE - TECHNOLOGY DATA BASE FOR PINACOLYL ALCOHOL					1020	597
	PROBLEM - PINACOLYL ALCOHOL IS NOT CURRENTLY AVAILABLE COMMERCIALLY IN PRODUCTION QUANTITIES AND THEREFORE, THE ARMY HAS NO AVAILABLE SUPPLY TO SUPPORT PRODUCTION OF HIGH PRIORITY BINARY IVA CHEMICAL MUNITIONS.						
	SOLUTION - THIS PROJECT WILL ESTABLISH THE OPTIMUM CHEMICAL PROCESSES AND OPERATIONAL MODES FOR PRODUCTION OF PINACOLYL ALCOHOL AND DEVELOP A TECHNICAL DATA BASE FOR SCALE-UP TO COMMERCIAL OF GOVERNMENT PRODUCTION FACILITIES						
(4547)	TITLE - PROCESS TECHNOLOGY FOR IR XM76 GRENADE	319	301				
	PROBLEM - NEW IR SMOKE SCREENING TECHNOLOGY NEEDED.						
	SOLUTION - DEVELOP PROCESS TECHNOLOGY FOR FUTURE IPF.						
(4657)	TITLE - BINARY FACILITY MONITORING AND DETECTION SYSTEM		290				
	PROBLEM - A RAPID AND SENSITIVE MEANS OF DETECTING METHYL PHOSPHORIC DIFLUORIDE (DF) WHICH WILL AVOID GENERATION OF THE TOXIC GB IS ESSENTIAL TO THE SAFE OPERATION OF THE INTEGRATED BINARY PROD FAC AT PINE BLUFF ARSENAL.						
	SOLUTION - HYFED AND TECHNICON DETECTORS ARE PROMISING CANDIDATES. THEY WILL BE TESTED TO DETERMINE THEIR SENSITIVITY, STABILITY, AND RELIABILITY OF MONITORING DF WHILE AVOIDING GENERATION OF GB.						

	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- PROCESSES (CONTINUED)						
(4771) TITLE - IMPROVED OF PROCESSES TECHNOLOGY FOR BINARY MUNITIONS						200
PROBLEM - IN THE CURRENT PRODUCTION OF METHYLPHOSPHONIC DIFLUORIDE, THERE IS PRODUCT LOST DURING PURIFICATION AND DISTILLATION.						
SOLUTION - THE EFFICIENCY OF THE PRODUCTION PROCESS WILL BE IMPROVED BY MODIFYING THE REACTOR AND DISTILLATION PRESSURES, USE ALTERNATE PACKING MATERIALS, AND VARYING REFLUX RATIOS DURING DISTILLATION.						
COMPONENT -- PROTECTIVE GEAR						
(FC03) TITLE - LEAK STANDARDS FOR PROTECTIVE MASK						250
PROBLEM - AN INDEPENDENT LEAK TESTING STANDARD IS REQUIRED FOR OPERATION OF PROTECTIVE MASK ACCEPTANCE TEST EQUIPMENT. THE PRESENT PROCEDURE IS SUBJECT TO CONSIDERABLE OPERATOR ERROR IN DETERMINING THE PASS OR FAIL OF A PROTECTIVE MASK.						
SOLUTION - A LEAK TEST STANDARD CONTAINING A KNOWN LEAK FACTOR WILL BE PROVIDED IN ORDER TO CALIBRATE THE EQUIPMENT WHICH WILL ALLOW THE OPERATOR LITTLE CHANCE FOR MISINTERPRETING THE FAILURE POINT.						
(0924) TITLE - MANUFACTURING PROCESS FOR GAS MASK CANISTERS	283	800	250			
PROBLEM - THE CANADIAN GAS MASK CANISTER IS BEING ADAPTED TO THE US STANDARDS UNDER A MACI PROGRAM. THE CANADIANS ARE HAVING DIFFICULTY PRODUCING THE CANISTERS RESULTING IN HIGH REJECT RATE.						
SOLUTION - PROVIDE A PILOT FACILITY FOR THE EQUIPMENT, TOOLING AND TEST EQUIPMENT TO ESTABLISH AND DOCUMENT THE MANUFACTURING PROCESS FOR PRODUCING ACCEPTABLE CANISTERS.						
(0925) TITLE - PROTECTIVE MASK LEAKAGE TESTING	199	600	230			
PROBLEM - CURRENT GAS MASK TESTER DOES NOT SIMULATE THE ACTUAL FIELD USE AND IS NOT SENSITIVE ENOUGH TO DETECT SMALL LEAKS						
SOLUTION - DEVELOP A MASK LEAKAGE TESTER THAT SIMULATES ACTUAL USAGE AND PROVIDES MAXIMUM SENSITIVITY TO CHALLENGE VAPORS.						
COMPONENT -- PYROTECHNICS						
(3710) TITLE - DEVELOP MANUFACTURING TECHNOLOGY FOR 40MM CS MUNITIONS						450
PROBLEM - CURRENT PRODUCTION FACILITIES EXIST ONLY IN PRIVATE INDUSTRY. THIS MUNITION WILL NOW BE PRODUCED IN GOGO FACILITY FOR MLB PURPOSES. CURRENT PROCESS REQUIRES IMPROVEMENTS FOR OSHA/EPA STANDARDS.						
SOLUTION - PROVIDE PILOT FACILITY TO PROVE OUT THE TOP. PROVIDE DESIGN CRITERIA AND PROCESS BASELINE FOR THE LAP OF CS MUNITIONS.						

	FUNDING ($000)					
	PRIOR	84	85	86	87	88

COMPONENT -- PYROTECHNICS (CONTINUED)

(4546) TITLE - SAFETY IMPROVEMENTS OF PYROTECHNIC MIXING	1687	347	114			

PROBLEM - PYROTECHNIC MIXING REQUIRES INCREASED PERSONNEL SAFETY FEATURES.

SOLUTION - EVALUATE CURRENT PROCESS AND INCREASE OPERATOR SAFETY THROUGH ADAPTION OF PROCESS CHANGES. IMPLEMENTATION THROUGH FOLLOW-ON FY86 MODERNIZATION PROJECT.

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* C A T E G O R Y *
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*ENERGY CONSERVATION *
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COMPONENT -- GENERAL

(3714) TITLE - ALTERNATIVE AZEOTROPIC SOLVENT FOR ACETIC ACID CONCENTRATION					25	

PROBLEM - CURRENT ACETIC ACID CONCENTRATION PROCESS AT HSAAP USES N-PROPYL ACETATE AS AN EXTRACTING AGENT TO REMOVE WATER FROM THE ACETIC ACID. THE CURRENT PROCESS USES VERY LARGE QUANTITY OF ENERGY FOR THIS PROCESS

SOLUTION - REPLACE THE N-PROPYL ACETATE WITH N-BUTYL ACETATE OR SULFURIC ACID. N-BUTYL ACETATE AND SULFURIC ACID ARE POTENTIALLY MUCH MORE EFFICIENT AZEOTROPIC AGENTS THAN N-PROPYL ACETATE.

(4027) TITLE - SOLVENT RECOVERY/DRYING OF SINGLE BASE PROPELLANTS	63				569	

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.

(4261) TITLE - CONSERVATION OF ENERGY AT AAPS	16691	180	95	286		

PROBLEM - ENERGY MAY NOT BE AVAILABLE IN THE FUTURE TO MEET PRODUCTION REQUIREMENTS.

MMT FIVE YEAR PLAN
RCS DRCMT 126

	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- HMX/RDX						
(4406) TITLE - IMPROVE YIELD OF HMX DURING RDX NITROLYSIS	670	217	1147	582		
PROBLEM - THE CURRENT MANUFACTURING PROCESS FOR HMX IS INEFFICIENT IN THAT YIELDS OBTAINED ARE STILL LESS THAN THEORETICAL.						
SOLUTION - THE CURRENT BACHMANN PROCESS WILL BE MODIFIED TO INCREASE THE HMX YIELD BEYOND 30 PERCENT.						
(4423) TITLE - ON-LINE MOISTURE ANALYZER FOR RDX/HMX MFG						410
PROBLEM - THERE IS CURRENTLY NO ON-LINE MOISTURE ANALYZER FOR RDX/HMX MANUFACTURE FOR COMP B AND OCTOL.						
SOLUTION - PROVIDE AN ON-LINE ANALYZER TO CONTINUOUSLY MONITOR MOISTURE CONTENT FOR PROCESS CONTROL.						
(4449) TITLE - PROCESS IMPROVEMENT FOR COMPOSITION C-4	917		179	165		
PROBLEM - THE EXISTING FACILITIES WHICH ARE COMMON TO THE MANUFACTURE OR COMP C-4 AND THE OTHER RDX COMPOSITION WOULD LIMIT THE AVAILABILITY OF THESE ITEMS BELOW THEIR MLB REQUIREMENTS.						
SOLUTION - ESTABLISH NEW PROCESSES AND METHODS FOR THE MANUFACTURE OF THESE ITEMS TO MINIMIZE THE IMPACT OF COMMON OPERATIONS ON CAPACITY.						
(4574) TITLE - IMPROVED PROCESS FOR RDX/HMX FINES MANUFACTURE		150	232	688	650	
PROBLEM - CURRENTLY THE HMX PRODUCED AT HOLSTON AAP IS MECHANICALLY GROUND TO THE REQUIRED SIZE FOR USE AS ROCKET PROPELLANT. THIS PROCESS IS INEFFICIENT AND RESULTS IN HIGHER COSTS.						
SOLUTION - UTILIZE A CHEMICAL GRINDING PROCESS FOR GRINDING OF RDX/HMX TO IMPROVE PRODUCT QUALITY, DECREASE UNIT COSTS, AND IMPROVE PROCESS EFFICIENCY.						
(4576) TITLE - MODIFICATION + IMPROVEMENT OF DMSO PILOT PROCESS FOR RDX/HMX		435	200	341		
PROBLEM - PILOT SCALE PROCESS FOR RECRYSTALLIZATION OF RDX/HMX FROM DMSO WAS DESIGNED, PROCURED AND INSTALLED AT HAAP, INSUFFICIENT DATA OBTAINED TO YIELD OPTIMIZED OPERATING CONDITIONS.						
SOLUTION - CORRECT MECHANICAL DEFICIENCIES IN EQUIPMENT AND EVALUATE AND OPTIMIZE THE PROCESS. PREPARE A TECHNICAL DATA PACKAGE FOR A FULL SCALE PROCESS BASELINE DOCUMENT.						

MMT FIVE YEAR PLAN
RCS DRCMT 126

		FUNDING ($000)					
		PRIOR	84	85	86	87	88
COMPONENT -- INSENSITIVE							
(1914)	TITLE - PROCESS ENGINEERING FOR EAK EXPLOSIVE		495	250			
	PROBLEM - THE AIR FORCE IS INVESTIGATING USE OF ETHYLENE DIAMINE DINITRATE/AMMONIUM NITRATE/POTASSIUM NITRATE EUTECTIC MIXTURE (EAK) AS A CASTABLE INSENSITIVE EXPLOSIVE FILL FOR AIR FORCE BOMBS. PROCESS ENGR PRMTRS HAVE TO BE DET TO PROVIDE DSGN INFO F/IPF.						
	SOLUTION - THE AIR FORCE HAS FUNDED THE NOS TO DEVELOP A METHOD FOR MFG EAK. THIS MMT EFFORT WILL CONTINUE THE EFFORT AT NOS PERFORMING ENGR STUDIES AND DEVELOPING DESIGN PARAMETERS REQUIRED TO DESIGN THE IPF.						
COMPONENT -- NITROGLYCERINE							
(4693)	TITLE - REMOTE AUTOMATIC SAMPLING OF NITROGLYCERINE					305	360
	PROBLEM - PRESENT METHOD OF SAMPLING USES AN EDUCATION PROCESS IN WHICH THE SAMPLE IS WASHED AND THEREFORE NOT REPRESENTATIVE. AVAILABLE BIAZZI SAMPLER IS NOT EFFECTIVE AT PRESSURES UP TO 60 PSI WHICH OCCUR IN THE RADFORD AAP NG TRANSFER SYSTEM.						
	SOLUTION - INSTALL AND EVALUATE SAMPLING SYSTEMS ON A BENCH SCALE USING INERT MATERIALS AND DEMONSTRATE SELECTED SYSTEM WITH NG AT A REMOTE TEST SITE.						
COMPONENT -- PROCESS CONTROL							
(1906)	TITLE - ADAPTIVE CONTROL OF EXPLOSIVES LINES						2230
	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.						
	SOLUTION - ADAPT MINI-PROCESS CONTROLS FROM PROPELLANT PROCESSES WITH REDUCTION IN COSTS, ENHANCED REAL TIME CONTROL, REDUCED PERSONNEL EXPOSURE AND IMPROVED OVERALL EFFICIENCY.						
(1913)	TITLE - PBX CONT CAST FOR BOMB LOADING					1000	
	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.						
	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.						

	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- PROCESS CONTROL (CONTINUED)						
(4566) TITLE - RDX/HMX RECRYSTALLIZATION PARTICLE SIZE CONTROL						350
PROBLEM - CURRENT LABORATORY MECHANICAL SCREENING TECHNIQUE FOR DETERMINING PARTICLE SIZE DISTRIBUTION OF RDX/HMX IS TIME CONSUMING.						
SOLUTION - AN ON-LINE PARTICLE SIZE MEASUREMENT SYSTEM WILL BE ADAPTED AND INSTALLED IN THE RECRYSTALLATION OPERATION.						
(4613) TITLE - METHOD F/PROCESS ANALYSIS OF RDX/HMX SLURRY			319	375		
PROBLEM - THERE IS CURRENTLY NO DIRECT METHOD FOR MEASURING RDX/HMX PROCESS STREAMS. CURRENT WET CHEMICAL METHODS ARE TIME CONSUMING AND LABOR INTENSIVE.						
SOLUTION - DEVELOP AN AUTOMATIC ANALYZER SYSTEM FOR THE RDX/HMX STREAMS BASED ON CURRENTLY AVAILABLE ANALYTICAL EQUIPMENT.						
(4694) TITLE - IMPROVED SOLVENT RECOVERY IN RDX/HMX MANUFACTURE						325
PROBLEM - THE SOLVENTS, CYCLOHEXANONE AND ACETONE ARE LOST DURING THE RECRYSTALLIZATION AND DECANTER OPERATIONS.						
SOLUTION - SOLVENT RECOVERY TECHNIQUES INVOLVING CONVENTIONAL COOLING AND/OR LIQUID NITROGEN SPARGING TECHNIQUES WILL BE EVALUATED.						
(4695) TITLE - AUTOMATED PACKAGING OF RDX/HMX EXPLOSIVES						240
PROBLEM - CURRENT PROCESSES FOR PACKAGING BULK RDX/HMX, COMP C4, AND COMP B AT HOLSTON AAP ARE LABOR INTENSIVE, TIME CONSUMING, AND PHYSICALLY TAXING ON PRODUCTION WORKER.						
SOLUTION - DESIGN, INSTALL AND EVALUATE AUTOMATIC WEIGH FEEDING, CONVEYING, AND BOX MAKE-UP SYSTEMS FOR BULK RDX/HMX, COMP C4, AND COMP B.						
COMPONENT -- PROPELLANTS/EXPLOSIVES						
(3036) TITLE - INSENSITIVE HIGH EXPLOSIVES FOR LARGE CALIBER SHELLS (NEAR)					455	545
PROBLEM - DEVELOP A HIGH PERFORMANCE INSENSITIVE PROJECTILE EXPLOSIVE.						
SOLUTION - DEVELOP NITROGUANIDINE - ETHYLENEDIAMINETEDINITRATE - AMMONIUM NITRATE COMPOSITION STABILIZED WITH POTASSIUM NITRATE FOR LARGE CALIBER PROJECTILES. INVESTIGATE APPLICATION TO LOW VULNERABILITY EXPLOSIVES AND HARD TARGET PENETRATORS.						

	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- TNT						
(P124) TITLE - ELECTROCHEMICAL REDUCTION OF DNT AND TNT ISOMERS						275
PROBLEM - ON-LINE ANALYSES OF CONTINUOUS TNT NITRATION STREAMS FOR DNT AND TNT ISOMERS ARE NEEDED TO REPLACE TIME-CONSUMING SAMPLE ANALYSIS FOR PROCESS CONTROL.						
SOLUTION - ELECTROCHEMICAL REDUCTION OF DNT AND TNT ISOMERS WILL BE STUDIED AND EVALUATED AS AN ON-LINE METHOD OF ANALYSIS FOR THE CONTINUOUS TNT NITRATION.						
(3729) TITLE - MFG PROCESSES F/SPEC CONCRETE STRUCTURE DEMOLITION CHARGES						200
(3734) TITLE - MFG PROCESSES F/SPEED, SAFE PREEMPLOYED EXPLOSIVE DEVICE						500
(4452) TITLE - REPROCESSING DEMILLED EXPLOSIVES						325
PROBLEM - LARGE QUANTITIES OF EXPLOSIVES FROM DEMILITARIZATION ARE DESTROYED ANNUALLY, PRIMARILY BY BURNING BECAUSE NO ESTABLISHED METHOD IS AVAILABLE FOR REPROCESSING THE MATERIAL FOR REUSE IN MUNITIONS LOADING.						
SOLUTION - DEVELOP PROTOTYPE EQUIPMENT FOR REPROCESSING/REFINING RECLAIMED EXPLOSIVES, ANALYZE THE QUALITY, ENERGY POTENTIAL, AND LOADING RESULTS OF RECLAIMED EXPLOSIVES USED ALONE OR AS A MIXTURE WITH VIRGIN MATERIAL.						

CATEGORY

FUZES

COMPONENT -- ELECTRONICS						
(3716) TITLE - SENSOR TECHNOLOGY						1500
PROBLEM - REPLACE CONVENTIONAL (AND COMPLEX) FUZES WITH OPTICAL SENSING DEVICES.						
SOLUTION - THIS TECHNOLOGY (SENSOR) WILL BE HIGHLY AUTOMATED IN PRODUCTION AND HIGHLY ACCURATE IN USE (COMMERCIAL APPLICATIONS WILL BE NUMEROUS IN THIS TIME SPAN).						
(3731) TITLE - MFG PROCESSES F/XM742 AND XM762 ELECTRICAL TIMER						1000

	FUNDING ($000)					
	PRIOR	84	85	86	87	88

COMPONENT -- ELECTRONICS (CONTINUED)

(4570) TITLE - IMPR MFS PRO IES PROC F/XM762 ARTY ELECT TIME FUZE — 84: 367; 85: 970; 86: 760

PROBLEM - CRYSTAL DEFECTS CAN CAUSE CRYSTAL OSCILLATORS TO FAIL AT HIGH SETBACK FORCES. ALSO, VARIATIONS IN MAGNETIC PROPERTIES OF PARTS IN THE SETBACK GENERATOR CAN CAUSE LOW OUTPUT, AND EACH FUZE MODULE SHOULD BE TESTED AS IT IS BEING ASSEMBLED.

SOLUTION - SCREEN COMMERCIAL CRYSTALS AFTER MAKING THEM USING IMPROVED MANUFACTURING PROCESSES. ALSO, ASSEMBLE, MAGNETIZE AND TEST THE SETBACK GENERATOR. AND TEST EACH FUZE MODULE (ENCODER, SETBACK GENERATOR, S*A, AND ELECTRONIC ASSEMBLY) PRIOR TO ASSEMBLY.

(4624) TITLE - AUTOMATED MFG OF MILLIMETER WAVE DIODES (CAM) — 85: 2843; 86: 616; 87: 976

PROBLEM - CURRENT MANUFACTURE OF GUNN, VARACTOR + MIXER DIODES IS SLOW HAND LABOR OF HIGH PAID SCIENTISTS. THESE GAAS DEVICES OPERATE AT 35 GHZ. THE FABRICATION YIELD IS VERY LOW.

SOLUTION - T&D VENDORS WILL BE FUNDED TO AUTOMATE USING MOLECULAR BEAM EPITAXY.

(4625) TITLE - AUTO MFG OF SILICON IF AMPLIFIER IC (CAM) — 87: 285; 88: 1191

PROBLEM - COMMERCIAL MONOLITHIC IF AMPLIFIER ICS ARE DEFICIENT IN BAND PASS (1-50 MHZ), NOISE FIGURE (1.5 DB) AND POWER GAIN (60 DB). R+D DEVELOPED A SILICON MONOLITHIC IF AMPLIFIER BUT VOLUME MFG PROCESSES WERE NOT ESTABLISHED.

SOLUTION - AUTOMATE EPITAXIAL SILICON GROWTH, WAFER FAB, DIFFUSION PROCESSES, PACKAGE FAB, + IC LEVEL RF TESTING, ENVIRONMENTAL TEST + SYSTEM LEVEL TEST. ALSO, AUTOMATE ATTACHMENT OF IC PACKAGE TO MICROSTRIP.

(4626) TITLE - AUTO ASSEMBLY OF MILLIMETER WAVE TRANSDUCER — 84: 160; 85: 3183; 86: 602; 87: 507

PROBLEM - PLACEMENT AND BONDING OF SMALL SEMICONDUCTOR CHIPS ONTO MICROSTRIP REQUIRES ACCURACY NOT FOUND IN TODAY'S PICK-AND-PLACE EQUIPMENT.

SOLUTION - MODIFY PICK AND PLACE EQUIPMENT AND REFLOW SOLDERING AND LASER BONDING EQUIPMENT TO HANDLE FINE BEAM LEAD AND BALL BONDED CHIPS. INCORPORATE COMPONENT AND MODULE TEST APPARATUS FOR HIGH FREQUENCY TESTING.

(4627) TITLE - AUTO TESTING OF MILLIMETER WAVE TRANSDUCER — 85: 1943; 86: 1088

PROBLEM - THE HAND LABOR INVOLVED IN TUNING MILLIMETER WAVE TRANSDUCERS IS EXTREMELY COSTLY.

SOLUTION - THE USE OF LASER TRIMMING EQUIPMENT TO MAKE CUTS IN MICROSTRIP LINES WHILE PERFORMANCE IS SIMULTANEOUSLY MONITORED WILL SIGNIFICANTLY REDUCE COST.

	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- ELECTRONICS (CONTINUED)						
(4630) TITLE - AUTOMATED METHOD FOR BORESIGHTING IR (CAM)			1407	676	391	
PROBLEM - BORESIGHTING THE TRIAD OF MMW SENSOR, IR SENSOR AND WARHEAD TO LESS THAN 1 MRAD IS LABOR INTENSIVE.						
SOLUTION - IMPLEMENTATION OF AN AUTOMATED TEST STATION TO CHECK BORESIGHT/SENSOR ALIGNMENT AND TO MAKE FINAL ADJUSTMENTS AUTOMATICALLY.						
(4631) TITLE - AUTO TEST OF SIGNAL PROCESSOR ASSEMBLIES					835	451
PROBLEM - MICROCOMPUTER SIGNAL PROCESSORS USED IN MILLIMETER-WAVE/IR SENSORS ARE PRESENTLY TESTED WITH INADEQUATE DIAGNOSTIC FAULT FINDING EQUIPMENT AND IN-CIRCUIT ANALYZERS. TESTERS ARE TOO LABOR INTENSIVE FOR UNIT LOAD, CONNECT, DISCONNECT AND UNLOAD.						
SOLUTION - COMMERCIALLY AVAILABLE TEST EQUIPMENT WILL BE MODIFIED WITH SPECIALLY DESIGNED ADAPTERS AND PROBING HARDWARE. SOFTWARE TESTING AND DIAGNOSTIC ROUTINES WILL BE DEVELOPED TO MINIMIZE DIAGNOSTICS AND REWORK.						
(4632) TITLE - LEADED CHIP CARRIERS					740	98
PROBLEM - SADARM WAS DESIGNED WITH IC DUAL-IN-LINE (DIP) ELECTRONIC PACKAGING. A BETTER ALTERNATIVE TO THIS TYPE PACKAGING IS SOUGHT.						
SOLUTION - ONE OF FOUR TECHNOLOGIES- A. LEADED CHIP CARRIERS B. CERTAB C. TAB OR D. TAPEPAK WILL BE UTILIZED TO PACKAGE THE ELECTRONICS. PROCESS TOOLING AND EQUIPMENT TO IMPLEMENT THE SELECTED TECHNOLOGY WILL BE DEVELOPED.						
(4633) TITLE - AUTO SENSOR SYSTEMS TEST F/MMW + IR SENSOR					639	595
PROBLEM - AT PRESENT THE MILLIMETER/IR SENSOR SYSTEM IS MANUALLY SYNCHRONIZE. THIS METHOD IS SLOW AND NOT CAPABLE OF MEETING COST REQUIREMENTS, THROUGHPUT, AND SCHEDULE GOALS.						
SOLUTION - TO USE COMPUTER CONTROLLED VERSION OF SENSOR SIMULATORS WHICH ARE COMMERICALLY.						
(4634) TITLE - AUTO ASSEMBLY OF ELEC MODULE + TOP SENSOR					1019	696
PROBLEM - SADARM ELECTRONICS MODULE AND TOP SENSOR ARE LABOR INTENSIVE ASSEMBLIES. PROBLEM AREAS INCLUDE- MINIMAL CLEARANCES, CROWDED CIRCUIT CARDS, SHORT UNSUPPORTED SPANS, FIXTURING AND FEEDING COMPONENTS FOR PICK AND PLACE.						
SOLUTION - AUTOMATED ASSEMBLY PROCESSES WILL BE DEVELOPED WHICH INCLUDE ROBOTS WITH OPTICAL AND TACTILE SENSING FEEDBACK CONTROL SYSTEMS. SMART CONVEYORS, AN AUTOMATED LASER SOLDERING SYSTEM, + INDEXING + POSITION FIXTURES WILL ASSIST IN SYSTEM AUTOMATION.						

	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- ELECTRONICS (CONTINUED)						
(4692) TITLE - INFRARED SEEKER FIBER OPTICS ASSY COST REDUCTION					200	300
PROBLEM - ALIGNMENT AND BONDING OF FIBER OPTICS FROM OPTICAL ASSEMBLY TO DETECTORS IS A RELATIVELY CLOSE TOLERANCE PROCESS WHICH IS VERY COSTLY BECAUSE OF THE HIGH LABOR CONTENT.						
SOLUTION - AUTOMATED EQUIPMENT WILL BE DEVELOPED FOR FIBER OPTIC PLACEMENT AND BONDING.						
(4753) TITLE - LO COST PROC TECH F/PHOTOCONDUCTIVE INFRARED DETECTORS					600	170
PROBLEM - MERCURY CADMIUM TELLURIDE WAFERS ARE SMALL, ONLY 1 SQUARE CM, AND VERY FRAGILE. AND AFTER THE WAFERS ARE MADE INTO DETECTORS THEY MUST BE CUT INTO DETECTORS. A METHOD MUST BE FOUND TO TEST FOR GOOD DETECTOR ARRAYS WHILE STILL IN WAFER FORM.						
SOLUTION - GROW LARGER WAFERS BY THE LIQUID PHASE EPITAXIAL PROCESS. USE EITHER CADMIUM TELLURIDE OR SAPPHIRE SUBSTRATES. SCALE UP THE PROCESS TO MAKE 6 SQUARE CM SUBSTRATES. TEST FOR HIGH QUALITY DETECTORS WHILE STILL IN WAFER FORM.						
COMPONENT -- LAP						
(4760) TITLE - AUTOMATIC HI-DENSITY ASSEMBLY OF AMMUNITION COMPONENTS				500	100	
PROBLEM - FUZES ARE BECOMING MORE DELICATE TRADITIONAL FASTENING TECHNIQUES SUCH AS THREADING RIVETING AND POTTING ARE WASTEFUL OF SPACE AND WEIGHT. IN ADDITION ASSEMBLY IS TIME CONSUMING AND COST EXCESSIVE.						
SOLUTION - JOIN FUZE COMPONENTS USING LASER WELDING THIS WILL ALLOW FOR SMALLER AND MORE DELICATE ASSEMBLIES. THIS PROCESS WILL ENABLE THE ASSEMBLY TO BE AUTOMATED AND REDUCE ASSEMBLY TIME AND COST.						
COMPONENT -- POWER SUPPLIES						
(1803) TITLE - IMPROVED LEAD DIOXIDE ELECTROPLATING TECHNOLOGY		346				
PROBLEM - ADHESION OF PB/2 PLATE IN ELECTRODES IN LIQUID RESERVE POWER SUPPLIES FOR SPIN-STABILIZED FUZING IS OFTEN POOR. THIS CAUSES (1)CHIPPING AND FLAKING, HENCE REJECT MATERIAL AND (2)POOR DISCHARGE EFFICIENCY AT HIGH TEMPS CAUSING SHARER BATTERY LIFE						
SOLUTION - R+D ESTABLISHED THAT ANODIZATION OF NICKEL SURFACE AND CAREFUL CONTROL OF PROCESS PARAMETERS ARE CRITICAL TO NI-PB/2 BOND. IT IS PROPOSED TO UPGRADE PROC FACILITY FOR NI ANODIZATION AND THEN OPTIMIZE PARAMETERS CRITICAL TO PLATE ADHESION.						

	FUNDING ($000)				
	PRIOR	84	85	86	87	88

COMPONENT -- CA/TESTING

(1805) TITLE - IMPROVED PRODUCTION VIBRATION TESTS-M732 (PIP) FUZE — 85: 200; 86: 250

PROBLEM - PROJECT WILL EXPAND THE CAPABILITY OF A 3-D VIBRATION SYSTEM BUILT UNDER MMT PROJECTS 5 79, 80, 81 3961. TEST DEFICIENCIES WILL BE ELIMINATED BY EXACT DUPLICATION OF FUZE TRI-AXIAL WAVEFORMS.

SOLUTION - ADDITIONAL MEMORY, PERIPHERALS, AND SOFTWARE WILL BE ADDED TO STORE LONG DURATION VIBRATION RECORDS AND ANALYZE RAW DATA. VIBRATION RECORDS (RECORDED ACCELERATIONS) ARE AVAILABLE FROM EXISTING TACTICAL DATA BANKS (TECOM).

(4628) TITLE - AUTO MFG IR DETECTORS + REFLECTORS — 85: 1670; 86: 1211

PROBLEM - CURRENT TEST AND ASSEMBLY PROCESSES ARE NOT CAPABLE OF THE REQUIRED HIGH PRODUCTION RATE AND LARGE PRODUCTION VOLUME.

SOLUTION - COMPUTER CONTROLLED AUTOMATION OF THE TEST AND ASSEMBLY OF THE IR DETECTOR/REFLECTOR MODULES AND REFLECTOR SURFACE MACHINING ARE PROPOSED.

(4629) TITLE - AUTO ASSEMBLY + TEST OF IR TRANSDUCER — 85: 1845; 86: 817; 87: 617

PROBLEM - ASSEMBLY AND TEST OF THE IR TRANSDUCER ARE LABOR INTENSIVE OPERATIONS. MANY IN-PROCESS ALIGNMENT AND TEST OPERATIONS ARE DONE MANUALLY BY HIGHLY TRAINED PERSONNEL IN A CLEAN ROOM ENVIRONMENT. THESE MANUFACTURING TECHNIQUES ARE ERROR PRONE.

SOLUTION - THE REQUIREMENTS WILL BE DETERMINED FOR AN AUTOMATED COMPUTER CONTROLLED ALIGNMENT AND TESTING EQUIPMENT. PROCEDURES WILL BE ESTABLISHED FOR PROCESSING IR TRANSDUCERS WITH THIS AUTOMATED EQUIPMENT.

COMPONENT -- THICK FILM

(1802) TITLE - AUTOMATED OPTICAL MICROELECTRONICS INSPECTION — 84: 496; 85: 556

PROBLEM - HYBRID FABRICATION INVOLVES CHIP PLACEMENT + CHIP + WIRE BONDING. INSPECTION IS NOT UNIFORM AMONG INSPECTORS + IS TIME CONSUMING. NEW AUTOMATIC INSPECTION PROCESS ARE NEEDED WHICH INSURE DEVICE UNIFORMITY + GUARANTEE RELIABILITY.

SOLUTION - A SCANNING SYSTEM WILL BE DEFINED BY DIGITIZING AN OPTICAL IMAGE FROM LOCALIZED INSPECTION AREAS. A COMPUTER SYSTEM WILL BE AUTHORIZED TO COORDINATE DIGITIZING + SCANNING TASKS.

(4751) TITLE - AUTO COMP ASSY + THICK FILM COPPER TECH F/PROD ELECTRONICS — 87: 55; 88: 220

PROBLEM - LEADED/LEADLESS CHIP CARRIERS ASSEMBLED ON COPPER CLAD INVAR AND OTHER TYPE SUBSTRATES WILL BE EXAMINED. OPTIMUM MATERIAL SUBSTRATES WILL BE SELECTED.

SOLUTION - SUBSTRATE TEMPERATURE THERMAL COEFFICIENT OF EXPANSION WILL BE INVESTIGATED. LEADED/LEADLESS CHIP CARRIER ASSEMBLY ONTO SUBSTRATES WILL BE AUTOMATED.

CATEGORY
GENERAL

	PRIOR	84	85	86	87	88
	FUNDING ($000)					
COMPONENT -- MISCELLANEOUS						
(0929) TITLE - DARCOM LIFE CYCLE ENGINEERING MANAGEMENT SYSTEM			307		801	681
PROBLEM - THERE IS AN INADEQUATE COMMUNICATION/DECISION PATH BETWEEN LIFE CYCLE PHASES OF COMBAT MATERIEL. ENGINEERING CHANGE ORDERS REQUIRE AN UPDATE TO VULNERABILITY ANALYSIS. THERE IS NO VIABLE LINK BETWEEN ECOS, PROD ENGR, ESIP AND VULNERABILITY STUDIES.						
SOLUTION - DESIGN,CONSTRUCT,AND IMPLEMENT A PROOF OF PRINCIPLE PROTOTYPE.MULTIDISCIPLINE ENGR/ANALYSIS/MGMT SYSTEM WILL BE LINKABLE TO CONVENTIONAL GOVERNMENT/CONTRACTOR CAD/CAM SYSTEMS VIA MILNET A GUIDE WILL BE PREPARED TO AID IN ADDITIONAL IMPLEMENTATION.						
(2742) TITLE - LASER APPLIED DURABLE COATINGS						200
PROBLEM - PRODUCTIVITY IS A FUNCTION OF RAM TO INCREASE RELIABILITY AND REDUCE MAINTENANCE DOWNTIME AND COST IN THE MUNITIONS PLANT ENVIRONMENT IS VERY DIFFICULT.						
SOLUTION - UTILIZE LASER APPLIED DURABLE COATINGS ON MACHINE AND TOOL WEAR SURFACES AND IN CORROSIVE ENVIRONMENTS.						
(3727) TITLE - MFG PROCESSES FOR VARIABLE TIME FIRING DEVICES						250
(3730) TITLE - MFG PROCESSES F/SENSOR OFF-ROUTE MINE SYSTEM (STORMS)						750
(4698) TITLE - MULTI-PRESSING OF 155MM COMBUSTIBLE CASE COMPONENTS				625		
PROBLEM - CURRENTLY, ALL PULP MOLDED 155MM COMBUSTIBLE CASE COMPONENTS ARE MADE ON A 'ONE PART TO ONE PRESS' BASIS. HENCE, THIS IS NOT SUITABLE FOR HIGH VOLUME PRODUCTION APPLICATIONS. THIS IS IMPORTANT BECAUSE A FACILITY PROJECT FOR THE CASE IS PLANNED SOON.						
SOLUTION - DEVELOP FULL SCALE PROTOTYPE MULTI-PRESSING MANUFACTURING HARDWARE FOR 155MM COMBUSTIBLE CASE COMPONENTS. THIS SHOULD RESULT IN BOTH LESS MANUFACOTRING LABOR AND LESS CAPITAL INVESTMENT TO PRODUCE THESE 155MM COMBUSTIBLE CASES.						
(4752) TITLE - INTEGRALLY MACH OPTICAL ASSY FOR INFRARED SEEKER				625	620	
PROBLEM - THE ROTATING OPTICAL ASSEMBLY OF INFRARED SEEKERS CONTAIN MANY PARTS OF DIFFERENT MATERIALS AND DIFFERENT PHYSICAL CHARACTERISTICS.						
SOLUTION - TO SIMPLIFY THE FABRICATION AND ASSEMBLY PROCESS, THE TELESCOPE WILL CONSIST OF HOMOGENEOUS MATERIAL CAST FROM ALUMINUM AND MACHINES BY DIAMOND TURNING.						

CATEGORY LAP	FUNDING ($000) PRIOR	84	85	86	87	88
COMPONENT -- ASSEMBLY						
(4366) TITLE - DEVELOP AUTOMATED EQPT FOR SEALING M55 DETONATORS					500	341
PROBLEM - CURR M55 DETS ARE BEING LACQUERED. 2 APPROACHES TO SEALING ARE BEING INVEST. 1 USED FOIL PRECOATED W/ADHESIVE + THE OTHER WELDS THE DET CUP TO FOIL. BOTH CAN BE PERF ON A LOADER.LESS HANDLING WILL REDUCE COST OF DET.						
SOLUTION - DEVELOP EQUIPMENT BASED ON EITHER THE HOT MELT ADHESIVE OR ULTRA SONIC WELDING TECHNIQUE CURRENTLY BEING INVESTIGATED. RETROFIT BOTH SINGLE-TOOL AND MULTI-TOOL DETONATOR LOADERS WITH EQUIPMENT TO SEAL THE M55 DETONATOR.						
(4523) TITLE - RAPID MOISTURE ANALYSIS OF EXPLOSIVE MIXES		200				
PROBLEM - PRESENT MOISTURE ANALYSIS TECHNIQUE REQUIRES SOME 3 3/4 HOURS PER SAMPLE. IN AN AUTOMATED BACKLINE, THIS IS TOO LONG A PERIOD TO WAIT RELATIVE TO AN ACCEPTANCE/REJECTION DECISION FOR THE BATCH.						
SOLUTION - INVESTIGATE THREE KNOWN TECHNIQUES FOR RAPID MOISTURE ANALYSIS AND PROCEED WITH THE OPTIMUM TO THE PROTOTYPE STAGE.						
(4595) TITLE - AUTOMATED ASSEMBLY OF M21 FLASH SIMULATOR				550	750	200
PROBLEM - THE LONGHORN AAP PRODUCTION LINE IS BASICALLY A HAND LINE OPERATION WHICH IS LABOR INTENSIVE AND EXPOSES THE LINE OPERATORS TO POTENTIALLY HAZARDOUS OPERATIONS.						
SOLUTION - DEVELOP SEMI-AUTOMATED OR MECHANIZED ASSEMBLY EQUIPMENT WHICH WOULD SIGNIFICANTLY REDUCE THE PRODUCTION MANPOWER REQUIREMENTS AND REDUCE THE EXPOSURE OF PERSONNEL TO POTENTIALLY HAZARDOUS OPERATIONS.						
(4606) TITLE - AUTOMATED ASSEMBLY OF BLU 97/B COMBINED EFFECTS MUNITION		1418				
PROBLEM - MANUFACTURE OF THE BLU-97/B ON THE HAND LINE AT KANSAS AAP IS LABOR INTENSIVE AND EXPOSES PERSONNEL TO POTENTIALLY HAZARDOUS OPERATIONS. THE HAND LINE PRODUCTION SYSTEM WILL RESULT IN HIGH UNIT COSTS AND REQUIRE A LARGE PHYSICAL ASSEMBLY FACILITY.						
SOLUTION - DEVELOP AUTOMATED SYSTEM FOR ASSEMBLY OF THE BLU-97/B WHICH WOULD REDUCE PRODUCTION AREA SIZE REQUIREMENT, PRODUCTION MANPOWER REQUIREMENTS AND PERSONNEL EXPOSURE TO HAZARDOUS OPERATIONS.						
COMPONENT -- GENERAL						
(4015) TITLE - DEVELOP TECHNOLOGY FOR MFG OF DELAY TRAINS						400
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.						

	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- GENERAL (CONTINUED)						
(2703) TITLE - THREAD CLEANING/INSPECTION OF HE LOADED MUNITIONS						150
PROBLEM - THE THREADS OF HE LOADED MUNITIONS ARE CLEANED INDIVIDUALLY BY HAND. THE OPERATION IS LABOR INTENSIVE AND HAZARDOUS TO THE OPERATOR.						
SOLUTION - UTILIZING CURRENT TECHNOLOGY DESIGN + BUILD PROTOTYPE EQUIP THAT WILL CLEAN, INSPECT + TRANSFER THE MUNITION THROUGH ENTIRE OPERATION CYCLE AUTOMATICALLY.						
(4251) TITLE - AUTO MANU OF DELAY FOR M549 AND XM650 PROJECTILES						966
PROBLEM - CURRENT OPERATION ARE LABOR INTENSIVE. COST OF ITEM IS HIGH.						
SOLUTION - DEV AUTO L&P EQUIP.						
(4522) TITLE - AUTO CARRIER CLEANING STATION FOR DET FAC				400		
PROBLEM - CARRIERS USED IN PRODUCTION MAY HAVE CONSIDERABLE POWDER ON THEM WHICH MUST BE REMOVED IN A SAFE MANNER. THE CURRENT MANUAL OPERATION IS POTENTIALLY HAZARDOUS.						
SOLUTION - DEVELOP AN AUTOMATED POWDER REMOVAL AND CLEANING STATION FOR THE AUTOMATED CONVEYOR SYSTEM AT THE LSAAP MODERNIZED DETONATOR FACILITY.						
(4550) TITLE - AUTO ASSY OF M22 FLASH SIMULATOR		465		750	200	
PROBLEM - ITEM MANUFACTURED AT LONGHORN AAP ON HAND LINE WHICH IS A LABOR INTENSIVE OPERATION. ITEM ALSO MANUFACTURED BY PRIVATE INDUSTRY.						
SOLUTION - THE MMT WILL DEVELOP AUTOMATED EQUIPMENT AND REDUCE LABOR FOR MANUFACTURE. PROJECT WILL BE SELF-IMPLEMENTING AT LONGHORN AAP.						
COMPONENT -- LOAD						
(6001) TITLE - 60MM SMOKE PDN TECH F/IMPROVED SMOKE MUNITION						450
PROBLEM - A FAMILY OF NEW IMPROVED RP OR 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 INCORPORATION RP WICK MATERIAL WITH WP.						
(6308) TITLE - PRESS/INJECTION LOADING OF INSENSITIVE HE						200

COMPONENT -- LOAD (CONTINUED)

	FUNDING ($000)					
	PRIOR	84	85	86	87	88
(P244) TITLE - MODERNIZATION OF TRACER LOADING						750
PROBLEM - CURRENT TRACER LOADING TECHNOLOGY UTILIZES CONSIDERABLE LABOR, SLOW/SINGULAR OPERATING TYPE PRESSING MACHINES.						
SOLUTION - DEVELOP MODERN AUTOMATED MULTIPLE ITEM LOADING EQUIPMENT. HIGH PRODUCTION, LOW MAINTAINABILITY, ECONOMICAL AND RELIABLE EQUIPMENT ADAPTABLE TO NUMEROUS TRACER ITEMS WILL RESULT.						
(1367) TITLE - DEVELOP MFG TECHNOLOGY FOR XM96 CS ROCKET						450
PROBLEM - NEVER PRODUCED AT PBA. MOBILIZATION REQUIREMENT.						
SOLUTION - PROVIDE MFG TECHNOLOGY. PROVIDE DESIGN CRITERIA FOR IPF.						
(1712) TITLE - FILL AND PRESS TECHNOLOGY F/M8 RP GRENADE						340
PROBLEM - THERE IS CURRENTLY NO AVAILABLE FILL AND PRESS FACILITY FOR LOADING RED PHOSPHOROUS GRENADES. CURRENT POWDER HANDLING AND COMPACTION TECHNOLOGY IS NOT ACCEPTABLE.						
SOLUTION - DEVELOP THE MANUFACTURING TECHNOLOGY TO FILL, PRESS, COMPACT THE M8 RED PHOSPHOROUS GRENADE.						
(2707) TITLE - IMPROVED PROCESS FOR HE CAVITY FORMING						650
PROBLEM - CURRENT GOCO PROCESSES REQUIRE MACHINING OF EXPLOSIVE CAVITIES . THIS IS VERY HAZARDOUS AND MUST BE PERFORMED BEHIND A BARRICADE AND IS VERY COSTLY.						
SOLUTION - REDESIGN HE POURING FUNNEL TO ELIM MACHINING. THIS WILL DRASTICALLY REDUCE COST AS NO BARRICADE IS REQUIRED, EXPENSIVE MACHINERY/MAINT IS ELIMINATED AND SUPPORTING LABOR IS REDUCED.						
(3721) TITLE - MFG PROCESS F/LAP OF IMPROVED MINE SYSTEM						750
(3722) TITLE - MFG PROCESSES F/LAP OF OFF-ROUTE ANTITANK MINE SYSTEM						1500
(3723) TITLE - MFG PROCESS F/LAP OF THE GUIDED ANTIARMOR MORTAR PROJECTILE						1500
(3724) TITLE - MFG PROCESSES F/LAP OF THE UNIVERSAL MINE DISPENSING SYSTEM						750
(3725) TITLE - MFG PROCESSES F/LAP OF ADVANCED CONCEPT MINE SYSTEMS						1500
(3726) TITLE - MFG PROCESSES F/WIDE AREA SPRAY SYSTEM (SPRAY FAL)						750

	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- LCAC (CONTINUED)						
(3733) TITLE - MFG PROCESSES F/ADV DET DESIGNS						850
(3735) TITLE - MFG PROCESS F/WALL BREAKING CHARGE						250
(3746) TITLE - TECHNOLOGY F/LAP OF DIRECT SUPPORT WEAPON SYS (DSWS) AMMO						1000
(4076) TITLE - UPGRADE SAFETY READINESS AND PRODUCTIVITY OF EXIST MELT POUR	500	621			814	
PROBLEM - SIGNIFICANT IMPROVEMENT OF MELT POUR FACILITIES IS NOT BEING REALIZED BECAUSE DESIGN APPROACHES FOR COST-EFFECTIVE INTERMEDIATE UPGRADING ARE NOT AVAILABLE.						
SOLUTION - DEVELOP A SERIES OF PROCESS DESIGN CONCEPTS TO IMPROVE SAFETY, REDUCE EXPLOSIVE QUANTITIES, REMOVE PERSONNEL FROM HAZARDOUS AREAS, INCREASE EFFICIENCY AND REDUCE PRODUCTION COSTS. PROVIDE MODULAR DESIGN PKGS F/VARIOUS PROCESSES AND UPGRADING LEVELS.						
(4373) TITLE - SILK SCREEN DEPOSITION OF PRIMARY EXPLOSIVES						1408
PROBLEM - CURRENT NON-ELECTRIC DETONATOR FACILITIES, EQUIPMENT AND METHODS LACK VERSATILITY, PRESENT PROBLEMS IN QUALITY AND UNIFORMITY OF PRODUCT AND ARE COSTLY IN OPERATION AND MAINTENANCE.						
SOLUTION - EVAL NEW IMPROVED OR MODIFIED EQUIPMENT AND TECHNIQUES FOR THE MASS PRODUCTION OF DETONATORS USING SILK-SCREEN TECHNIQUES WITH THE ULTIMATE GOAL OF MODERNIZING PRODUCTION FACILITIES.						
(4510) TITLE - AUTO ASSY OF ADDITIVE LINER TO TANK CTG		295	217			
PROBLEM - APPLYING ADHESIVE TO, CURLING, AND INSERTING AND POSITIONING THE LINER INSIDE THE CASE IS LABOR INTENSIVE AND SUBJECT TO POOR QUALITY AND EXCESSIVE SCRAP GENERATION.						
SOLUTION - DESIGN, BUILD AND TEST A SEPARATE PROTOTYPE PRODUCTION MACHINE FOR INSERTION OF ADDITIVE LINERS INTO THE 105MM CARTRIDGE CASE.						
(4520) TITLE - PRESS LOADING OF HMX COMPOSITIONS FOR TANK ROUNDS		569		618		
PROBLEM - THE 105MM XM815 WILL BE THE FIRST TANK ROUND TO USE A PRESSED SHAPED CHARGE. A PRODUCTION PROCESS FOR PRESS LOADING MUST BE ESTABLISHED EVALUATING SEVERAL CANDIDATE EXPLOSIVES AND ESTABLISHING TOOLING DESIGN AND PRESSING PARAMETERS.						
SOLUTION - PROCESSING PROCEDURES WILL BE ESTABLISHED FOR HMX COMPOSITIONS AND A LIMITED NUMBER OF UNITS LOADED, EVALUATED, AND TESTED. PROCESS EQUIPMENT WILL BE IDENTIFIED SO THAT PROPER PRESS LOADING PROCEDURES MAY BE IMPLEMENTED INTO PRODUCTION.						

COMPONENT -- SUPPORT

(6002) TITLE - IMPROVED AUTOMATED LAP MATERIAL HANDLING TECH 1500

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.

COMPONENT -- TNT

(4200) TITLE - TNT CRYSTALLIZER FOR LARGE CALIBER 420 570 235

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.

MMT FIVE YEAR PLAN
RCS DRCMT 126

CATEGORY
METAL PARTS

FUNDING ($000)

	PRIOR	84	85	86	87	88

COMPONENT -- CARTRIDGE CASES

(4542) TITLE - ULTRASONIC DEEP DRAWING OF CANNON STEEL CARTRIDGE CASES 232

PROBLEM - DEEP DRAWN STEEL CASES REQUIRE MULTIPLE DRAWS AND REQUIRE EXCESSIVE PROCESSING AND ENERGY VS BRASS.

SOLUTION - ULTRASONIC ACTIVATION OF FORMING DIES HAS POTENTIAL FOR REDUCING DRAWING FORCES AND ELIMINATING STEPS IN THE DRAWING PROCESS.

(4765) TITLE - AUTOMATED NDT OF M509 PROJECTILE BODIES 750

PROBLEM - THE INSPECTION TECHNIQUES CURRENTLY BEING USED FOR M509 IS MAGNETIC PARTICLE INSPECTION IS SUBJECT TO HUMAN INTERPRETATION AND ERROR AND THEREFORE IS UNRELIABLE.

SOLUTION - THE SOLUTION TO THE ABOVE PROBLEM IS TO APPLY THE NDT METHOD SELECTED FOR THE M483 PROJECTILE BODY TO THE M509. BOTH ULTRASONICS AND MAGNETIC FLUX LEAKAGE ARE BEING INVESTIGATED AS POSSIBLE CANDIDATES.

COMPONENT -- FORMING/MACHINING

(2726) TITLE - LASER CUTTING SLOTS IN HARDENED STEEL STRUCTURES 190

PROBLEM - CURRENT TECHNOLOGY EMPLOYED TO FORM SLOTS IN HARDENED STEEL STRUCTURE OF VARYING THICKNESS IS SLOW AND COSTLY. A MORE COST EFFECTIVE

	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- FORMING/MACHINING (CONTINUED)						
(5712) TITLE - PRODUCTION BASE FOR NOVEL SHAPED CHARGE LINERS						500
PROBLEM - NEW SHAPED CHARGE MATERIALS BEING INVESTIGATED TO COMBINE HIGH MASS AND PYROPHORICITY WILL HAVE NO PRODUCTION BASE BECAUSE OF THE NATURE OF THE MATERIALS.						
SOLUTION - A COMBINATION OF RHEOCASTING THE COMPOSITE AND PRESSURE CASTING TO REMOVE EXCESS LOW DENSITY MATERIAL CAN PRODUCE SHAPED STOCK FOR FURTHER WARM WORKING.						
(5713) TITLE - EQUIP IDENT + ASSESSMENT TO MAINTAIN A RESPONSIVE PON BASE						750
(4397) TITLE - FABRICATION OF ADVANCED WARHEADS						350
PROBLEM - MANUFACTURING PROCEDURES FOR ADVANCED WARHEADS NEED TO BE ESTABLISHED.						
SOLUTION - STUDIES TO ESTABLISH AND OPTIMIZE THE MANUFACTURING PROCESS FOR ADVANCED WARHEADS.						
(4519) TITLE - OUTLINE AUTOMATIC DETECTION OF TOOL WEAR						40
PROBLEM - TOOL WEAR ON SEMIAUTOMATIC METAL MACHINES CAUSE DEFECTIVE PARTS IF UNDETECTED.						
SOLUTION - PROVIDE AN AUTOMATIC MEASURING DEVICE ON THE TRANSPORTER OF THE LOAD/ UNLOAD SYSTEM.						
(4761) TITLE - MFG METHODS FOR ALTERNATE MATERIAL CHEMICAL ENERGY WARHEADS				775		
PROBLEM - THE NEED FOR IMPROVED TERMINAL BALLISTIC PERFORMANCE IN CHEMICAL ENERGY WARHEADS HAS DICTATED R+D EFFORTS INTO THE USE OF ALTERNATE MATERIALS FOR SHAPE CHARGE AND EXPLOSIVELY FORMED PROJECTILE (EFP) WARHEADS.						
SOLUTION - DEVELOP A PROCESS TO PRODUCE SELECTED MATERIAL IN A KNOWN CONFIGURATION. WHERE FEASIBLE ADAPT/APPLY EXISTING PROCESS TECHNOLOGIES INHERENT IN THE SEVERAL CANDIDATE FABRICATION METHODS.						
(4770) TITLE - MACHINING LONG ROD DU PENETRATORS			672	1050	425	
PROBLEM - CURRENT MACHINING PROCESSES FOR DU PENETRATORS ARE SUCH THAT VERY HIGH PRESSURES ARE EXERTED ON THE PENETRATOR BLANK DURING THE FINISHING OPERATION. FUTURE GENERATION PENETRATORS ARE LONGER AND THINNER AND WILL NOT WITHSTAND THESE PRESSURES.						
SOLUTION - ASSESS AVAILABLE ALTERNATIVE PROCESSES AND SELECT FOR DEVELOPMENT THE ONE WHICH APPEARS MOST PROMISING FOR THE MACHINING OF DU PENETRATORS. AT A MINIMUM, FORM GRINDING AND SCREW MACHINING WILL BE CONSIDERED.						

	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- MORTAR						
(4754) TITLE - VOLUME PROD OF FLUIDIC REACTION JET CONTROL FRJC SYSTEM					550	510
PROBLEM - FLUIDIC REACTION JET CONTROL HARDWARE IS CURRENTLY FABRICATED UTILIZING PROTOTYPE LABORATORY OPERATIONS CREATING COST AND QUALITY CONTROL PROBLEMS.						
SOLUTION - REPLACE THE CURRENT PROTOTYPE FABRICATION TECHNIQUE WITH A PRODUCTION OPERATION. THIS WOULD BE DONE BY EVALUATING ALTERNATIVE PROCESSES AND AUTOMATED TECHNOLOGIES.						
COMPONENT -- PROJECTILES						
(1502) TITLE - REAL TIME CHEM EVAL+QUAL CTRL OF OVERLAY ROTATING BAND PROC			265			
PROBLEM - THERE ARE NO COST EFFECTIVE TESTING TECHNIQUES FOR VERIFYING THE WELD-BOND INTEGRITY OF ROTATING BANDS ON LARGE CALIBER MUNITIONS. IN ADDITION THERE ARE NO RELIABLE METHODS FOR IN-PROCESS QUALITY CONTROL OR PROCESS CORRECTION.						
SOLUTION - A WELD QUALITY MONITOR (WQM) WILL BE USED TO DETECT, IDENTIFY, AND CORRECT CONDITIONS THAT LEAD TO BAND DEFECTS IN REAL TIME. THE WQM WILL MONITOR THE SPECTRAL SIGNATURE OF THE WELDING ARC. THIS DATA WILL THEN BE USED TO CONTROL PROCESS PARAMETERS.						
(3740) TITLE - MFG PROCESSES F/IMPROVED STANDOFF DUAL PURPOSE ICM						1000
(3741) TITLE - MFG PROCESSES F/ADV DESIGN ARTILLERY TRAINING AMMUNITION						1000
(3745) TITLE - IMPRVD TECH F/MFG OF 8 IN FIN STABILIZED ART PROJ (CHAMP)						1000
(3747) TITLE - TECHNOLOGY F/MFG OF ADVANCED 75MM AMMUNITION						1000
(4563) TITLE - XM833 METAL PARTS PRODUCTIVITY	3480	2350		650		
PROBLEM - CURRENT PRODUCTION PROCESSES ARE INCAPABLE OF MEETING TIME CYCLES AND QUANTITIES OF D/U PROJECTILES AS PLANNED IN FACILITIZATION STUDIES.						
SOLUTION - INVESTIGATE D/U PRODUCTION PROCESS TO REDUCE CYCLE TIMES, CONSERVE MATERIAL, IMPROVE BALLISTICS, REDUCE WASTE AND IMPROVE THE ENVIRONMENT.						
(4563) TITLE - MANUFACTURE OF STEEL FOLDING FINS						580
PROBLEM - THE METHOD OF PRODUCING THE FINS FOR THE XM815 HEAT-MP-T PROJECTILE INVOLVES COSTLY AND TIME CONSUMING SURFACE GRINDING RESULTING IN COST PER PROJECTILE OF $570.00.						
SOLUTION - ALTERNATE FORMING METHODS SUCH AS ROLL FORMING DIE FORGING AND INVESTMENT CASTING WILL BE EVALUATED IN ORDER TO COME UP WITH A MORE ECONOMICAL FIN COST.						

	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- PROJECTILE (CONTINUED)						
(4597) TITLE - MFG PROC F/CANNON CALIBER DU PENETRATOR (20MM, 25MM, 30MM)		374			446	
PROBLEM - CURRENT FABRICATION TECHNIQUES FOR SMALL CALIBER DEPLETED URANIUM PENETRATORS RESULT IN EXCESSIVE SCRAP OF RADIOACTIVE CONTAMINANTS AND ARE HIGHLY LABOR INTENSIVE.						
SOLUTION - DEFINE A FULL PRODUCTION PROCESS AND EQUIPMENT FOR THE MANUFACTURE OF DU PENETRATORS DIRECT FROM ROLLED BAR BY SKEWED AXIS ROLL FORMING TECHNIQUES.						
(4637) TITLE - AUTOMATED MANUFACTURE + INSPECTION OF SFF WARHEAD LINERS			980	1075	882	
PROBLEM - CONVENTIONAL SFF LINER MACHINING AND INSPECTION TECHNIQUES REQUIRED TO ACHIEVE DESIGN TOLERANCES ARE COSTLY AND TIME CONSUMING.						
SOLUTION - DEVELOP METHODS TO MANUFACTURE AND INSPECT DUCTILE IRON SFF WARHEAD LINERS IN A PRECISE, LOW COST, HIGH VOLUME MODE.						
(4653) TITLE - PRE-IMPREGNATED FIBERGLASS ON PROJECTILE BODY				539		
PROBLEM - THE FILAMENT WINDING PROCESS FOR THE M483A1 PROJ REQUIRES APPLICATION OF WET UNCURED EPOXY RESIN TO THE GLASS ROVING. EXCESS RESIN DRIPS ONTO THE PROCESS EQUIPMENT CLOGGING MOTOR BEARINGS AND DRIVES AND CAUSING EQUIPMENT CLEAN-UP DIFFICULTIES.						
SOLUTION - ESTABLISH A PROCESS USING FIBERGLASS, PRE-IMPREGNATED WITH POLYESTER RESIN IN A SEMI-CURED STATE. THE IMPROVED SYSTEM WOULD ELIMINATE MASKING, CLEAN-UP AND MAINTENANCE PROBLEMS.						
(4659) TITLE - AUTOMATIC INSPECTION FOR ROTATING BAND CHEMISTRY			410			
PROBLEM - ROTATING BAND OF THE M483A1 IS PRESENTLY ANALYZED FOR IRON AND FINE CONTENT BY COLLECTING CHIPS FROM FINAL MACHINING PROCESS. AT PRESENT THE TURN AROUND IS FOR THIS ANALYSIS IS EXCESSIVE CREATING LARGE BACKLOG OF PROJECTILES AWAITING RELEASE.						
SOLUTION - THE PRESENT METHOD OF ANALYSIS WILL REPLACE BY AN X-RAY FLORESCENCE TECHNIQUE MEASURING THE IRON-ZINC CONTENT DIRECTLY ON THE BAND WITHIN A THIRTY MINUTE PERIOD.						
(4667) TITLE - CONTINUOUS ELECTROSLAG REMELT OF DU CHIPS FOR RECYCLE				672		
PROBLEM - NO ECONOMICAL PROCESS EXISTS TO RECYLE DEPLETED URANIUM CHIPS IN TO USEFUL PRODUCTS.						
SOLUTION - UTILIZE A MOLTEN SALT PROCESS WHICH WILL REMELT URANIUM CHIPS INTO A USABLE PRODUCT.						

	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- PROJECTILES (CONTINUED)						
(4678) TITLE - LO COST PROD TECH F/SGL MOTION DBL ARTIC WING/FIN DEV SYS						100
PROBLEM - A NEW FIN STABILIZER DESIGN REQUIRES A LOWEST COST MANUFACTURING METHOD.						
SOLUTION - DETERMINE THE LOWEST COST METHOD FOR THIS NEW DESIGN.						
(4769) TITLE - CERAMIC CRUCIBLES IN MELTING DU MATERIAL F/PENETRATORS					825	
PROBLEM - IN THE MANUFACTURE OF DU PENETRATORS THE CARBON ERODES FROM THE CRUCIBLE AND CONTAMINATES THE MELT MATERIAL RAISING THE CARBON BEYOND ACCEPTABLE LEVELS.						
SOLUTION - USE CERAMIC TYPE MATERIALS IN HIGH TEMPERATURE CRUCIBLES AND THUS PREVENT CARBON PICK UP FROM THE CRUCIBLE.						
COMPONENT -- TOOLING						
(3707) TITLE - WELDING TECHNOLOGY ADVANCEMENTS (AFB3-7)						200
PROBLEM - FAB AND MAINT COSTS OF TOOLING FIXTURES; TOOLING AND PART SAFETY FOR RESISTANCE AND TIG WELDING; EXTENSIVE WELDING SCHEDULES, TESTING, AND STRIP REQUIREMENTS FOR TAPERED MATERIALS ARE COST DRIVERS OF COMPONENTS FOR MISSILE AND ROCKET MOTOR.						
SOLUTION - EVALUATE THE DESIGN AND MATERIALS OF CONSTRUCTION OF SHORT BARS, DEVELOP NEW TECHNIQUE UTILIZING LOW HEAD PRESSURES. THE DEVELOPMENT OF A WELDING MACHINE AND/OR PROCESS TO PERMIT VARIABLE SCHEDULES AND WELD SAMPLES WHILE IN OPERATION.						
(4164) TITLE - ANALYSIS FOR PREDICTING FAILURE OF MFG TOOLING				250		
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.						
(4535) TITLE - PRECISION TOOLING FOR SMALL CALIBER AMMUNITION						270
PROBLEM - COST OF TOOLS AND REPLACEMENT/SETTING TIME ARE SIGNIFICANT FACTORS IN THE COST OF AMMUNITION. WORK IN THE CAN INDUSTRY SHOWS THAT SIGNIFICANT IMPROVEMENTS IN CLOSER TOLERANCES, IMPROVED GRINDING METHODS, AND TOOL LIFE CAN BE ACHIEVED.						
SOLUTION - INDUSTRY TECHNIQUES WILL BE EVALUATED. SAMPLES WILL BE PRODUCED AND EVALUATED IN ACTUAL PRODUCTION ENVIRONMENT. COST AND TOOL LIFE WILL BE OPTIMIZED.						

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* CATEGORY *
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*POLLUTION ABATEMENT *
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	FUNDING ($000)					
	PRIOR	84	85	86	87	88

COMPONENT -- GENERAL

(4348) TITLE - NOISE POLLUTION ABATEMENT F/SCAMP IN LCAAP — 264

PROBLEM - NOISE LEVEL EXCEEDS 85 DBS IN BLDG 1 AT LAKE CITY AAP.

SOLUTION - INSTALL RECOMMENDED ONE SUBMODULE NOISE SUPPRESSION SYSTEM AND EVALUATE ALL OTHER SUBMODULES.

(4758) TITLE - SOLID WASTE (SLUDGE) DISPOSAL TECHNOLOGY — 300

PROBLEM - CURRENTLY, TOXIC SLUDGES ARE BEING STORED IN LAGOONS. DUE TO MORE STRINGENT FEDERAL AND STATE WATER POLLUTION AND SOLID WASTE DISPOSAL STANDARDS, THE NEED FOR A SATISFACTORY SLUDGE DISPOSAL METHOD FOR THE ARMYS MUNITIONS PLANTS IS NEEDED.

SOLUTION - SELECTED COMMERCIALLY AVAILABLE TREATMENT TECHNOLOGIES SUCH AS CHEMFIX, CHEM-CLEAN OR STABLEX PROMISE STABILIZATION OF SLUDGE BY SOLIDIFICATION AND/OR CHEMICAL FIXATION. IT IS PROPOSED TO INVESTIGATE AND ASSESS THESE PROCESSES FOR APPLICATION AT AAPS

COMPONENT -- PROPELLANTS/EXPLOSIVES

(4469) TITLE - ADVANCED POLLUTION ABATEMENT FOR DARCOM FACILITIES — PRIOR 1443, 84 917

PROBLEM - MUCH WORK HAS BEEN DONE IN THE PROPELLANTS AND EXPLOSIVES PLANTS TO MEET THE POLLUTION ABATEMENT STANDARDS. HOWEVER, ALL OF THE GOALS HAVE NOT YET BEEN MET.

SOLUTION - DEVELOP TECHNOLOGY TO DISPOSE OF WASTEWATER TREATMENT SLUDGE, TO PROVIDE TERTIARY TREATMENT OF HAAP WASTEWATER, TO TREAT PINK WATER, AIR EMISSION AND DETONATOR WASTE, AND TO PROVIDE ENVIRONMENTAL IMPROVEMENTS FOR NITRATE ESTERS.

(4511) TITLE - DISPOSAL OF FINAL SLUDGE FROM ACID RECOVERY OPERATIONS — PRIOR 722, 84 164, 85 275, 86 370, 87 47

PROBLEM - SODIUM HYDROXIDE IS PRESENTLY USED TO NEUTRALIZE NITRIC ACID IN WEAK ACETIC ACID PRIOR TO ITS PRIMARY DISTILLATION AND IN THE FINAL SLUDGE TO KILL THE WASTE RDX. A BY PRODUCT OF THIS REACTION IS A LOW GRADE SODIUM NITRATE.

SOLUTION - TO DEV AN ALTERNATIVE MORE COST EFFECTIVE PROCESS F/ NEUTRALIZATION OF NITRIC ACID CAUSTICIZING + SLUDGE. AMMONIUM ACETATE IS A RECOMMENDED ALTERNATIVE. THE BY PROD IS AMMONIUM NITRATE, A MORE VALUABLE PROD THAN SODIUM NITRATE.

	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- PROPELLANTS/EXPLOSIVES (CONTINUED)						
(4556) TITLE - ON-LINE MONITORS F/WATER POLLUTANTS GENERATED BY MFR OF EXPL		458				
PROBLEM - AAPS DISCHARGES ARE HAZARDOUS, TOXIC AND UNIQUE TO THE MILITARY. THE LAW STIPULATES THAT ALL POLLUTANTS BE MONITORED. SPECIAL INSTRUMENTATION IS NECESSARY TO MONITOR MILITARY UNIQUE POLLUTANTS AT THE REQUIRED DETECTION LEVELS.						
SOLUTION - EARLIER PROJECTS DEVELOPED AN ELECTROCHEMICAL, RAMAN AND POLAROGRAPHIC ANALYZERS. FIELD TEST AND EVALUATE THESE ANALYZERS FOR ON-LINE MONITORING USE. THOSE MEETING PERFORMANCE CRITERIA WILL BE MATED WITH ON-LINE SAMPLING AND FURTHER FIELD TESTED.						
(4612) TITLE - NITRAMINE (LOVA) PROPELLANT WASTEWATERS ABATEMENT			250	250		
PROBLEM - THE INGREDIENTS (RDX-TAGN) IN NITRAMINE PROPELLANTS WERE NOT CONSIDERED IN DEVELOPING CRITERIA FOR POLLUTION ABATEMENT AT GOCO FACILITIES. NOW NITRAMINE PROPELLANTS ARE SCHEDULED FOR PRODUCTION. EFFECT OF NITRAMINE ON POLLUTION ABATEMENT UNKNOWN.						
SOLUTION - EVALUATE SELECTED TECHNOLOGIES FOR NITRAMINE ABATEMENT IN FY85 WHEN RESULTS OF CURRENT R+D PROGRAM EXAMINING THIS WILL BE FINISHED. OBTAIN DATA FOR PLANT IMPLEMENTATION.						
(4651) TITLE - EXPLOSIVE RECLAMATION FACILITY				335	231	
PROBLEM - EXISTING HI-PRESSURE WASHOUT FACILITY AT IOWA AAP HAS DEMONSTRATED REUSE AND RECIRCULATION OF PROCESS WATER. THE REMAINING PROBLEM INVOLVES WHAT TO DO WITH THE EXPLOSIVES THAT HAVE BEEN WASHED OUT.						
SOLUTION - DESIGN, INSTALL AND DEMONSTRATE A PROTOTYPE RECLAMATION SYSTEM THAT CAN BE USED IN THE HI-PRESSURE WASHOUT FACILITY AT IOWA AAP.						
(4689) TITLE - EAK EXPLOSIVE WASTEWATER TREATMENT					350	250
PROBLEM - EAK EXPLOSIVE IS UNDER DEVELOPMENT. PRODUCTION OF EAK IS EXPECTED TO EXCEED 10 MILLION LBS/YEAR. THE POTENTIAL SITES FOR MANUFACTURING EAK DO NOT HAVE TREATMENT FACILITIES FOR EXPLOSIVE CONTAMINATED WASTEWATERS.						
SOLUTION - DEVELOP TREATMENT OF EAK EXPLOSIVE CONTAMINATED WASTEWATERS. A FY84 R+D PROJECT WILL CHARACTERIZE THIS WASTEWATER. AFTER STUDYING FEASIBLE TREATMENTS MAKE A PILOT PLANT TO EVALUATE THE MOST PROMISING ONES.						
(4691) TITLE - DESTRUCT/REMVL OF EXPLOS FROM WASTEWTR USING SUPERCRIT FLUID						275
PROBLEM - WASTEWATER FROM ARMY AAPS POSE A SERIOUS POLLUTION PROBLEM TO DRINKING WATER SUPPLIES AND AQUATIC/AMPHIBIAN LIFE IN RECREATIONAL WATERS. MORE STRINGENT ENVIRONMENTAL LAWS/REGULATORY STANDARDS MANDATE DEVELOPMENT OF NEW MORE COST EFFECTIVE TECHNOLOGY.						
SOLUTION - USE SUPERCITICAL(ABOVE 374 DEG C AND 220 ATMOSPHERES)FLUID TECHNOLOGY.IT CAUSES SOLUTION OF COMPLEX ORGANIC SUBSTANCES AND SUBSEQUENT DECOMPOSITION/REFORMATION INTO LOW MOLECULAR WEIGHT PRODUCTS.BOTH ORGANIC ++ INORGANIC COMPOUNDS UNDER [illegible] DESTRUCTN.						

	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- PROPELLANTS/EXPLOSIVES (CONTINUED)						
(4697) TITLE - SOLVENT REGENERATION OF NITROBODY LADEN ACTIVATED CARBON						250
PROBLEM - CARBON IN CARBON ADSORTION BECOMES CONTAMINATED WITH EXPLOSIVES AFTER OPERATING. IT MUST BE EITHER DISPOSED OF OR REGENERATED. OPEN BURNING WAS THE USUAL DISPOSAL METHOD BUT SOONER OR LATER THIS WILL BE BANNED COMPLETELY.						
SOLUTION - REGENERATE THE CARBON IN-SITU WITH SOME NEW PROMISING SOLVENTS. THIS WILL BE A VIABLE ALTERNATIVE TO STOCKPILING A HAZARDOUS WASTE (SPENT CARBON) CAUSED BY A BAN ON OPEN BURNING.						
COMPONENT -- RECYCLE						
(4579) TITLE - WHITE WATER POLLUTION ABATEMENT		374				
PROBLEM - A BY PRODUCT OF FORMING COMBUSTIBLE CASES ARE WASTEWATERS CONTAINING NC FINES AND OTHER CONTAMINANTS INCLUDING DPA. THE DISCHARGE LIMIT FOR DPA IS 0.026 MG/L. ESTIMATES PLACE DPA IN WASTEWATER AT 20 MG/L OR 770 TIMES THE MAXIMUM AMOUNT PERMITTED.						
SOLUTION - TREAT THE WHITE WATER TO ABLE TO RECYCLE/REUSE THE WATER IN THE MAIN PROCESS. CARBON ADSORPTION FOR REMOVAL OF DPA AND MICROFILTRATION TO REMOVE NC FINES AND OTHER SUSPENDED SOLIDS/FIBERS WILL BE INVESTIGATED.						

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* C A T E G O R Y *
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*PROPELLANTS *
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COMPONENT -- BALL

(4540) TITLE - CALCIUM CARBONATE COATING OF 7.62MM BALL PROPELLANTS	115	322				
PROBLEM - A SAFE AND EFFICIENT PROCESS IS NOT CURRENTLY AVAILABLE FOR THE COATING OF 7.62MM BALL PROPELLANT WITH CALCIUM CARBONATE.						
SOLUTION - UTILIZE AN EXISTING 2-STAGE CONTINUOUS PILOT SCALE COATER WHICH WILL BE SHIPPED FROM OLIN, ST. MARKS, FL. FACILITY TO BADGER AAP TO DEVELOP A SAFE AND EFFICIENT PROCESS TO COAT 7.62 MM BALL PROPELLANT WITH CALCIUM CARBONATE.						
(4568) TITLE - SMALL CAL AUTOMATED NON-DESTRUCTIVE TEST - SCANT						1415
PROBLEM - .50 CALIBER BALL, TRACER, ARMOR PIERCING INCENDIARY(API) AND ARMOR PIERCING INCENDIARY TRACER(APIT) AMMUNITION IS INSPECTED USING WW II GAGE AND WEIGH MACH AND VISUAL EXAM. THIS PROCESS IS SLOW, INACCRATE AND EXPENSIVE						
SOLUTION - AUTOMATE THE GAGE + WEIGH PROCESS USING THE TECHNOLOGY DEVELOPED FOR 5.56MM. THE TECHNOLOGIES FOR THIS AUTOMATED PROCESS INCLUDE- OPTICS/ELECTRONICS, LASER SCATTERING, EDDY CURRENT, AND X-RAY. THE PROCESS WILL BE COMPUTER CONTROLLED.						

MMT FIVE YEAR PLAN
RCS DRCMT 126

	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- GENERAL						
(4145) TITLE - CONTROL DRYING IN AUTO SB AND BALL PROP MFG			300			
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	821	1028	712	300		
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 AUTOMATE THE TAKE-AWAY AND CUTTING OPERATIONS FOR SOLVENT-TYPE STICK PROPELLANT. THIS PROCESS WILL OPERATE WITH EXISTING 12 INCH PRESS AND PRESS BAY.						
(4615) TITLE - IMPROVED SOLVENTLESS PASTE BLENDING			600	753		200
PROBLEM - PASTE BLENDING AND FINAL BLENDING OF STICK PROPELLANT IS NOW REQUIRED. A MORE INTENSIVE PASTE BLEND MAY ALLOW ELIMINATION OR REDUCTION OF THE FINAL BLENDING STEP.						
SOLUTION - PURCHASE, INSTALL AND EVALUATE PROTOTYPE EQUIPMENT TO IMPROVE PASTE BLENDING.						
(4660) TITLE - AUTOMATED BLENDING OF STICK PROPELLANT			723	1600	1365	375
PROBLEM - MANUAL BLENDING OF STICK PROPELLANT IS LABOR AND SPACE INTENSIVE AND CANNOT SUPPORT PRODUCTION OF LARGE QUANTITIES OF STICK PROPELLANT.						
SOLUTION - DEVELOPMENT OF A MECHANICAL STICK BLENDER TO AUTOMATICALLY BLEND AND PACK LONG STICK PROPELLANT.						
(4699) TITLE - DEWATERING OF WASTE PROPELLANT INCINERATOR FEED					220	
PROBLEM - WASTE PROPELLANT INCINERATOR REQUIRES HIGH TEMPERATURE FOR COMPLETE COMBUSTION OF GASES AND EVAPORTION OF SLURRY WATER. THE GREATER THE WATER TO PROPELLANT RATIO THE GREATER THE FUEL OIL REQUIREMENT.						
SOLUTION - DEVELOP A METHOD TO DEWATE THE INCINERATOR FEED TO A MINIMUM LEVEL CONSISTENT WITH HANDLING.						

	FUNDING (*000)					
	PRIOR	84	85	86	87	88
COMPONENT -- MULTI-BASE						
(4521) TITLE - AUTOMATED PRODUCTION OF MULTI-BASE STICK PROPELLANT ON CAMBL			754	760	670	
PROBLEM - VARIOUS HIGH ENERGY AND LOVA GRANULAR AND STICK MULTI-BASE PROPELLANTS ARE BEING DEVELOPED. BATCH FACILITIES FOR MULTI-BASE HAVE A CONSTRAINED CAPACITY. A NEW CAMBL IS BEING BUILT BUT HAS NOT PROVEN CAPABLE OF MANUFACTURING STICK PROPELLANTS.						
SOLUTION - ADAPT RECENTLY DEVELOPED CAMBL PROCESS TO DEMONSTRATE THE MASS PRODUCIBILITY OF THE NEW PROPELLANTS. THIS WILL INSURE A PRODUCTION BASE FOR STICK PROPELLANT AND PREVENT HAVING TO USE AND/OR BUILD INEFFICIENT BATCH FACILITIES.						
(4544) TITLE - DEVELOP A THIRD GENERATION DYNAGUN TO SIMULATE TANK GUNS		416	317			
PROBLEM - STANDARD BALLISTIC EVALUATION TESTS ARE THE ONLY MEANS AVAILABLE FOR ASSESSING PROPELLANTS FOR HIGH PRESSURE/HIGH VELOCITY SYSTEMS SUCH AS THE 105MM AND 120MM TANK GUNS. THESE PROCEDURES ARE VERY EXPENSIVE AND TIME CONSUMING.						
SOLUTION - DEVELOP A THIRD GENERATION DYNAGUN WHICH CAN BE USED IN LIEU OF STANDARD BALLISTIC TESTS AS A MORE RAPID AND LESS COSTLY MEANS OF ASSESSING PROPELLANTS FOR THE 105MM AND 120MM TANK GUNS.						
(4572) TITLE - IMPROVED BATCH PROCESSING OF MULTI BASE PROPELLANTS					440	547
PROBLEM - BATCH MANUFACTURE OF MULTI-BASE PROPELLANTS REQUIRES MANY OPERATIONS WHICH ARE LABOR INTENSIVE DIFFICULT TO CONTROL AND HAZARDOUS TO THE OPERATORS.						
SOLUTION - PROVIDE PROTOTYPE EQUIPMENT TO IMPROVE, SIMPLIFY AND COMBINE OPERATIONS IN BATCH PROCESSING OF MULTI-BASE PROPELLANTS BOTH GRANULAR AND STICK TO REDUCE COST AND OPERATOR HAZARD.						
(4656) TITLE - NITRAMINE PROPELLANT PROCESSING			398	652	585	486
PROBLEM - NITRAMINE CONTAINING GUN PROPELLANTS SUCH AS LOVA AND GAU-8 PROP ARE PRESENTLY PRODUCED BY A DISCONTINUOUS, MANPOWER INTENSIVE, INEFFICIENT BATCH PROCESS. PRODUCT UNIFORMITY IS DIFFICULT TO OBTAIN DUE TO IMPRECISE CONTROLS.						
SOLUTION - DEVELOP A CONTINUOUS PROCESSING OPERATION FOR THE MANUFACTURE OF LOVA AND OTHER NITRAMINE PROPELLANTS BY THE USE OF NDS SCREW EXTRUDER, AUTOMATIC FEEDS AND CUTTERS WILL DECREASE COST AND IMPROVE SAFETY.						

	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- MULTI-BASE (CONTINUED)						
(4668) TITLE - SOLVENT STICK PROPELLANT PROCESSING CHARACTERIZATION						527
PROBLEM - BLENDING OF TRIPLE BASE, SOLVENT STICK PROPELLANT IS REQUIRED TO ASSURE ACROSS-THE-LOT BALLISTIC UNIFORMITY. EACH STAGE OF MANUAL BLENDING ADDS APPROXIMATELY $1.50 PER LB TO THE PROPELLANT COST. THREE STAGE BLENDING IS CURRENTLY SPECIFIED.						
SOLUTION - IMPROVING BATCH-TO-BATCH UNIFORMITY CAN REDUCE THE NUMBER OF BLENDING STAGES REQUIRED THUS REDUCING THE COST OF AN AUTOMATED BLENDING FACILITY AS WELL AS PROPELLANT UNIT COST. A NUMBER OF SPECIFIC FACTORS WILL BE EVALUATED.						
(4773) TITLE - 120MM COMBUSTIBLE CASE BODY REMOVAL SYSTEM		200	230			
PROBLEM - A POTENTIAL SAFETY PROBLEM CURRENTLY EXISTS IN THE COMBUSTIBLE CASE MOLDING AREA ON THE 120MM LINE. THE REMOVAL OF THE CASE BODY FROM THE MALE PRESSING MANDREL IN THIS AREA IS A HAZARDOUS STEP IN THE PRODUCTION OF THE 120MM CASE BODIES.						
SOLUTION - TO DESIGN, FABRICATE, INSTALL, AND PROVE-OUT A PNEUMATICALLY CONTROLLED CASE BODY REMOVAL SYSTEM WHICH WILL WORK IN CONJUNCTION WITH THE CURRENT PRESSING SYSTEMS ON THE 120MM COMBUSTIBLE CASE LINE.						
COMPONENT -- NITROCELLULOSE						
(4594) TITLE - NITROCELLULOSE (NC) PAPER MANUFACTURING TECHNOLOGY					458	
PROBLEM - CURRENTLY THE NC MFG BASE IN THIS COUNTRY HAS BEEN LIMITED TO SMALL LOT PRODUCTION. SINCE THE CONTRACTOR DOES NOT WANT TO UPGRADE HIS FACILITIES FOR A PROD SOURCE, THE GOVT IS COMMITTED TO ESTABLISHING AN NC PAPER MFG BASE TO MEET PROJECTED NEED.						
SOLUTION - THIS PROJECT WILL DEVELOP MFG TECHNIQUES, DEFINE SPECIFICATIONS AND SOP REQUIREMENTS, IDENTIFY THE NC PAPER MFG PARAMETERS AND HARDWARE OPERATIONAL REQUIREMENTS TO SUPPORT OPERATION OF THE PAPER MANUFACTURING LINE.						
(4690) TITLE - IMPROVED DEHYDRATION OF NITROCELLULOSE						701
PROBLEM - TWO METHODS ARE USED FOR ALCOHOL DEHYDRATION OF NC. ALCOHOL PRESS DEHYDRATION PRODUCES A TIGHTLY COMPACTED BLOCK WHICH MUST BE BROKEN BY MECHANICAL MEANS,RESULTING IN LUMPS OF NC WHICH ARE DIFFICULT TO SOLVATE.THERMAL DEHY,2ND METHOD,USES HI ENERGY.						
SOLUTION - IMPROVED METHODS FOR NC DEHY WILL BE EVALUATED WITH EMPHASIS ON SCREW EXTRUSION AND CENTRIFUGAL OPERATION. THESE OPERATIONS AS WELL AS OTHER LATEST TECH WILL BE INVESTIGATED TAKING INTO ACCOUNT THE SOLVENT SYSTEMS PRESENTLY USED FOR PROP PROCESSES.						

	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- NITROCELLULOSE (CONTINUED)						
(4763) TITLE - MFG PROCESSES FOR CASELESS PROPELLANTS				400	700	1000
PROBLEM - THE DEVELOPMENT OF AN ADVANCED COMBAT RIFLE HAS BEEN INITIATED WHICH WILL USE CASELESS AMMUNITION. PRIOR TO PLANT CONSTRUCTION, MANUFACTURING PROCESSES MUST BE DEFINED AND PROVEN ON A PILOT LINE.						
SOLUTION - ROTE PROJECTS ARE PRESENTLY DEFINING PROPELLANT CONFIGURATION AND PRELIMINARY PROCESS ON LAB EQUIPMENT. THIS PROJECT WILL CULMINATE IN A COMPLETELY TESTED PILOT LINE WHICH WILL BE USED FOR THE PRODUCTION OF TEST QUANTITIES.						
COMPONENT -- NITROGUANIDINE						
(4427) TITLE - ON-LINE ANALYZERS FOR NITROGUANIDINE PLANT					498	689
PROBLEM - A NITROGUANIDINE MFG FACILITY IS BEING CONSTRUCTED AT SUNFLOWER AAP. MMT 5 78 4447 INDICATED THE FEASIBILITY OF AUTOMATED ON-LINE INSTRUMENTATION FOR PROCESS STREAM CHEMICAL ANALYSIS. HOWEVER THE RELIABILITY HAS NOT BEEN DEMONSTRATED.						
SOLUTION - INSTALL AND EVALUATE AN ON-LINE ION CHROMATOGRAPH, A GAS CHROMATOGRAPH, AND A SPECTROPHOTOMETER IN THE FACILITY WHICH IS TO BE BUILT BEGINNING IN FY85.						
(4623) TITLE - CALCIUM CYANAMIDE PROCESS CONTROL			263			
PROBLEM - IN THE MFG OF NQ THE INTERMEDIATE CHEMICAL CALCIUM CYANAMIDE IS PROD CONTINUOUSLY BY REACTING RAW MATERIALS. WIDELY VARING IMPURITIES IN THE FEED HAVE NEGATIVE EFFECT ON THE KILN OPNS, SUCH AS SINTERING AND OVERPRESSURES WHICH CREATE DUST HAZARDS.						
SOLUTION - STUDY THE INTERACTION BETWEEN KILN OPERATING CONDITIONS,RECYCLE OF CALCIUM CYANAMIDE AND IMPURITIES IN THE FEED ON SINTERING, YIELD AND PRODUCT QUALITY USING EXISTING LABORATORY SCALE KILNS AT SAAP. RESULTS WILL BE USED TO INCREASE YIELD + QUAL.						
COMPONENT -- SINGLE BASE						
(4573) TITLE - COMBINED CPD, MIX AND EXTRUSION FOR S.B. PROPS						1478
PROBLEM - BATCH MANUFACTURE OF SINGLE BASE PROPELLANTS REQUIRES OPERATIONS WHICH ARE LABOR INTENSIVE, DIFFICULT TO CONTROL AND HAZARDOUS TO THE OPERATORS.						
SOLUTION - THIS PROJECT WILL PROVIDE PROTOTYPE EQUIPMENT TO IMPROVE, SIMPLIFY AND COMBINE OPERATIONS IN BATCH PROCESSING OF SINGLE BASE PROPELLANTS TO REDUCE COST AND OPERATOR HAZARDS.						

FUNDING ($000)

	PRIOR	84	85	86	87	88
COMPONENT -- SINGLE BASE (CONTINUED)						
(4767) TITLE - COMBINED SOLVENT RECOVERY + DRYING OF SINGLE BASE PROPELLANT						517
PROBLEM - PRESENTLY, SOLVENT RECOVERY, WATER DRYING, AND AIR DRYING OPERATIONS FOR MANUFACTURE OF SINGLE BASE PROPELLANTS IS ACCOMPLISHED SEPARATELY. THESE PROCEDURES ARE BOTH LABOR AND ENERGY INTENSIVE.						
SOLUTION - COMBINE THE THREE SEPARATE OPERATIONS INTO ONE COMBINED OPERATION.						
(4768) TITLE - SINGLE BASE STICK PROPELLANT PROCESSING						1776
PROBLEM - DEVELOPMENT PROGRAMS ARE UNDERWAY WITH SINGLE BASE SOLVENT, TRIPLE BASE SOLVENT, SOLVENTLESS AND NITRAMINE FORMULATIONS. MEETING PROJECTED REQUIREMENTS FOR STICK PROPELLANT WILL REQUIRE ESTABLISHMENT OF MFG PROCESSES, TECHNIQUES AND EQUIPMENT.						
SOLUTION - DEFINE A PROCESS TO MASS PRODUCE SINGLE BASE STICK PROPELLANT ON THE BATCH LINES AT RADFORD AAP, PROCURE, INSTALL AND DEBUG PROTOTYPE PRODUCTION-SIZED EQUIPMENT, EVALUATE THE SELECTED PROCESS AND EQUIPMENT AND BALLISTICALLY EVALUATE THE PROPELLANT.						

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*    C A T E G O R Y     *
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*QUALITY CONTROL/TESTING *
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	PRIOR	84	85	86	87	88
COMPONENT -- INSPECTION						
(3718) TITLE - CONTINUOUS EVALUATION OF THE PROTECTIVE COATINGS					2100	
PROBLEM - ARTILLERY SHELLS ARE GIVEN PROTECTIVE COATINGS AND SAMPLES FROM EACH LOT ARE EVALUATED DURING PRODUCTION IN THE STANDARD ASTM B117 SALT SPRAY TEST (REQUIRES 2-4 DAYS).						
SOLUTION - CONTINUOUS SCANNING PROBE IMPEDANCE TECHNIQUES WILL PERFORM 100 PCT PROTECTIVE COATING CHECKS.						
(4358) TITLE - AUTO LINE - PROCESS INSPECTION OF NEW EED (ALPINE)		250	490	310		
PROBLEM - INSPECTION OF BRIDGE WIRE ON ELECTRIC DETONATORS.						
SOLUTION - AUTOMATE THE TESTING TECHNOLOGY DEVELOPED BY TTT ARRADCOM 12-78, 'ELECTROTHERMAL ANALOG RESPONSE INSPECTION OF EED?S' FOR FINAL END ITEM NONDESTRUCTIVE ACCEPTANCE INSPECTION.						

AD-A148 828 MANUFACTURING METHODS AND TECHNOLOGY PROGRAM PLAN CY 1984(U) ARMY INDUSTRIAL BASE ENGINEERING ACTIVITY ROCK ISLAND IL G FISCHER SEP 84 SBI-AD-E700 011 2/3

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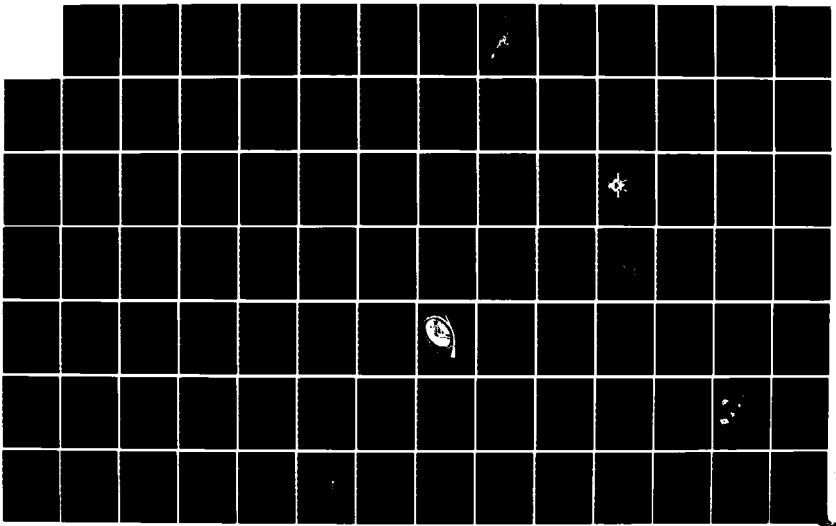
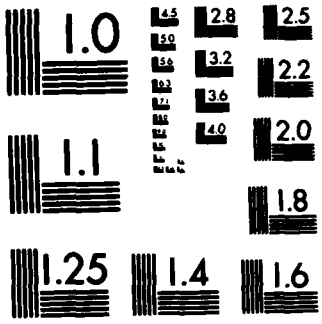




MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

	FUNDING ($000)				
	PRIOR	84	85	86	87	88
COMPONENT -- INSPECTION (CONTINUED)						
(4471) TITLE - CONICAL SURFACE INSPECTION						197
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.						
COMPONENT -- MECHANICAL						
(0930) TITLE - ACCEPTANCE EQUIPMENT FOR XM21 ALARM				600	600	600
PROBLEM - THE XM21 SYSTEM AND SUB-ASSEMBLIES REQUIRE A MEANS FOR TEST AND INSPECTION CURRENTLY NOT AVAILABLE.						
SOLUTION - DEVELOP TESTING DEVICES OR EQUIPMENT FOR THE PRODUCTION ACCEPTANCE OF THE XM21 AGENT ALARM SYSTEM.						
COMPONENT -- NON-DESTRUCTIVE TESTING						
(3719) TITLE - APPLICATION OF X-RAY SYSTEM SCANNER 100 PCT					2200	
PROBLEM - IN THE CURRENT METHOD OF TESTING THE METALLURGICAL PROPERTIES OF SHELL, DESTRUCTIVE SAMPLES MUST BE TAKEN CONTINUOUSLY IN PRODUCTION						
SOLUTION - DEVELOP A RAPID AND EFFECTIVE NDT METHOD TO CONTINUOUSLY VERIFY THE TENSILE AND HARDNESS PRORERTIES OF EACH SHELL PRODUCED.						
(4473) TITLE - AUTO LEAK DETECTION OF WP MUNITIONS		410	230	220		
PROBLEM - THE CURRENT METHOD OF HEATING THE WHITE PHOSPHOROUS MUNITIONS TO CHECK FOR LEAKS IS LABOR INTENSIVE AND IS NOT UNIFORM FOR ALL ROUNDS.						
SOLUTION - PROVIDE A PROTOTYPE AUTOMATED IN-LINE LEAK DETECTION SYSTEM BASED ON QUANTITATIVE FLAME PHOTOMETERY. THE SYSTEM WILL CONSIST OF TWO HEATING STAGES, A SAMPLING WHEEL, LEAK DETECTOR AND HANDLING SYSTEM.						
(4598) TITLE - AUTO NON-DEST DENSITY DETERMINATION EXPLOSIVE PROJECTILES				415		
PROBLEM - THE DENSITY OF THE EXPLOSIVE IN MILITARY PROJECTILES IS A KEY INDICATOR OF LEAD QUALITY AND SAFETY. THE METHOD IS TIME CONSUMING AND COSTLY AND DOES NOT PERMIT THE MEASUREMENT OF A STATISTICALLY VALID SAMPLE SITE.						
SOLUTION - THIS PROGRAM WILL REPLACE THE CURRENT MANUAL METHOD FOR DESTRUCTIVE DETERMINATION OF DENSITY IN PRESS-LOADED PROJECTILES WITH A SEMI-AUTOMATIC NONDESTRUCTIVE METHOD USING PENETRATING RADIATION.						

	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- NON-DESTRUCTIVE TESTING (CONTINUED)						
(4658) TITLE - AUTO INSPECTION OF FIBERGLASS WRAP ON ARTILLERY						457
PROBLEM - CURRENT METHOD OF ASSURING FIBERGLASS CONTENT OF THE WRAP IS TO REMOVE THE WRAP FROM THE BODY, CUT INTO ONE-INCH SQ, WEIGH + FIRE. REPEAT THIS PROCESS TILL A CONSTANT WEIGHT IS ATTAINED.						
SOLUTION - DEVELOP AN AUTOMATIC METHOD USING PENETRATING RADIATION, X-RAY, GAMMA RAYS, WHICH WILL INVOLVE A CORRELATION BETWEEN MATERIAL DENSITY AND FIBERGLASS CONTENT.						
COMPONENT -- SIMULATION						
(2856) TITLE - SHOCK IMPULSE HYDROSTATIC TESTING						205
PROBLEM - BALLISTIC ACCEPT TEST OF METALLIC CARTRIDGE CASES UTILIZES 100 SAMPLE ITEMS LOADED INTO COMPLETE ROUNDS + FIRED AT A PG. THIS TEST CONSITITUES APPROX 50 PERCENT OF ALL BALLISTIC ACCEPT TEST DONE ON ENTIRE ROUND REQUIRED TO PRODUCE ROUND.						
SOLUTION - A SHOCK IMPULSE HYDROSTATIC PRESSURE TESTER DEV TO TEST COMPONENT CARTRIDGE CASE IN-PLANT W/O NEED OF ASSEMBLING INTO A FULL-UP ROUND WHILE STILL SIMULATING INTERIOR BALLISTIC PULSE WILL MINIMIZE EXPENSE OF TESTING BALLISTICALLY.						
COMPONENT -- X-RAY						
(4545) TITLE - DIGITAL IMAGE AMPLIFICATION X-RAY SYSTEM				936	383	
PROBLEM - EXISTING IMAGE AMPLIFICATION X-RAY DOES NOT MEET THE IMAGE QUALITY CRITERIA TO BE USED AS AN INSPECTION TOOL FOR HE MORTAR ROUNDS. FILM RADIOGRAPHY, AS CURRENTLY USED, IS LABOR INTENSIVE, TIME CONSUMING, AND SUBJECT TO HUMAN INTERPRETIVE JUDGEMENT.						
SOLUTION - REPLACE WITH AN IMPROVED REAL-TIME IMAGE AMPLIFICATION SYSTEM. TECHNIQUES FOR DIGITAL IMAGE ENHANCEMENT AND ANALYSIS DEVELOPED UNDER THE AXIS PROJECT WILL BE ADOPTED.						

CATEGORY
SAFETY

	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- GENERAL						
(4071) TITLE - EXPLOS PREVENTION IN DRY DUST COLLECTION SYSTEMS	461					194
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.						
COMPONENT -- PROPELLANTS/EXPLOSIVES						
(4318) TITLE - OCCUPATIONAL EXPOSURE TO NITRATE ESTERS IN MUNITION MFG						100
PROBLEM - THE THRESHOLD LIMIT VALUE FOR NITROGLYCERIN AND OTHER NITRATE ESTERS MAY BE REDUCED FROM 0.2 PPM TO 0.02 PPM. THIS COULD INVOLVE EXTENSIVE REDESIGN ON ALL FACILITY PROJECTS INVOLVING NG OR NITRATE ESTERS.						
SOLUTION - UTILIZE MORE EFFECTIVE VENTILATION OR CHEMICAL ENTRAPMENT, REMOTE ALTOMATIVE OPERATIONS, DEVELOP PROTECTIVE CLOTHING AND AIR RESPIRATORS.						
(4696) TITLE - ROBOTIC SAMPLING OF IN-PROCESS ENERGETIC MATERIALS						175
PROBLEM - CHEMICAL PROCESSES FOR THE MANUFACTURE OF EXPLOSIVES AND PROPELLANTS REQUIRE SAMPLING OF IN-PROCESS MATERIAL. SAMPLING IS DONE MANUALLY. PEOPLE ARE EXPOSED TO HAZARDOUS MATERIALS SUCH AS CORROSIVE ACIDS, TOXIC FUMES AND SENSITIVE ENERGETICS.						
SOLUTION - SURVEY PRODUCTION FACILITIES AND DEFINE APPLICATIONS FOR AUTOMATED SAMPLING.						

CATEGORY

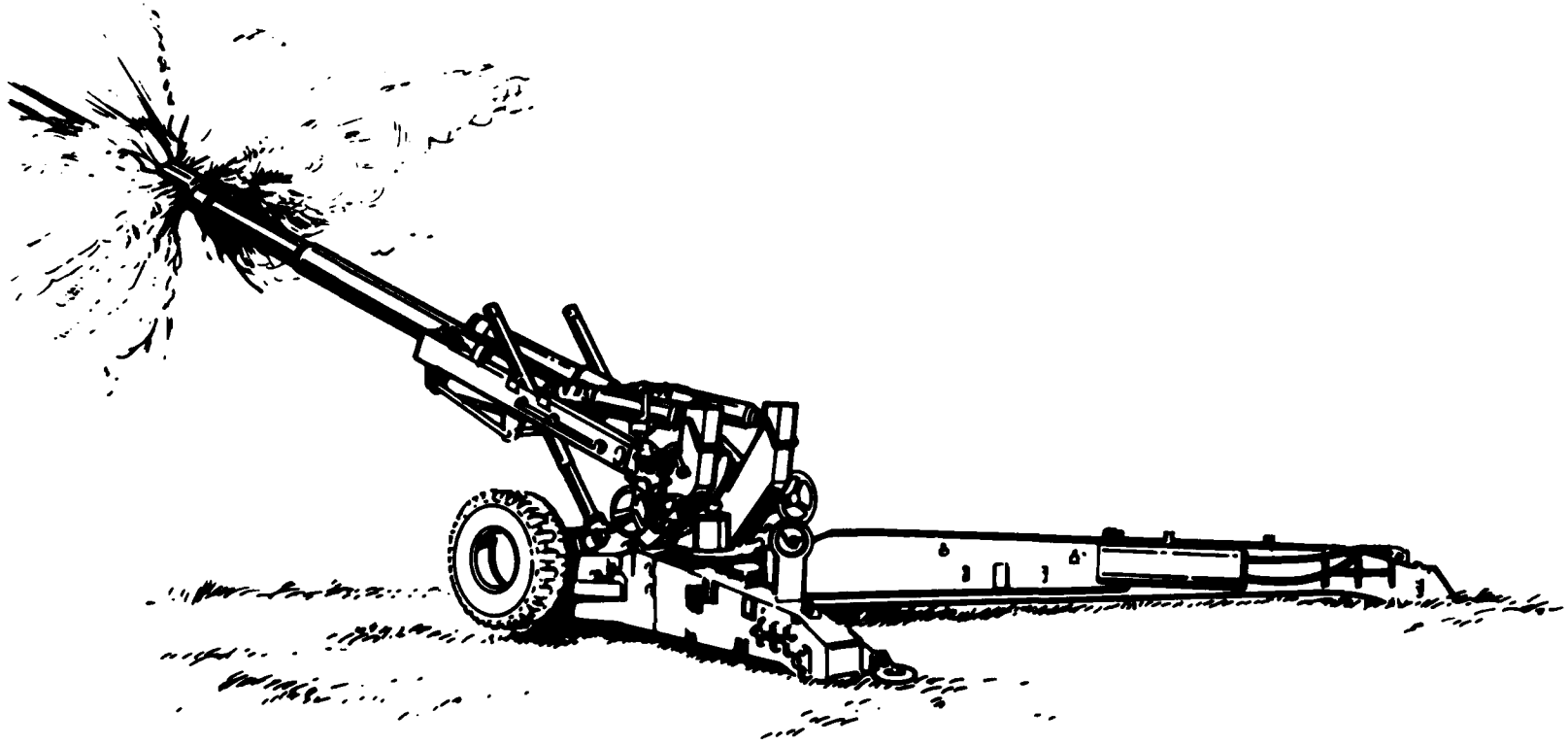
SMALL ARMS

COMPONENT -- GENERAL						
(4351) TITLE - IMPROVED STORAGE TECHNOLOGY FOR PRODUCTION MACHINE					421	330
PROBLEM - NEED TO OVERCOME DEGRADATION OF ELECTRONIC COMPONENTS + MEET RAPID REACTIVATION OF AUTO PDN LINES F/MOB REQUIREMENTS.						
SOLUTION - DEVELOP PACKAGING TECHNIQUE AND USE OF DRY NITROGEN FOR SCAMP EQUIPMENT.						

		FUNDING ($000)					
		PRIOR	84	85	86	87	88
COMPONENT -- GENERAL (CONTINUED)							
(4464)	TITLE - COMPUTER/GROUP TECHNOLOGY FOR SMALL CAL AMMO						228
	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.						
(4539)	TITLE - AUTOMATIC CARTRIDGE CASE HARDNESS MEASUREMENT		182	397			
	PROBLEM - MANUAL MEASUREMENTS BY SAMPLING METHODS ARE INADEQUATE AND COSTLY.						
	SOLUTION - DIRECT EDDY CURRENT TECHNIQUE WOULD PROVIDE CONTINUOUS AND 100% INSPECTION						
COMPONENT -- 5.56MM - .30 CAL							
(2743)	TITLE - IMPROVED TECH FOR SMALL CALIBER AMMUNITION						1000
	PROBLEM - THE SMALL ARMS MUNITION PRODUCTION BASE MUST KEEP ABREAST OF THE RAPIDLY EMERGING NEW MANUFACTURING TECHNIQUES ON A COST/PRODUCTIVITY BASIS.						
	SOLUTION - CONTINUALLY MONITOR THE SMALL ARMS DEVELOPMENTS AND APPLICABLE EMERGING MANUFACTURING TECHNOLOGY.						
(4534)	TITLE - SAWS BULLET CONVERSION OF SCAMP EQUIPMENT	1192	1858	557			
	PROBLEM - AN AMERICANIZED VERSION OF BELGIUM SS-109 WILL BE USED IN THE SAW SYSTEM. THIS EFFORT IS DIRECTED TOWARD DEVELOPMENT OF CONVENTIONAL PROCESSES TO MASS PRODUCE SAWS AMMUNITION ON SCAMP EQUIPMENT.						
	SOLUTION - THIS PROJECT WILL DEFINE PROCESSES AND EQUIPMENT/TOOLING CHANGES REQUIRED ON SCAMP LINE. INITIATION OF THESE EFFORTS THIS YEAR WILL PROVIDE PROCESS EQUIPMENT SPECIFICATIONS FOR IMPLEMENTATION IN SUFFICIENT TIME TO MEET FY87 AND ON REQUIREMENTS.						
(4541)	TITLE - AUTO PRIMER INSERT LACQUER AND ANVIL PRESENCE INSPECT SYS		374				
	PROBLEM - LACQUER INSPECT AT GAGE + WEIGH IS BEING ELIMINATED. THE PRIMER INSERT SUBMODULE CURRENTLY INSPECTS FOR PRIMER ANVIL WITH A PROBE. TO IMPROVE EFFICIENCY, A BACK-UP INSPECTION IS DESIRED CAPABLE OF BEING INSTALLED ON EXISTING EQUIPMENT.						
	SOLUTION - A FLORESCENT DYE WILL BE ADDED TO THE PRIMER LACQUER TO BE DETECTED BY TWO DETECTORS. THE BACK-UP INSPECTION OF PRIMER ANVIL WILL BE EVALUATED BY USING A NONCONTACT EDDY CURRENT PROBE.						

	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- .50 CAL AND LARGER						
(5021) TITLE - HOT FORMING OF P/M PROJ BODIES						127
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.						
(4584) TITLE - LOADING EQUIPMENT FOR CAL .50 AMMUNITION				650	1760	
PROBLEM - THE INCREASED REQUIREMENTS FOR .50 CAL AMMUNITION IS IN EXCESS OF THE CAPACITIES OF CURRENT PRODUCTION EQUIPMENT.						
SOLUTION - INVESTIGATE CURRENT AND PROPOSED EQUIPMENT TO DETERMINE THE MOST COST EFFECTIVE. PRODUCE A PROTOTYPE SYSTEM THAT WILL MEET THE ANTICIPATED PRODUCTION RATES.						
(4585) TITLE - SABOT LAUNCHED ARMOR PENETRATOR (SLAP) AMMO MFG PROCESSES						1092
PROBLEM - THE MFG OF SLAP AMMUNITION REQUIRES THE DEVELOPMENT OF PROTOTYPE EQUIPMENT AND TOOLING TO PROVIDE THE MOST COST EFFECTIVE PRODUCTION.						
SOLUTION - PROCESSES AND EQUIPMENT WILL BE DEMONSTRATED TO COLD FORM THE AREA MULTIPLIER, TO AUTOMATE AREA MULTIPLIER FEEDING AND SABOT MELDING, TO FABRICATE PENETRATORS FROM POWDER METAL AND TO ASSEMBLE THE SABOT/PENETRATOR/CARTRIDGE.						
(4596) TITLE - PRODUCTION PROCESSES FOR CALIBER .50 PLASTIC BLANK AMMO						760
PROBLEM - THERE IS CURRENTLY NO PRODUCTION EQUIPMENT TO PRODUCE THE PLASTIC CASED CAL .50 BLANK ROUND IN LARGE QUANTITIES. THIS IS A NEW CONFIGURATION REQUIRING NEW PRIMING AND LAP TECHNIQUES.						
SOLUTION - THE PRODUCTION REQUIREMENTS WILL BE MET EITHER BY MODIFYING A SCAMP MOD B LOADING MACHINE OR A COMMERCIAL SHOT SHELL PRIMING AND LOADING MACHINE. EITHER OPTION IS SUFFICIENT TO MEET REQUIREMENTS.						
(4642) TITLE - CAL .50 CARTRIDGE FEEDING						388
PROBLEM - CALIBER .50 CARTRIDGES HAVE TO BE FED INTO THE INSPECTION AND LINKING MACHINES BY HAND. THE OPERATION IS EXPENSIVE AND WILL NOT BE FAST ENOUGH TO MEET THE FYDP RATES AS CURRENTLY PLANNED.						
SOLUTION - A PROTOTYPE FEEDER CAPABLE OF FEEDING ALL TYPES OF BRASS (AND POSSIBLY THE PROPOSED PLASTIC BLANK) 0.50 CAL AMMUNITION. DESIGN OPERATING RATE OF THE EQUIPMENT WILL BE 240 TO 400 PPM.						

	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- .50 CAL AND LARGER (CONTINUED)						
(4643) TITLE - AUTO LINKING OF CAL .50 AMMUNITION			700	1300		
PROBLEM - THE CURRENT LINKING AND PACKAGING OPERATION AT LCAAP FOR CAL 50 AMMUNITION IS LABOR INTENSIVE AND SLOW. THE CURRENT LINKERS ARE A MAINTENANCE PROBLEM DUE TO THE LACK OF A TDP AND REPLACEMENT PARTS.						
SOLUTION - A MODERN LINKING SYSTEM WILL BE DEVELOPED FOR THE M9 AND M15A2 LINKS THAT WILL OPERATE AT 400 PPM. THE LINKER WILL BE BASED ON THE SCAMP MODULE B CONCEPT (20MM) AND THE LINK INSPECTION MACHINE WILL BE BASED ON THE 5.56MM SAWS CONCEPT.						
(4645) TITLE - AUTOMATED CUP INSPECTION				509		
PROBLEM - THE CURRENT INSPECTION TECHNIQUES ARE LABOR INTENSIVE AND DO NOT ALWAYS CHECK ALL CRITICAL PARAMETERS. TOOL BREAKAGE AND HIGH SCRAP RATES CAN RESULT FROM OUT-OF-SPEC CARTRIDGE CUPS.						
SOLUTION - A 30 PPM AUTOMATED FILL AND FORGET INSPECTION MACHINE WILL BE DESIGNED TO MEASURE DIMENSIONS AND RELATIVE HARDNESS. THE MACHINE WILL BE CAPABLE OF INSPECTION AND DATA ANALYSIS FOR UP TO 10,000 PIECES IN 8 HOURS.						
(4681) TITLE - IMPROVED CALIBER .50 CASE MANUFACTURE				500	700	
PROBLEM - THE CURRENT ANNEALING METHOD FOR CAL .50 CARTRIDGE CASES IS ENERGY INTENSIVE, LABOR INTENSIVE, AND EXPOSES PERSONNEL TO HAZARDOUS CHEMICALS AND FUMES.						
SOLUTION - THE CONVENTIONAL GAS FIRED FURNACE AND RESULTING PICKLING, RINSING + DRYING OPERATIONS WILL BE REPLACED WITH A MESH BELT FURNACE AND AN EXOGAS GENERATOR. THE INERT GAS SHOULD ELIMINATE OR GREATLY REDUCE OXIDATION DURING ANNEALING.						
(4682) TITLE - IMPROVED BULLET MFG FOR CALIBER .50 AMMUNITION				350	450	
PROBLEM - THE CURRENT ANNEALING METHOD FOR CAL .50 BULLET JACKETS IS ENERGY INTENSIVE, LABOR INTENSIVE, AND EXPOSES PERSONNEL TO HAZARDOUS CHEMICALS AND FUMES.						
SOLUTION - THE CONVENTIONAL GAS FIRED FURNACE AND RESULTING PICKLING, RINSING AND DRYING OPERATIONS WILL BE REPLACED WITH A MESH BELT FURNACE AND AN EXOGAS GENERATOR. THE INERT GAS SHOULD ELIMINATE OR GREATLY REDUCE OXIDATION DURING ANNEALING.						



ARMAMENT, MUNITIONS AND CHEMICAL COMMAND
(AMCCOM)
(WEAPONS)

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WEAPONS PROGRAM

The major portion of the weapons related MMT projects are conducted by two AMCCOM arsenals; Watervliet Arsenal (WVA) and Rock Island Arsenal (RIA). The main emphasis of their programs 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 FY 84-88 at Watervliet Arsenal are related, in whole or in part, to the handling and fixturing of cannon tubes and their components. Since many items produced at Watervliet are large, complex and/or require close tolerances, the setup and movement time are important cost drivers.

A major cost driver at WVA is metal removal. 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) and rotary forging. Projects are also proposed to improve the metal removal process. High speed metal removal is addressed in several projects. One such project addresses energy adaptive grinding which makes full use of the cutting capacity of the abrasive wheel. Some of the other areas in the Watervliet submission include computer integrated manufacturing, computer-aided manufacturing, non-traditional surface hardening methods, chromium plating, tantalum coating, and electropolishing to reduce fatigue failures in gun tubes.

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/managment 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 process modeling, performance measurement, computer-aided work measurement system, and online production information system. 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 and automated process control.

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 automated control of foundry melt composition, automated forging centers, and a study to establish a flexible machining system.

AMCCOM

COMMAND FUNDING SUMMARY
(THOUSANDS)

CATEGORY	FY84	FY85	FY86	FY87	FY88
FIRE CONTROL	579	745	550	901	1770
GENERAL MANUFACTURING	3987	2450	3567	5236	9819
LARGE CALIBER	2961	2079	1138	1895	3320
POLLUTION ABATEMENT	0	0	0	200	0
QUALITY CONTROL/TESTING	566	602	942	905	1450
SMALL CALIBER	888	1190	1070	1140	3230
TOTAL	8981	7066	7267	10277	19589

CATEGORY	FUNDING ($000) PRIOR	84	85	86	87	88
FIRE CONTROL						
COMPONENT -- ASSEMBLY						
(8321) TITLE - ADHESIVE BONDING FC SYSTEMS						340
PROBLEM - CURRENT ASSEMBLY METHODS DO NOT TAKE FULL ADVANTAGE OF THE MANY ADVANCED ADHESIVE SYSTEMS AVAILABLE. MANY OPERATIONS COULD BE CONVERTED WITH SIGNIFICANT SAVINGS IN BOTH TIME AND MONEY AND WITH INCREASED RELIABILITY.						
SOLUTION - SELECT A SERIES OF ASSEMBLY OPERATIONS AS CANDIDATES FOR ADHESIVE BONDING, DESIGN BONDING SYSTEMS, APPLY, TEST AND EVALUATE. PREPARE PROCESS SPECIFICATIONS FOR THE SUCCESSFUL SYSTEMS.						
COMPONENT -- GENERAL						
(8327) TITLE - COMPUTER INTEGRATED MFG (CIM F/FC MATERIAL) (CAM)						530
PROBLEM - MANUFACTURING METHODOLOGIES AND THE APPLICATION OF CAD AND CAM TO FC MANUFACTURING HAS ONLY PRODUCED ISOLATED IMPROVEMENTS AND MANY OF THE MAJOR PRODUCTION PROBLEMS STILL PREVAIL.						
SOLUTION - A SYSTEMS APPROACH WITH COMPUTER INTEGRATED MANUFACTURING METHODOLOGIES TO ESTABLISH A CLOSE-LOOP SYSTEM FOR THE DESIGN-THROUGH MANUFACTURING PROCESS FOR FC, INCLUDING PLANNING ENGINEERING, QA, AND DECISION MAKING.						
COMPONENT -- OPTICS						
(6262) TITLE - PRODUCTION METHODS FOR OPTICAL WAVE GUIDES	480	155	470		105	
PROBLEM - MANUFACTURE OF INTEGRATED WAVEGUIDES IS COMPLICATED AND TIME CONSUMING INVOLVING PROCESSES RELATED TO METHODS USED TO MAKE SEMICONDUCTOR INTEGRATED CIRCUITS.						
SOLUTION - USE ION IMPLANTATION TO ALTER OPTICAL PROPERTIES OF GALLIUM ARSENIDE AND PHOSPHIDE SUBSTRATES TO DIRECTLY FORM OPTICAL WAVEGUIDES IN A ONE-STEP PROCESS.						
(6329) TITLE - FIRE CONTROL OPTICAL DEVICES NEW PROCESS PRODUCTION TECH		424	275	550	296	
PROBLEM - PRODUCTION DELAYS AND COST OF REWORKS HAVE BEEN A GREAT LOGISTICS PROBLEM. THERE HAS BEEN A SIGNIFICANT SHORTFALL IN PRODUCTION CAPABILITY.						
SOLUTION - ASSESSMENT OF NEW PROCESS TECHNOLOGY, UPDATED EQUIPMENT AND OPTIMIZED PROCESSES IS NECESSARY FOR THE ASSEMBLY OF A PILOT PRODUCTION LINE CAPABLE OF DEMONSTRATING HIGH SPEED PRODUCTION AND IMPROVED INSPECTION TECHNIQUES.						
(6365) TITLE - RADIAL GRADIENT INDEX OPTICS						520
PROBLEM - GRADIENT INDEX OPTICAL ELEMENTS CAN IMPROVE THE PERFORMANCE OF ARMY OPTICAL SYSTEMS AND REDUCE PRODUCTION COST. RADIAL INDEX OPTICS HAVE BEEN PRODUCED UNDER LAB CONDITIONS BUT NOT IN LARGE SCALE.						
SOLUTION - VAPOR PHASE AXIAL DEPOSITION OR ELECTRIC FIELD ASSISTED DIFFUSION USED TO PRODUCE RADIAL GRADIENT INDICES IN OPTICAL ELEMENTS ON A LAB SCALE WILL BE EXPANDED TO ENABLE PILOT PRODUCTION OF OPTICAL BLANKS.						

	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- OPTICS (CONTINUED)						
(8467) TITLE - DIAMOND POINT TURNING OF GLASS OPTICS					500	380
PROBLEM - THE GENERATION OF UNCONVENTIONAL AND EXTREMELY ASPHERICAL-OPTIC SURFACES HAVE BEEN DIFFICULT AND EXPENSIVE TO MAKE BY CONVENTIONAL TECHNIQUES. RECENT DEVELOPMENTS HAVE ESTABLISHED A BASIS FOR DIAMOND TURNING OF GLASS OPTICS.						
SOLUTION - INVESTIGATE AND APPLY N/C PRECISION MACHINING AND POSITIONAL MEASUREMENT FEEDBACK SYSTEMS FOR DIAMOND TURNING SMOOTH DAMAGE FREE GLASS SURFACES AND APPLY THE ADVANCES IN THE METROLOGY FOR THESE SURFACES.						

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* C A T E G O R Y *
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*GENERAL MANUFACTURING *
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COMPONENT -- EQUIPMENT						
(7625) TITLE - AUTOMATED FORGING OF WEAPON COMPONENTS (CAM RELATED)						270
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.						
(8154) TITLE - COMPUTER INTEGRATION MFG FOR CANNON (CIM)	1092	450				
PROBLEM - NUMERICAL CONTROL MACHINE TOOLS OFFER MANY ADVANTAGES OVER CONVENTIONAL MACHINE TOOLS BUT HAVE CERTAIN DISADVANTAGES. ONE PROBLEM AREA IS GETTING MACHINE INSTRUCTIONS TO THE MACHINE TOOL AND COLLECTING MANAGEMENT INFORMATION.						
SOLUTION - INTERFACE IN-HOUSE COMPUTER FACILITIES WITH CURRENT AND FUTURE NC MACHINE TOOLS TO FORM AN ADVANCED COMPUTER INTEGRATED MFG SYSTEM. UTILIZE DNC TECHNOLOGY.						
(8416) TITLE - FLEXIBLE MACHINING SYSTEM-RIA (CAM)	138	399	176			
PROBLEM - FLEXIBLE MACHINING SYSTEM (FMS) TECHNOLOGY OFFERS MANY ADVANTAGES TO PLANTS THAT MANUFACTURE PARTS ON LOW TO MID VOLUME QUANTITIES. HOWEVER, ESTABLISHING FEASIBILITY, PURCHASING, AND IMPLEMENTING FMS IS WIDE IN SCOPE AND VERY COMPLEX.						
SOLUTION - FEASIBILITY WILL BE ESTABLISHED VIA AN FY82 PROJECT. THIS PROJECT WILL PERFORM THE ANALYSES NEEDED TO DEVELOP A REQUEST FOR PROPOSAL (RFP). A RFP WILL BE PREPARED.						

	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- EQUIPMENT (CONTINUED)						
(6424) TITLE - AUTOMATIC/ROBOTIC WELDING OF WEAPON COMPONENTS (CAM)					438	328
PROBLEM - THE REPAIR OF DEFECTIVE WELDS ARE FREQUENTLY EXPERIENCED. REPAIR REQUIREMENTS ARE OFTEN TRACED TO THE SKILL LEVEL OF THE WELDING OPERATORS.						
SOLUTION - ADAPTIVE CONTROLS ARE BEING USED IN AN INCREASING NUMBER OF WELDING APPLICATIONS TO DEEMPHASIZE OPERATOR SKILL IN MAKING CONSISTENT PRODUCT. SUCH FEEDBACK CONTROL ROBOTS SHOULD BE USED ALSO IN WEAPONS FABRICATION.						
(6501) TITLE - NON-ROTATION METHODS OF FRICTION WELDING						400
PROBLEM - ROTATIONAL FRICTION WELDING IS CONFINED TO APPLICATIONS IN WHICH AT LEAST ONE OF THE TWO PIECES TO BE JOINED HAS A CIRCULAR OR NEAR-CIRCULAR CROSS SECTION.						
SOLUTION - NON-ROTATION FRICTION WELDERS SUCH AS ORBTAL AND OSCILLATORY TYPES ARE NOW AVAILABLE WHICH OVERCOME RESTRICTIONS ON SHAPE.						
(9532) TITLE - ARMCAM FOR FUTURE CAM ACTIVITIES						275
PROBLEM - IN CONDUCTING SEPARATE EFFORTS ON CAM, IT CAN BE EXPECTED THAT PURCHASED EQUIPMENT MAY NOT BE FULLY UTILIZED OR SOFTWARE MAY NOT BE COMPATIBLE WITHIN VARIOUS CAM SYSTEMS USED BY DIFFERENT ARMY INSTALLATIONS AND SUPPLIERS.						
SOLUTION - DEVELOP A MASTER PLAN FOR ARMY CAM ACTIVITIES. IT WILL OUTLINE MEDIUM TO LONG-RANGE GOALS FOR FURTHER CAM APPLICATION AND DETERMINE WHAT MFG AREAS REQUIRE MORE EMPHASIS.						
(3608) TITLE - STATE-OF-THE-ART LADLE/FURNACE REFINING				117		
PROBLEM - THERE ARE NO PROVISIONS IN PROJECT 6838251, IMPROVED MELTING PRACTICES, TO IMPLEMENT TECHNIQUES THAT REQUIRE PURCHASE OF MAJOR ITEMS SUCH AS AN ARGON OXYGEN DECARBURIZATION FURNACE.						
SOLUTION - THIS PROJECT WILL BE USED TO INSTALL NEW FURNACE/LADLE EQUIPMENT. THE BEST PROCESS PARAMETERS WILL BE DETERMINED AND CONTROLS WILL BE EVALUATED.						
(6724) TITLE - ROBOTICS FOR CLEANING CASTINGS						420
PROBLEM - CLEANING THE CASTINGS AND REMOVING THE GATES AND RISERS IS LABOR INTENSIVE AND HOISTS ARE NEEDED TO POSITION THE CASTINGS. THE CASTINGS ARE OFTEN DAMAGED FROM FREQUENT REPOSITIONING. GRINDING OF GATES AND RISERS CREATES A HOSTILE ENVIRONMENT.						
SOLUTION - USE A ROBOTIC SYSTEM FOR CLEANING AND REMOVING THE GATES AND RISERS. THE PRODUCTIVITY WILL IMPROVE, CASTINGS WILL NOT HAVE TO BE REPAIRED OR REJECTED AS FREQUENTLY, AND WORKERS WILL NOT BE EXPOSED TO THE HOSTILE ENVIRONMENT.						

	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- INFORMATION SYSTEM						
(3616) TITLE - BINARY CUTTER LOCATION EXCHANGE (CAM)					75	
PROBLEM - ONE OF THE INEFFICIENCIES OF NC IS ASSOCIATED WITH THE UNIQUE POST PROCESSORS REQUIRED FOR DIFFERENT MACHINE TOOLS.						
SOLUTION - THIS PROJECT WILL UPGRADE WATERVLIET ARSENALS NC PROGRAMMING CAPABILITY TO PRODUCE BINARY CUTTER LOCATION (BCL) DATA. BCL PROCESSING OFFERS A SOLUTION TO THE POST PROCESSING PROBLEM.						
(6637) TITLE - SIMULATION + MODELING OF PROTO MFG - WEAPONS + FIRE CONTROL						360
PROBLEM - THE CURRENT PROCEDURES ASSOCIATED WITH BUILDING AND TEST PROTOTYPES TO VERIFY THEIR CONFORMANCE TO SPECIFICATIONS AND PERFORMANCE REQUIREMENTS ARE EXPENSIVE AND LENGTHY.						
SOLUTION - ESTABLISH A COMPUTER SIMULATION AND MODELING FACILITY TO OPTIMIZE DESIGN, MANUFACTURING PROCESSES, AND MANUFACTURING SYSTEM.						
COMPONENT -- INFORMATION SYSTEMS						
(6132) TITLE - PERFORMANCE MEASUREMENT PARAMETERS FOR GOGO MFG.						100
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 BY ITSELF IS NOT SUFFICENT 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.						
(6305) TITLE - INTEGRATED MANUFACTURING SYSTEM (ICAM)	574	1677	950	1500	2084	2000
PROBLEM - MI SYSTEMS ARE APPLIED LOCALLY BUT THERE IS NO DATA MANAGEMENT SYSTEM FOR THE ENTIRE MFG ACTIVITY. THIS INCREASES COST DUE TO LONG LEAD TIMES, SCHEDULE INTERRUPTIONS AND SHORTAGES OF MACHINE AVAILABILTY, LABOR AND MATERIAL.						
SOLUTION - DEVELOP AN MIS WHICH ADDRESSES ACTIVITIES OF ALL DIRECTORATES SUPPORTIVE TO MANUFACTURING AT RIA. THE SYSTEM WILL USE STATE-OF-THE-ART TECHNOLOGY TO DELINIATE OPTIMUM SCHEDULING AND PIN POINT POTENTIAL PROBLEM AREAS FOR EASIER RESOLUTION.						
(6306) TITLE - ON-LINE PRODUCTION INFORMATION SYSTEM (CAM)	270	571				
PROBLEM - THE MANUFACTURING DATA BASE CANNOT BE ACCESSED THROUGH AN ON-LINE DATA BASE SYSTEM, MAKING INTEGRATION OF AUTOMATED SYSTEMS FOR PROCESS PLANNING,TIME STDS GENERATION, FACILITIES/MOBILIZATION PLANNING AND PRODUCTION CONTROL SIMULATION DIFFICULT.						
SOLUTION - DEVELOP THE MANUFACTURING DATA BASE FROM ITS PRESENT BATCH ORIENTATED ENVIRONMENT TO AN ON-LINE SYSTEM.						

	PRIOR	84	85	86	87	88
	FUNDING ($000)					

COMPONENT -- INFORMATION SYSTEMS (CONTINUED)

	PRIOR	84	85	86	87	88
(6417) TITLE - FACTORY INFORMATION MANAGEMENT - RIA (CAM)		280				
(8559) TITLE - CIM FOR CANNON CAD/CAM/COMM			1010	769	780	620
(6635) TITLE - PROCESS CONTROL + INFORMATION SYSTEM (CAM)				150	150	

PROBLEM - THE EXCHANGE OF INFORMATION WITHIN THE ROCK ISLAND ARSENAL MANUFACTURING ORGANIZATION IS BY HARDCOPY REPORTS. THE GENERATION OF MANUFACTURING MANAGEMENT REPORTS IS LABOR INTENSIVE AND ERROR PRONE.

SOLUTION - THE REQUIREMENTS FOR RIA MANUFACTURING MANAGEMENT OF PRODUCTION DATA WILL BE DEFINED AND A PILOT COMPUTER SYSTEM WILL BE PROCURED.

PROBLEM - THE EXCHANGE OF MANUFACTURING DATA AT WATERVLIET ARSENAL IS LARGELY MANUAL, ERROR PRONE AND TIME CONSUMING. CURRENT PROCESS PLANNING, SCHEDULING, AND PRODUCTION CONTROL SYSTEMS EXCHANGE DATA MANUALLY.

SOLUTION - DETERMINE THE SYSTEM REQUIREMENTS FOR A COMPUTER AIDED DESIGN SYSTEM. DETERMINE THE SYSTEM REQUIREMENTS TO INTEGRATE THE COMPUTER AIDED MANUFACTURING FACILITIES AND BUSINESS SYSTEMS. THE SYSTEM REQUIREMENTS WILL BE ADDRESSING EXISTING AND NEAR TERM.

PROBLEM - SEVEN METAL FINISHING FACILITIES AT WATERVLIET ARSENAL NEED MONITOR AND CONTROL SYSTEMS. SOME OF THESE FACILITIES ARE BEING AUTOMATED UNDER OTHER EFFORTS. MANUAL FUNCTIONS CONTROL 3 OF THE 7 SYSTEMS. A LESS THAN OPTIMUM FINISH OR COATING RESULTS.

SOLUTION - DETERMINE FACTORS RELATING TO CONTROL AND MONITOR OF SURFACE TREATMENT PROCESSES. ESTABLISH REQUIREMENTS FOR AN AUTOMATED PROCESS DATA ACQUISITION SYSTEM, WHICH WILL ESTABLISH AN ELECTRONIC DATA BASE REQUIRED FOR MANAGEMENT DECISIONS.

COMPONENT -- MISCELLANEOUS

	PRIOR	84	85	86	87	88
(6404) TITLE - OPTICAL COATING/MOUNTING PLASTICS F/MILITARY OPTICS					490	

PROBLEM - LACK OF OPTICAL PERFORMANCE, THERMAL STABILITY, ENVIRONMENTAL RESISTANCE HAS PREVENTED USE OF THESE MATERIALS FOR ARMY APPLICATION. USE OF PLASTICS FOR FIRE CONTROL OPTICAL SYSTEMS OFFERS SIGNIFICANT POTENTIAL FOR COST AND WEIGHT REDUCTIONS.

SOLUTION - THIS PROJECT WILL IDENTIFY THE MFG PROCEDURES AND CONTROLS AND THE PLASTIC MATERIALS WHICH MUST BE MODIFIED TO UPGRADE THE MANUFACTURED ITEM TO MILITARY QUALITY. A PILOT PRODUCTION LINE WILL BE ESTABLISHED.

	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- MISCELLANEOUS (CONTINUED)						
(8555) TITLE - DETERMINATION OF AREAS WITHIN MANTECH FOR FUTURE R+D						95
PROBLEM - WITH THE ADVENT OF THE NEW ARMY BATTLE PLAN, FIELD CAPABILITY FOR MANUFACTURING REPLACEMENT PARTS AND REPAIRS WILL BE NEEDED. THE ECONOMICS, FUTURE DEVELOPMENTS, SIGNIFICANT PROCESSES AND COMPONENTS REQUIRING NEW TECHNIQUES NEED IDENTIFICATION.						
SOLUTION - BY COMPILING INFO ON MFG OF MILITARY HARDWARE FROM DOMESTIC AND FOREIGN SOURCES,DETERMINE THOSE ITEMS WHICH ARE DIFFICULT/EXPENSIVE TO MFG AND SUGGEST POSSIBLE PRODUCTION TECHNIQUES FOR CONUS OR BATTLEFIELD USES.						
COMPONENT -- PROCESSES						
(8120) TITLE - ADAPTIVE CONTROL TECHNOLOGY (CAM)	555			200		
PROBLEM - CURRENT GRINDING PROCESSES DO NOT TAKE ADVANTAGE OF THE GRINDING WHEEL CUTTING EFFICIENCY. PRECISION TOLERANCES ARE DIFFICULT TO HOLD DUE TO PART HEATING. WHEEL WEAR RATES INCREASE EXPONENTIALLY WITH FEED RATES AND LIMIT PRODUCTIVITY.						
SOLUTION - USE A PROCESS CALLED ENERGY ADAPTIVE GRINDING. IT USES AN ADAPTIVE CONTROL, FITTED TO A CYLINDRICAL GRINDER. WHEEL SPEED, WHICH DETERMINES WHEEL SHARPNESS WHICH EFFECTS METAL REMOVAL RATES AND EFFICIENCY, IS CONTROLLED.						
(8206) TITLE - APPLICATION OF HIGH-RATE ABRASIVE MACHINING						105
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.						
(8230) TITLE - NON SOLVENT BASED PAINTING PROCESSES						250
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.						
(8251) TITLE - IMPROVED CASTING TECHNOLOGY (CAM)	386	122				
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.						

	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- PROCESSES (CONTINUED)						
(8360) TITLE - ESTABLISHMENT OF ZINC ION VAPOR DEPOSITION PROCESS						235
PROBLEM - REPLACEMENT OF ELECTROPLATING ON WEAPON COMPONENTS IS REQUIRED TO AVOID HYDROGEN EMBRITTLEMENT OF PLATED FERROUS PARTS HAVING A HARDNESS ABOVE ROCKWELL C40 AND TO AVOID THE DISCHARGE OF CYANIDES AND HEAVY METALS IN EFFLUENTS.						
SOLUTION - THE ZINC ION VAPOR DEPOSITION PROCESS PROVIDES A LOW COST, HIGH PERFORMANCE CORROSION PROTECTION TO STEEL AND ALUMINUM ALLOYS. NEITHER THE COATING NOR THE COATING PROCESS PRESENT ECOLOGY PROBLEMS.						
(8402) TITLE - WARM FORGING OF WEAPON COMPONENTS (CAM)		227	127			
PROBLEM - EXCESSIVE ENERGY IS CONSUMED IN CONVENTIONAL FORGING. ALSO DIE LIFE IS SHORTENED BY HIGH FORGING TEMPERATURES AND BY OXIDATION.						
SOLUTION - BY USING CAD/CAM TECHNIQUES FOR DIE DESIGN, FORGING WILL BE DONE AT MUCH LOWER TEMPERATURE AND THE FINAL PARTS WILL HAVE BETTER MECHANICAL PROPERTIES						
(8403) TITLE - DESIGN CRITERIA FOR HARDENING (CAM)		261		154		
PROBLEM - SELECTION OF THE BEST HARDENING PROCESS. INCOMPLETE HARDENING THROUGHOUT THE COMPONENT AND COMPLICATIONS CAUSED DURING THE HEAT TREATMENT OF WELDMENTS ARE RECURRING PROBLEMS CURRENTLY ADDRESSED BY EMPIRICAL METHODS.						
SOLUTION - THE RELATIONSHIPS OF DIFFERENT VARIABLES SUCH AS QUENCH RATES, COMPONENT SIZE, SHAPE, AND COMPOSITION WILL BE ESTABLISHED. A COMPUTER WILL BE PROGRAMMED TO FURNISH THE NECESSARY INFORMATION						
(8505) TITLE - ELECTRO-MECHANICAL JOINING TECHNIQUES						200
PROBLEM - PURELY MECHANICAL (FRICTION WELDING) OR MOSTLY ELECTRICAL (RESISTANCE) WELDING MACHINES OF VARIOUS TYPES WOULD HAVE TO BE LARGE AND WOULD TAKE EXCESSIVE TIME TO WELD JOINT AREAS 25 SQUARE INCHES OR MORE.						
SOLUTION - COMBINE THE FEATURES OF BOTH METHODS TO DELIVER SUFFICIENTLY LARGE SPECIFIC ENERGY FOR WELDING OF LARGE PARTS						
(8509) TITLE - COMPUTERIZED FOUNDRY MELT COMPOSITION CONTROL (CAM)					125	369
PROBLEM - PRESENT METHODS FOR DETERMINING THE MELT CHARGE ARE INEFFICIENT + INCREASE MELT TIME CONSUME EXCESS ELECTRICITY AND ELECTRODES THEREBY INCREASING COSTS.						
SOLUTION - INSTALL COMPUTER CONTROLS TO MONITOR THE MELT AND ELECTRIC POWER AND ELECTRODE THE RESULT WILL BE MORE ACCURATE COMPOSITIONS AND POUR TEMPERATURES THE RESULT WILL BE LOWER COST CHARGES + LESS ENERGY AND ELECTRODE CONSUMPTION.						

FUNDING ($000)

	PRIOR	84	85	86	87	88
COMPONENT -- PROCESSES (CONTINUED)						
(8513) TITLE - MICROWAVE CURING OF FURAN BONDED SAND						250
PROBLEM - CURE RATE OF FURAN BOND SANDS DEPENDS ON THE ACID CATALYST/RESIN RATIO AND THE SIZE AND TEMP OF THE MOLD. SINCE PDN RATES ARE HIGH, SOME RATIOS CANNOT BE USED WHILE USEABLE RATIOS ARE A COMPROMISE BETWEEN VALUES FOR LARGE AND SMALL MOLDS.						
SOLUTION - USE MICROWAVE HEATING TO CHANGE THE CURE CHARACTERISTICS OF SELECTED RESIN-CATALYST SYSTEMS TO COMPENSATE FOR DIFFERENT SIZES OF MOLDS. THIS WILL PERMIT A MORE UNIFORM PRODUCTION RATE.						
(8515) TITLE - APPLICATION OF WIDE AREA PLUNGE GRINDING						105
PROBLEM - CONVENTIONAL MACHINING OF WORKPIECES WITH MULTIPLE DIAMETERS AND BLENDED TAPERS AND RADII REQUIRES MANY OPERATIONS AND IS SLOW AND COSTLY.						
SOLUTION - USE A WIDE GRINDING WHEEL WHOSE FACE IS DRESSED TO THE REQUIRED PROFILE AND PRODUCE THE FINISHED PIECE IN ONE OPERATION BY PLUNGE GRINDING TO SIZE.						
(8522) TITLE - LASER SURFACE ALLOYING PROCESS FOR IMPROVED WEAR RESISTANCE						300
PROBLEM - COMPONENT PARTS OF WEAPON SYSTEMS SUBJECTED TO EXTENDED OPERATIONS ARE EXPERIENCING EXCESSIVE WEAR THAT JEOPARDIZES THE DRIVE TOWARD HIGH PERFORMANCE CAPABILITY.						
SOLUTION - MARGINALLY WEAR RESISTANCE COMPONENT PARTS CAN BE SUBSTANTIALLY UPGRADED BY LASER SURFACE ALLOYING WITH HARDFACING MATERIAL DESIGNED TO IMPROVE ITS WEAR RESISTANCE.						
(8523) TITLE - ION IMPLANTATION OF WEAPON COMPONENTS						375
PROBLEM - COMPONENT PARTS OF WEAPON SYSTEMS SUBJECTED TO EXTENDED OPERATIONS ARE EXPERIENCING EXCESSIVE WEAR THAT JEOPARDIZES THE DRIVE TOWARD HIGH PERFORMANCE CAPABILITY.						
SOLUTION - MARGINALLY WEAR RESISTANCE COMPONENT PARTS CAN BE SUBSTANTIALLY UPGRADED BY ION IMPLANTING ELEMENTAL SPECIES DESIGNED TO IMPROVE ITS WEAR RESISTANCE.						
(8534) TITLE - CONSERVATION OF ENERGY IN PROCESSING OF WEAPONS COMPONENTS						350
PROBLEM - PRESENT HEAT TREAT TECHNIQUE AND SELECTION OF HEAT TREAT EQUIPMENT RELIES ON PAST EXPERIENCE AND IS NOT BASED ON SCIENTIFIC CALCULATIONS.						
SOLUTION - EVAL PRESENT TECHNIQUES AND EQUIPMENT. DEVELOP COMPUTER-AIDED-MODULAR METHOD TO PREDICT MIN TIME REQD TO HEAT A PART. DEVELOP MODELS TO COMPARE COSTS TO HEAT A GIVEN PART BY VARIOUS MEANS (GAS, INDUCTION, RESISTANCE, ETC).						

	FUNDING ($000)				
	PRIOR	84	85	86	87	88

COMPONENT -- PROCESSES (CONTINUED)

(6545) TITLE - GAS SHIELDED METAL POWDER ARC WELDING — 86: 250; 87: 200; 88: 200

PROBLEM - COMMERCIAL WELDING ELECTRODES ARE NOT AVAILABLE IN THE DESIRED CHEMISTRY AND SPECIAL ORDERS OF ELECTRODES ENTAILS DELAYS AND ADDED COST.

SOLUTION - USE POWDERED METAL TO FORMULATE THE DESIRED CHEMICAL MIX THUS SAVING THE EXPENSE OF COMMERCIAL ELECTRODES.

(6603) TITLE - ROBOTIC WELDING — 85: 185; 86: 158; 87: 50

PROBLEM - PRODUCTIVITY IN THE WELD SHOP IS LIMITED BECAUSE THE MAJORITY OF THE WELDING IS DONE MANUALLY.

SOLUTION - MULTIPLE AXIS ROBOTIC WELDERS INTEGRATED WITH MULTIPLE AXIS PART HANDLING SYSTEMS, PALLETIZING, PREHEAT FURNACES, STRESS RELIEVING OVENS, AND FIXTURING CAN REDUCE COSTS WHILE IMPROVING RATES.

(6605) TITLE - RING ROLLING OF WEAPON COMPONENTS — 88: 190

PROBLEM - COMPONENTS WITH RING LIKE SHAPE OFTEN REQUIRE EXTENSIVE METAL REMOVAL OVER ALMOST THE ENTIRE SURFACE BECAUSE TUBING OF THE OPTIMUM SIZE FOR RAW MATERIAL IS NOT AVAILABLE. THIS INCREASES PRODUCTION COSTS.

SOLUTION - SIMPLE SHAPED RINGS WITH LITTLE EXCESS MATERIAL WILL BE SHAPED ON SPECIAL RING ROLLING EQUIPMENT TO NEAR NET SHAPE.

(6611) TITLE - AUTOMATED ANALYSIS AND CONTROL OF PLATING BATHS — 87: 150

PROBLEM - PERIODIC WET CHEMISTRY ANALYSIS OF PLATING BATHS IS REQD TO MAINTAIN PROPER CHEMICAL BALANCE. THE TIME LAG BETWEEN ANALYSIS AND USE IS A DETRIMENTAL FACTOR.

SOLUTION - APPLY AUTOMATED ANALYTICAL EQUIPMENT FOR THE CONTINUOUS MONITORING OF BATH COMPOSITIONS AND FOR THE AUTOMATIC ADDITION OF THE REQD INGREDIENTS. THIS EQUIPMENT WILL IDENTIFY IMPURITIES IN THE BATH AND ALSO CHECK WASTEWATER.

(6615) TITLE - POWDERED METALS FOR NONFERROUS COMPONENTS — 88: 120

PROBLEM - ROCK ISLAND ARSENAL MUST CAST SMALL PARTS FROM AL OR CU ALLOYS THAT ARE NOT VERY CASTABLE. SHRINKAGE, HOT TEARING AND OXIDES CAUSE UNSOUND CASTINGS WITH ATTENDANT LOW ACCEPTANCE RATES.

SOLUTION - IMPROVE ACCEPTANCE BY MAKING THE PROBLEM COMPONENTS FROM POWDERED METAL. COMPARE PROPERTIES OF PM PARTS WITH CAST PARTS. DETERMINE IF ADDITIONAL PROCESSING SUCH AS HIP IS NEEDED AND PERFORM AN ECONOMIC COMPARISON.

	FUNDING ($000)				
	PRIOR	84	85	86	87	88
COMPONENT -- PROCESSES (CONTINUED)						
(8615) TITLE - ROBOTIZED WELDING OF BASE PLATE (CAM)					150	
PROBLEM - MANUAL WELDING IS LARGELY DEPENDENT ON INDIVIDUAL TECHNIQUE. QUALITY AND APPEARANCE OF THE WELD VARY. WELDING IS HAZARDOUS. PROTECTIVE MEASURES ARE REQUIRED TO MINIMIZE RISK OF TOXIC FUMES AND OF THE OCCURRENCE OF BURNS OR EYE INJURY.						
SOLUTION - A ROBOTIC WELDING SYSTEM WILL BE SPECIFIED AND PROCURED. THE REQUIREMENTS FOR THE WELDING SYSTEM WILL BE DETERMINED BY THIS EFFORT.						
(8638) TITLE - CONTROL OF SEQUENTIAL MACHINING OPERATIONS (CAM)				269	269	200
PROBLEM - PRESENTLY, ON ALMOST ALL AUTOMATED MACHINING OPERATIONS, CUTTING RATES ARE LOWERED TO AVOID TOOL BREAKAGE AND REJECTION OF COMPONENTS. MACHINING PARAMETERS ARE SET BY ALLOWING FOR WORST POSSIBLE CONDITIONS.						
SOLUTION - ESTABLISH AN IN-PROCESS INSPECTION AND CONTROL SYSTEM DIRECTED TOWARD DRILLING, REAMING, TAPPING, BORING, INTERNAL GRINDING, AND HONING. THE AUTOMATED, COMPUTERIZED MACHINING SYSTEM WILL INTEGRATE THESE OPERATIONS.						
(8671) TITLE - INCLUSION CONTROL TECHNOLOGY APPLIED TO RAPID FIRE WEAPONS						400
PROBLEM - THE USABLE LIFE OF AUTOMATIC WEAPONS BETWEEN DEPOT REBUILDS IS PRIMARILY DEPENDENT UPON CRACK PROPAGATION RESULTING FROM CYCLIC LOADING. IN ORDER TO EXTEND THIS LIFE IT IS NECESSARY TO INCREASE THE FATIGUE RESISTANCE OF THE STEEL.						
SOLUTION - POTENTIAL FOR SIGNIFICANTLY IMPROVED LIFE OF RAPID FIRE WEAPONS IS PROVIDED THROUGH APPLICATION OF STATE-OF-THE-ART TECHNOLOGY IN INCLUSION CONTROL.						
(8706) TITLE - INVESTMENT CASTING OF LARGE WEAPON COMPONENTS						225
PROBLEM - CONVENTIONAL CASTING RESULTS IN LOW YIELD. THE PARTS USUALLY HAVE LARGE RISERS AND EXTENSIVE GATES THAT CONSUME METAL. MACHINED SURFACES REQUIRE EXTENSIVE MACHINING. THE INACCURATE TOLERANCES ON NONMACHINED SURFACES CONTRIBUTE NEEDLESS WEIGHT.						
SOLUTION - INVESTMENT CASTING WILL BE USED FOR LARGER AND MORE COMPLEX PARTS. THIS PROCESS WILL INCREASE THE YIELD, SAVE MONEY BY ELIMINATING WORK FOR REMOVING GATES AND RISERS, REDUCE MACHINING, AND REDUCE THE WEIGHT OF SOME COMPONENTS.						
(8709) TITLE - NEAR NET SHAPE MOLDING						160
PROBLEM - CASTINGS ARE NORMALLY POURED IN LARGE SAND MOLDS WHICH EXPAND AND SHIFT AS THEY ARE HEATED BY THE MOLTEN METAL. THE PROCESS YIELDS A CASTING LARGER THAN NECESSARY. EXCESS MACHINING HAS TO TAKE PLACE.						
SOLUTION - USING THE SHELL MOLDING PROCESS, THE MOLTEN METAL IS POURED INTO THIN SHELLS OF BONDED SAND. THESE SHELLS ARE RIGID SO THAT THE FINAL CASTING IS CLOSER IN DIMENSIONS TO THE DRAWING. MACHINING AND WEIGHT ARE REDUCED.						

	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- PROCESSES (CONTINUED)						
(6710) TITLE - AUTOMATED CONTROL OF CUTTING FLUID CONCENTRATION LEVEL						400
PROBLEM - THE EFFECTIVENESS OF ANY CUTTING FLUID IN A PARTICULAR MACHINING OPERATION IS DEPENDENT ON MAINTAINING THE PROPER CONCENTRATION LEVEL DURING THE TIME THE FLUID IS IN THE MACHINE. AT THE PRESENT TIME, VARIATIONS ARE QUITE COMMON.						
SOLUTION - A SINGLE MACHINE, OPERATING FROM ITS OWN SUMP, OR A SERIES OF MACHINES OPERATING FROM A CENTRAL CUTTING FLUID SYSTEM, WILL BE MONITORED SO THAT THE CONCENTRATION LEVEL CAN BE READILY CONTROLLED ON A CONTINUOUS BASIS.						
(6712) TITLE - DISPOSITION OF SPENT CHROMIC ACID PLATING SOLUTION						200
PROBLEM - THE DISPOSITION OF SPENT CHROMIC ACID PLATING SOLUTION IS DIFFICULT BECAUSE OF POLLUTION CONTROL RESTRICTIONS ON HAZARDOUS WASTES. IT IS ALSO EXPENSIVE IF PERFORMED IN-HOUSE SINCE THE COST OF DESTRUCTING CHROME IS 3 TIMES THE PURCHASE PRICE.						
SOLUTION - THE APPLICATION OF MODERN CHROMIC ACID RECOVERY OR REPROCESSING TECHNIQUES COULD RESULT IN A REDUCTION IN BOTH THE AMOUNT OF CHROMIC ACID PURCHASED AND DESTROYED.						
(6713) TITLE - INDUCTION HARDENING BY THE SCANNING PROCESS						150
PROBLEM - THE CURRENT INDUCTION HARDENING PROCESS DOES NOT PRODUCE UNIFORM CASE DEPTHS NOR DOES IT ACHIEVE UNIFORM CONFIGURATION CONTROL OF LUNETTES FOR THE M101A1, M196 AND M102 WEAPON SYSTEMS. THE QUALITY OF THE PROCESS IS SUSPECT.						
SOLUTION - IT IS BELIEVED THAT USE OF A SCANNING TYPE OF INDUCTOR WILL PRODUCE A MORE UNIFORM CASE DEPTH AND BETTER CONFIGURATION CONTROL. THIS WILL IMPROVE THE RELIABILITY AND QUALITY OF THE PRODUCT.						
(6715) TITLE - APPLICATION OF METALLIDING						67
PROBLEM - PARTS OF WEAPONS SYSTEM REQUIRE CORROSION OR WEAR RESISTANCE. MATERIAL AND APPLICATION PROCESSES IN USE ARE DIFFICULT AND EXPENSIVE TO APPLY.						
SOLUTION - USE METALLIDING COATING ON LOW COST ALLOYS TO PROVIDE SURFACE MODIFICATIONS REQUIRED FOR ADDED RESISTANCE.						
COMPONENT -- TOOLING						
(6717) TITLE - IMPROVED UTILIZATION OF NEW GENERATION MACHINE TOOLS					50	
PROBLEM - CURRENT MACHINING PRACTICES UTILIZE METHODS FROM THE PRECOMPUTER AIDED ERA. NEW METHODS AND PRODUCTIVITY DEMANDS REQUIRE IMPROVED UTILIZATION AND IMPROVED TOOL LIFE.						
SOLUTION - DEVELOP ON-LINE MEASUREMENT SYSTEMS TO DERIVE RELATIONSHIPS FOR METAL REMOVAL IMPROVEMENTS.						

	FUNDING ($000)				
	PRIOR	84	85	86	87	88
COMPONENT -- TOOLING (CONTINUED)						
(8718) TITLE - WELD REPAIR AND MAINTENANCE OF HSS TOOLING					125	
PROBLEM - DAMAGED OR WORN TOOLING IS DISCARDED BECAUSE OF COST AND IMPRACTICALITY OF REGRINDING.						
SOLUTION - DEVELOP A SPECIAL WELDING TECHNIQUE FOR REPAIR OR REBUILD OF THESE TOOLS.						
(8720) TITLE - CUTTING TOOL TECHNOLOGY					100	
PROBLEM - CURRENT MACHINE TOOLS ARE STATE-OF-TH-ART. CUTTING TOOLS IN INVENTROY LAG BEHIND IN ABILITY TO MAINTAIN PRODUCTIVITY AVAILABLE IN NEW MACHINE TOOLS.						
SOLUTION - MAXIMIZE PRODUCTIVITY BY MATCHING CAPABILITIES OF CUTTING TOOLS TO MACHINE TOOLS.						

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* C A T E G O R Y *
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*LARGE CALIBER *
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COMPONENT -- BREECH MECHANISMS

(8440) TITLE - CONTROLLED GRAIN SIZE CASTINGS, PRODUCTION AND HEAT TREAT						335
PROBLEM - FINE GRAIN CASTINGS HAVE DEMONSTRATED AN IMPROVEMENT IN LOW CYCLE FATIGUE LIFE BY A FACTOR OF TWO TO FOUR, IT IS EXPECTED THAT A HEAT TREATMENT WILL EXTEND THE LIFE STILL FURTHER.						
SOLUTION - PROVIDE FOR CASTING A BREECH BLOCK BY ONE OF THE AVAILABLE TECHNIQUES THEN OPTIMIZE THE HEAT TREATMENT FOR THE CHOSEN ALLOY. LIFE IMPROVEMENTS WILL BE DEMONSTRATED.						
(5625) TITLE - MANUFACTURING OF MULTI-LUG BREECH MECHANISMS			60	200	100	
PROBLEM - THE MANUFACTURE OF MULTI-LUG COMPONENTS INVOLVES THE USE OF FORM CUTTERS WHICH ARE USED TO MILL THE REQUIRED CONFIGURATION. ALTHOUGH THIS METHOD HAS BEEN SUCCESSFUL ON A PROTOTYPE BASIS, IT DOES NOT APPEAR TO BE FEASIBLE FOR PRODUCTION QUANTITIES.						
SOLUTION - INVESTIGATE ALTERNATIVE METHODS OF MANUFACTURING MULTI-LUG BREECH COMPONENTS, SUCH AS BROACHING AND GRINDING.						

	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- GENERAL						
(6249) TITLE - SHORT-CYCLE HEAT TREATING OF WEAPON COMPONENTS		132	165			
PROBLEM - HEAT TREATING SOAK TIMES ARE DETERMINED WITHOUT CONSIDERATION OF THE RELATIONSHIPS BETWEEN COMPOSITION, CONFIGURATION, THICKNESS, AND DETRIMENTAL EFFECTS OF AUSTENITIC GRAIN GROWTH. CONSEQUENTLY, CONSIDERABLE ENERGY IS WASTED.						
SOLUTION - SUITABLE SYSTEMATIC PRODUCTION METHODS WILL BE USED TO DETERMINE THE PROPERTIES OBTAINED AT MINIMAL PROCESSING TIMES TO REDUCE ENERGY CONSUMPTION AND INCREASE PRODUCTION EFFICIENCY.						
(6323) TITLE - SPRAY-AND-FUSE PROCESSING OF ARMAMENT COMPONENTS		200	48			
PROBLEM - MISMATCHED AND WORN WEAPON COMPONENTS ARE NOT ONLY COSTLY TO REPLACE BUT SHORTAGE OF STRATEGIC MATERIALS IMPACT ON THE SUPPLY AND FABRICATION OF NEW COMPONENTS.						
SOLUTION - UTILIZE THE THERMAL SPRAY AND FUSE COATING PROCESS TO SALVAGE OR RECLAIM OVERSIZED OR WORN WEAPON COMPONENTS (E.G., M140 RECOIL PISTONS).						
(6326) TITLE - APPLICATION OF CORROSION RESISTANT GALVANIC COATINGS		185				
PROBLEM - CURRENT METAL FINISHES DO NOT PROVIDE ADEQUATE CORROSION AND HEAT RESISTANCE. COMPONENTS ARE REPLACED OR REWORKED BEFORE THEIR INTENDED LIFE. FREQUENT MAINTENANCE IN THE FIELD AND DEPOTS ADD TO THE OVERALL COST OF THE COMPONENTS.						
SOLUTION - A NEW PROCESS HAS EMERGED FOR APPLYING SUPERIOR CORROSION AND HEAT RESISTANT COATINGS. THE PROCESS, USING SERMIL-16, CONSISTS OF AN AUTOMATED SPRAY-BAKE PROCESS FOR A COATING OF ALUMINUM/CERAMIC AND INORGANIC COATINGS.						
(6426) TITLE - APPLICATION OF LASERS TO CANNON MANUFACTURE		622		128		
PROBLEM - COMPONENT MARKINGS, TOOL MAINTENANCE, COMPONENT SURFACE HARDENING, CUTOFF OF INVESTMENT CAST C PONENTS, WELDING AND BRAZING ARE DIFFICULT, COSTLY, TIME CONSUMING MANUFACTURING OPERATION .						
SOLUTION - APPLY LASER TO THESE TRADITIONAL MANUFACTURING OPERATIONS TO TAKE ADVANTAGE OF THIS RAPIDLY EMERGING TECHNOLOGY.						
(3437) TITLE - DENSIFICATION OF WEAPON CASTINGS (HIP)		108		67		
PROBLEM - CASTINGS FOR WEAPONS COMPONENTS OFTEN CONTAIN EXCESSIVE SHRINKAGE CAVITIES AND VOIDS, RESULTING IN REJECTION OR COSTLY WELD REPAIR.						
SOLUTION - INTERNAL VOIDS CAN BE MADE SMALLER OR ELIMINATED BY HOT ISOSTATIC PRESSING (HIP), THEREBY IMPROVING TOUGHNESS AND DUCTILITY.						

	FUNDING ($000)				
	PRIOR	84	85	86	87	88
COMPONENT -- GENERAL (CONTINUED)						
(6546) TITLE - MACHINERY CONDITIONS SURVEILLANCE SYSTEM			253	70	27	
PROBLEM - PROVISION DOES NOT PRESENTLY EXIST FOR CONTINUOUS LARGE-SCALE MONITORING OF MACHINE TOOL DYNAMICS IN ORDER TO DETECT CONDITIONS WHICH ARE LIKELY TO RESULT IN MECHANICAL MALFUNCTION.						
SOLUTION - INTRODUCE A DYNAMIC ON-LINE SYSTEM FOR MONITORING MACHINE TOOL VIBRATIONS AND OTHER OPERATING PARAMETERS. TRANSDUCERS WILL BE PERMANENTLY INSTALLED ON SELECTED MACHINES AND DATA TRANSFERRED TO A CENTRAL SYSTEM FOR ANALYSIS.						
(6652) TITLE - SMALL CALIBER INSPECTION FACILITY					305	
PROBLEM - INSP OF MORTARS (60MM + 81 MM) AND SMALL CALIBER GUNS(40MM) IS ACCOMPLISHED THROUGH THE USE OF STD HARD GAGIN. FREQ. THESE SMALL CALIBER HAVE COMPLEX INTERNAL + EXTERNAL FEATURES WHICH REQUIRES TIME CONSUMING INSPS TO INSURE PART INTEGRITY.						
SOLUTION - DEVELOP A FLEXIBLE INSP CELL TO INSPECT BOTH INTERIOR + EXTERIOR TUBE GEOMETRY. BORE INSP WILL BE ACCOMPLISHED BY USING LINEAR TRANSDUCERS. ADDITIONAL SAVING WILL BE REALIZED THRU AUTOMATED MATERIEL HANDLING A COMPUTER WILL CONTROL THE OPERATION.						
COMPONENT -- GUN MOUNTS						
(6606) TITLE - APPLICATION OF FLUIDIZED BED HEAT TREATMENT			74			
PROBLEM - SOME WEAPON COMPONENTS ARE CARBURIZED AND NITRIDED USING A SALT BATH THAT CONTAINS CYANIDE FUMES THAT ARE HEALTH HAZARDS. THE HOMO-CARB FURNACE IS INEFFICIENT SINCE IT HAS TO BE KEPT ON CONTINUOUSLY, EVEN WHEN EMPTY. CASE DEPTH IS HARD TO CONTROL.						
SOLUTION - A FLUIDIZED BED FURNACE WILL BE USED FOR AUSTENITIZING, CARBURIZING, AND NITRIDIZING WEAPON COMPONENTS. CYANIDES WILL NO LONGER BE USED IN THE HEAT TREATMENT SHOP.						
COMPONENT -- RECOIL MECHANISMS						
(6250) TITLE - IMPROVED FABRICATION OF RECOIL WEAR SURFACES		28	169			
PROBLEM - PRESENTLY GRINDING AND HONING OPERATIONS ON WEAR SURFACES RESULT IN PARTICLE INCLUSIONS WHICH COME IN CONTACT HYDRAULIC FLUID AND PRODUCE HIGH RATES OF WEAR.						
SOLUTION - USING ADVANCED METHODS REMOVE FOREIGN PARTICLES PRIOR TO THE FINAL GRINDING OR HONING OPERATIONS OR, IF MORE EFFECTIVE, AFTER FINAL GRINDING OR HONING.						

	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- RECOIL MECHANISMS (CONTINUED)						
(3422) TITLE - HONE FORMING OF RECOIL CYLINDERS						250
PROBLEM - REPLACEMENT OF SCARRED, WORN OR MISMACHINED RECOIL CYLINDERS ARE COSTLY AND TIME-CONSUMING IN TERMS OF LONG-LEAD TIMES FOR MATERIAL DELIVERY AND MACHINING. CYLINDER REPLACEMENT REQUIRES ADDITIONAL CONSUMPTION OF STRATEGIC MATERIALS.						
SOLUTION - HONE FORMING IS A SIMULTANEOUS PROCESS WHERE HONING AND MATERIAL BUILDOUT BY ELECTROPLATING TAKE PLACE TO ACHIEVE THE DESIRED DIMENSION AND FINISH. COST SAVINGS CAN BE ACHIEVED WITH THE PROCESS FOR RECOIL CYLINDER MANUFACTURE AND RECLAIMATION.						
(6511) TITLE - CASTING OF ANTIFRICTION METAL COMPONENTS			200	85		
PROBLEM - ANTIFRICTION METAL FOR PACKING GLANDS IN RECOIL MECHANISMS IS PRESENTLY HAND CAST. OVER 70-80 PERCENT OF THE METAL IS EXCESS + HAS TO BE MACHINED OFF AT ADDED COST.						
SOLUTION - USE OF DIE CAST PROCESS WILL REDUCE EXCESS METAL AND THE PROCESS WILL REDUCE CASTING DEFECTS.						
(6607) TITLE - AUTOMATED FLUSHING OF RECOIL SYSTEMS TO REDUCE CONTAMINATION					200	
PROBLEM - INEFFECTIVE CLEANING OF MACHINED SURFACES CAUSES METALLIC CONTAMINATION OF THE HYDRAULIC FLUID AFTER THE RECOIL SYSTEM IS ASSEMBLED. SUCH CONTAMINANTS ARE DIFFICULT TO REMOVE WITH NORMAL FLUSHING PROCEDURES.						
SOLUTION - ESTABLISH AN AUTOMATED FLUSHING SYSTEM INCORPORATING HIGH PRESSURE TO REMOVE METALLIC CONTAMINATION FROM THE HYDRAULIC FLUID. THIS WILL REDUCE THE NUMBER OF REJECTIONS OF ASSEMBLED RECOIL MECHANISMS AFTER MECHANICAL GYMNASTICATION.						
(6703) TITLE - AUTOMATED RECOIL MECHANISM ASSEMBLY						300
PROBLEM - ASSEMBLY AND TESTING OF RECOIL MECHANISMS IN SMALL LOTS AT ROCK ISLAND ARSENAL IS A MANUAL, TIME-CONSUMING PROCESS. TECHNOLOGY SUCH AS INDUSTRIAL ROBOTS AND MICROPROCESSOR CONTROLLED TESTING EQUIPMENT CAN IMPROVE THIS PROCESS.						
SOLUTION - ANALYZE THE CURRENT MANUAL METHOD OF ASSEMBLYING THE HYDRAULIC, PNEUMATIC, AND MECHANICAL PARTS OF RECOIL MECHANISMS. IDENTIFY AREAS WHERE AUTOMATED METHODS CAN BE APPLIED. DEVELOP AND INSTALL THOSE METHODS WHICH PROVE COST EFFECTIVE.						

	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- TUBE						
(6651) TITLE - ESTABLISH A PREPREG FACILITY FOR ORGANIC MATRIX COMPOSITES						250
PROBLEM - THE PURCHASE OF PREPREG ROVING IS EXPENSIVE, REQUIRES LONG LEAD TIMES, AND THE MATERIAL REQUIRES STORAGE IN A FREEZER.						
SOLUTION - DESIGN AND INSTALL IN-HOUSE A PROCESSING SYSTEM AND DEVELOP OPERATING PARAMETERS TO PRODUCE PREPREG COMPOSITE MATERIALS OF SPECIFIC PROPERTIES AND CHARACTERISTICS FOR USE IN FILAMENT WINDING OR BRAIDING OPERATIONS.						
COMPONENT -- TUBES						
(6163) TITLE - HIGH VELOCITY MACHINING	332	160			100	
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.						
(6193) TITLE - INCREASING GUN TUBE HEAT TREATMENT CAPACITY	325	250				
PROBLEM - OIL-FIRED SELAS CONTINUOUS HEAT TREATING CANNOT MEET THE PRODUCTION CAPACITY OF THE ROTARY FORGE. THE OUTPUT OF THE HEAT TREAT LINE MUST BE INCREASED THREE-FOLD TO MEET MOBILIZATION REQUIREMENTS.						
SOLUTION - INCREASE CAPACITY BY MODIFYING PRESENT SYSTEM, ADDING SECOND MODIFIED SYSTEM, ADDING A STABILIZING FURNACE, AND SHORTENING AUSTENITIZATION CYCLE. ANOTHER POSSIBILITY IS TO USE RAPID HEATING RATES AVAILABLE WITH INDUCTION HEATING TO REDUCE TIME NEED.						
(6241) TITLE - COMPUTER APPLICATIONS TO BORE GUIDANCE	308	85				
PROBLEM - THE BORE GUIDANCE SYSTEM CONSISTS OF MANY INTERDEPENDENT ELEMENTS MAKING IT DIFFICULT AND TIME CONSUMING TO DIAGNOSE PROBLEMS. ALSO, TUBES WITH LARGE WALL VARIATIONS GREATLY INCREASE THE DIFFICULTY IN MAINTAINING CONTROL.						
SOLUTION - COMPUTER CONTROL WILL MAKE POSSIBLE SUCH FEATURES AS SELF TESTING, CHECKING, MONITORING, AND CALIBRATION IN CONTROL, TEST, AND MEASUREMENT SYSTEMS.						
(6351) TITLE - IMP MFG OF QUADRANT FLATS + MUZZLE BRAKE	88				50	
PROBLEM - PRESENT METHODS OF MACHINING FLATS AND KEYWAYS REQUIRE TWO SET-UPS ON TWO SEPARATE MACHINE TOOLS WITH ATTENDANT MATERIEL HANDLING REQUIREMENTS.						
SOLUTION - DESIGN A DUAL MACHINING SYSTEM CAPABLE OF MANUFACTURING BOTH THE KEYWAY AND THE LEVELING FLATS IN A SINGLE SET-UP, FABICATE AND RETROFIT TO CURRENT EQUIPMENT.						

	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- TUBES (CONTINUED)						
(8352) TITLE - SKIVING OF GUN TUBE BORES	120			440	135	
PROBLEM - INTERMEDIATE TUBE BORE HONING OPERATIONS FOR SURFACE FINISH AND SIZE CONTROL ARE A TIME CONSUMING, COSTLY METAL REMOVAL PROCESS. COUNTERBORING OPERATIONS PRIOR TO SWAGE AUTOFRETTAGE ARE ALSO SLOW, TIME CONSUMING, AND HIGH IN TOOLING COSTS.						
SOLUTION - THE APPLICATION OF RECENTLY DEVELOPED SKIVING TECHNOLOGY AND EQUIPMENT WILL ELIMINATE COSTLY ROUGH HONING COUNTERBORING OPERATIONS.						
(8423) TITLE - P/M FABRICATION OF GUN TUBES					350	350
PROBLEM - MANUFACTURE OF BARRELS USING IMPROVED MATERIALS WITH RESISTANCE TO WEAR AND EROSION CAUSED BY THERMAL AND CHEMICAL DETERIORATION DESIGNED FOR USE AT ELEVATED TEMPERATURES, UNDER ADVERSE CONDITIONS BY CONVENTIONAL TECHNIQUES IS EXPENSIVE.						
SOLUTION - ROTARY SWAGING OF COMPACTED PREFORMS HAS BEEN DONE FOR IRON POWDER COMPACTS IN R&D LABS. THIS TECHNIQUE CAN BE EXTENDED TO FABRICATE PRECISION GUN BARRELS FROM LOW ALLOY-HIGH STRENGTH STEEL POWDERS.						
(8430) TITLE - AUTOMATED WELDING OF ROTARY FORGE HAMMERS		137				
PROBLEM - CURRENT METHOD TO WELD A WEAR RESISTANT OVERLAY ON ROTARY FORGE HAMMERS IS A TIME CONSUMING, MANUAL PROCESS. QUALITY DEPENDS ON OPERATOR SKILL.						
SOLUTION - AUTOMATE THE PROCESS BY OBTAINING WELDING ALLOY IN A FLUX-CORE METAL WIRE FORM, USABLE ON EXISTING AUTOMATIC WELDING EQUIPMENT.						
(8431) TITLE - AUTOMATED WELDING OF BORE EVACUATORS		215				
PROBLEM - PRESENT PROCEDURE DOES NOT ENABLE WELDING BORE EVACUATORS INSIDE AND OUTSIDE SIMULTANEOUSLY. THUS, ENERGY AND TIME ARE WASTED.						
SOLUTION - EMPLOY SPECIAL EQUIPMENT AND PROCEDURES TO PERMIT COMBINING THESE OPERATIONS.						
(8433) TITLE - IN PROCESS CONTROL OF SELAS HEAT TREAT SYSTEM (CAM)		125				
PROBLEM - AS GUN TUBES ARE HEAT TREATED THE ACTUAL WORKPIECE TEMPERATURE IS NOT KNOWN UNTIL THE PIECE EXITS THE FURNACE. EXCESSIVE FORGING TEMPERATURES CAN DEGRADE MECHANICAL PROPERTIES.						
SOLUTION - AUTOMATICALLY CONTROL FURNACE TEMPERATURES BY MONITORING THE ACTUAL WORKPIECE TEMPERATURE, AND FEEDING THIS DATA TO MICROPROCESSORS.						

	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- TUBES (CONTINUED)						
(8439) TITLE - IMPROVED RIFLING PROCEDURES		80				
PROBLEM - RIFLING HEADS USED TO HOLD BROACH CUTTERS IN THE RIFLING OPERATION ARE SUBJECT TO EXCESSIVE WEAR, NECESSITATING SIGNIFICANT MAINTENANCE AND REPAIR EXPENDITURE.						
SOLUTION - DESIGN A NEW RIFLING HEAD THAT IS NOT SUBJECT TO WEAR, THEREBY ELIMINATING MAINTENANCE AND REPAIR EXPENDITURE ASSOCIATED WITH WORN RIFLING HEADS.						
(8449) TITLE - OPTIMAL RIFLING CONFIGURATION FOR CHROME PLATING			140		180	
PROBLEM - EARLY FAILURE OF CHROMIUM COATINGS IN GUN TUBES OCCURS AT THE SHARP CORNERS OF THE LAND RUN-UP. PRESENTLY NO EFFECTIVE METHOD OR TOOL IS AVAILABLE TO ELIMINATE THIS CONDITION.						
SOLUTION - DEVELOP A METHOD AND APPROPRIATE TOOLING TO ALTER THE RIFLING PROFILE OF GUN TUBES.						
(8473) TITLE - APPL FUSED SALT PROCESS TO COAT TANTALUM ON L CAL LINERS		245	250	128		
PROBLEM - PRESENTLY NO FULL SCALE PRODUCTION CAPABILITY EXISTS AT WATERVLIET ARSENAL TO APPLY TANTALUM TO THE I. D. OF LARGE LINERS. THESE COATINGS MUST BE DEPOSITED FROM A FUSED SALT BATH.						
SOLUTION - ESTABLISH THE CAPABILITY TO COAT LARGE CALIBER LINERS ON A PRODUCTION BASIS.						
(8474) TITLE - APPL OF PARTIAL REFRACTORY LINERS TO CANNON TUBES		369	290			
PROBLEM - FUTURE CANNON TUBES WILL BE SUBJECTED TO HIGHER TEMPERATURE, PRESSURE AND VELOCITY. TUBES AS NOW DESIGNED WILL WEAR OUT MUCH FASTER. PROTOTYPE EQUIPMENT TO INSTALL ADVANCED TECHNOLOGY LINERS IN TUBES NOW EXISTS.						
SOLUTION - MODIFIY THE EXISITNG PROTOTYPAL FACILITY TO HANDLE ALL CURRENT AND FORESEEN RODUCTION TUBES. INSTALL ADVANCED TECHNOLOGY LINERS USING THIS EQUIPMENT.						
(8544) TITLE - WIRE E.D.M. MACHINING OF RIFLING BROACHES			70			
PROBLEM - BROACH CUTTER TEETH ARE FORMED BY ROUGH PLUNGE GRINDING USING BORAZON CBN WHEELS. FINISHING IS DONE BY FORMING STANDARD ALUMINUM OXIDE WHEELS AND GRINDING THE BROACH TEETH ON THESE WHEELS, WHICH BREAK DOWN FREQUENTLY AND REQUIRE MUCH REDRESS.						
SOLUTION - FORM THE BROACH TEETH VIA CNC CONTROLLED E.D.M.						

	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- TUBES (CONTINUED)						
(6549) TITLE - NDT TESTING OF ROTARY FORGED MANDRELS					63	237
PROBLEM - MANDRELS FAIL WITHOUT WARNING DURING THE FORGING OPERATION. THERE IS NO METHOD OF DETECTING DEFECTS UNLESS THE MANDREL IS REMOVED FROM THE FORGING MACHINE.						
SOLUTION - THE APPLICATION OF AN ULTRASONIC ELECTROMAGNETIC ACOUSTIC TRANSMISSION (EMAT) NDT SYSTEM THAT IS CAPABLE OF INSPECTING THE MANDREL BEFORE, AND AFTER THE FORGING OPERATION WHILE THE MANDREL IS STILL ATTACHED TO THE BAR HOLDER.						
(6552) TITLE - ELECTROPOLISHING TO IMPROVE TUBE FATIGUE LIFE			150		150	
PROBLEM - STRESS CONCENTRATION AREAS SUFFER FROM AMPLIFIED FATIGUE CRACKING AND ARE THE CAUSE OF EARLY TUBE CONDEMNATION. THE 155MMM M185 KEYWAY SLOT AND THE 105MM M68 BREECH THREAD FEATURES ARE EXAMPLES OF EARLY FATIGUE CRACKING.						
SOLUTION - THE REDUCTION OR ELIMINATION OF THE STRESSES WILL BE ACCOMPLISHED BY THE USE OF EXTERNAL ANODES CONFIGURED TO MATCH THE AREA TO BE TREATED.						
(6553) TITLE - APPLICATION OF REFRACTORY + OTHER COAT BY THE SPUTT TECH					225	363
PROBLEM - COATING LINERS WITH TANTALUM ELECTRODEPOSITION FROM MOLTEN SALTS INVOLVES HEATING THE SUBSTRATE TO ABOUT 800 DEGREE C. AT THIS TEMPERATURE GUN STEEL UNDERGOES UNDESIRABLE CHANGES IN MECHANICAL PROPERTIES.						
SOLUTION - HIGH RATE SPUTTERING IS A TECHNIQUE WHICH CAN BE USED TO DEPOSIT METALLIC COATINGS IN REASONABLE TIME INTERVALS AT SUBSTRATE TEMPERATURES AS LOW AS 70 DEGREE C.						
(6560) TITLE - APPLICATION OF COUNTER HOLDER EQUIPMENT TO ROTARY FORGING			190			
PROBLEM - THE PLANNED INSTALLATION OF AN ADDITIONAL COUNTERHOLDER ON THE ROTARY FORGE WILL HAVE AN IMPACT ON THE NC PROGRAMS AND PREFORM DESIGNS.						
SOLUTION - PROVIDE ENGINEERING SUPPORT TO DEAL WITH IMPACTS OF THE COUNTERHOLDER ACQUISITION ON THE PROCESS.						
(6621) TITLE - SPRAY ROLLING FOR TUBE MANUFACTURE						750
PROBLEM - BOTH GUN TUBE AND LINER MFG INVOLVE CLASSICAL WROUGHT INGOT METALLURGICAL PROCESSING THAT ENTAIL LARGE EXPENDITURES OF ENERGY AND SIGNIFICANT MATERIAL CROPPING LOSSES.						
SOLUTION - SPRAY FORMING PROVIDES A NEW APPROACH WHICH POTENTIALLY COMBINES ECONOMY WITH MATERIAL PROPERTY IMPROVEMENT. THE DIRECT ROLLING OF SPLAT-SPRAYED PRE-FORMULATED METAL POWDERS FOLLOWED BY CONSOLIDATION THROUGH SWAGING OFFERS IMPROVED PROPERTIES.						

	FUNDING ($000)				
PRIOR	84	85	86	87	88

COMPONENT -- TUBES (CONTINUED)

(8711) TITLE - CERAMIC GUN TUBE PROCESSING 485

PROBLEM - WITH THE ADVENT OF HOTTER, FASTER PROPELLANTS, GUN TUBE TEMPERATURE + WEAR WILL INCREASE BEYOND THE LIMITS OF PRACTICAL METALLURGY. CERAMIC LINER INSERTS ARE A SOLUTION BUT THE STRENGTH RELIABILITY OF CERAMICS MUST BE ADDRESSED.

SOLUTION - APPLICATION OF STATE OF THE ART HOT ISOSTATIC PRESSING TECHNOLOGY TO FORM HIGH STRENGTH CERAMICS OF CONTROLLED DEFECT SIZE.

****
* C A T E G O R Y *
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*POLLUTION ABATEMENT *
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COMPONENT -- MISCELLANEOUS

(8716) TITLE - ENVIRONMENTAL AND ENERGY MONITORING SYSTEM 200

PROBLEM - MANUFACTURING PROCESSES PRODUCE ENVIRONMENTAL CONTAMINANTS AND SOME PROCESSES ARE EXCESSIVE USERS OF ENERGY.

SOLUTION - INSTALL AND MONITOR REAL TIME ENVIRONMENTAL AND ENERGY INFORMATION TO EVALUATE PARAMETERS AND INSTITUTE REGULATION AND CONTROL ACTIONS TO ALLEVIATE.

****
* C A T E G O R Y *
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*QUALITY CONTROL/TESTING *
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COMPONENT -- FIRE CONTROL

(8561) TITLE - DIGITAL IMAGE DIAGNOSTIC TECHNIQUES 150

PROBLEM - VISUAL INSPECTION ERRORS DUE TO OPERATOR EYE FATIGUE, BOREDOM, INATTENTIVENESS CAN OCCUR AT MANUFACTURING FACILITIES,THAT LEAD TO COSTLY DISASSEMBLING PROCEDURES.

SOLUTION - REDUCTION OF VISUAL INSPECTION TIME AND ERRORS THROUGH USE OF AN AUTOMATED DIGITAL IMAGE PROCESSING INSPECTION TECHNIQUE AND DEVICE.

	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- GUN SYSTEMS						
(8376) TITLE - AUTOMATED INSPECTION OF WEAPONS COMPONENTS	193	300	225	250		
PROBLEM - FOR BARREL MFG, CURRENT HAND GAGED INSPECTION IS A MAJOR TIME FACTOR. BARREL STRAIGHTENING IS ALSO DONE MANUALLY AS MANY AS 13 TIMES DURING THE MFG CYCLE. NEW DNC EQUIP BEING PROCURED VIA PIF 66X7986 REQUIRES CENTRAL CONTROL.						
SOLUTION - AUTOMATE, TO MAX FEASIBLE DEGREE, INSPECTION OPERATIONS. USING LASER TECHNOLOGY, EQUIP A STRAIGHTENING PRESS WITH FEEDBACK CONTROL TO SELECT LOCATION FOR APPLICATION OF BENDING FORCES. CONTROL ALL DNC EQUIPMENT WITH A CNC MASTER UNIT.						
(8415) TITLE - ROBOTIC EMPLACEMENT DEVICE FOR INSPECTION BY X-RAY (REDIX)						160
PROBLEM - RADIOGRAPHIC INSPECTION IS USED EXTENSIVELY TO ASSURE THE QUALITY OF HOWITZER CARRIAGES DURING MFG. TO OBTAIN SATISFACTORY X-RAYS ALIGNMENT IS CRITICAL. USING THE PRESENT METHOD CONSISTENCY OF EXPOSURE IS IMPOSSIBLE.						
SOLUTION - REPLACE THE MANUAL RADIOGRAPHIC POSITIONING WITH AN AUTOMATED ROBOTIC DEVICE CAPABLE OF PRECISELY ALIGNING WELDMENTS AND CASTING						
(8434) TITLE - EDDY CURRENT INSPECTION OF GUN TUBES		118				
PROBLEM - THE CURRENT GUN TUBE PRODUCTION ID INSPECTION TECHNIQUES, BORESCOPE AND MAGNETIC PARTICLE, ARE SLOW AND SUBJECT OPERATOR ERROR. THESE TECHNIQUES DO NOT HAVE THE CAPABILITY TO PRODUCE PERMANENT RECORDS OF FLAW LOCATIONS.						
SOLUTION - DEVELOP A EDDY CURRENT INSPECTION SYSTEM HAS THE CAPABILITY TO DETECT AND PERMANENTLY RECORD SURFACE CRACKS OF .010 INCHES DEEP DURING THE MACHINING PROCESS. THIS TECHNIQUE WILL ADD ONLY ONE MINUTE TO THE MACHINING PROCESS						
(8436) TITLE - QUENCH CYCLE PROFILE MEASUREMENT SYSTEM		148	147			200
PROBLEM - THE QUENCH CYCLE DURING HEAT TREAT PLAYS AN IMPORTANT PART IN THE QUALITY OF GUN TUBE FORGINGS. QUENCH CRACKS HAVE BEEN OCCURING IN THE MUZZLE END OF 105 MM ROTARY FORGED GUN TUBES. THE CURRENT QUENCH CYCLE HAS LITTLE OR NO CONTROL.						
SOLUTION - DEVELOP A NONCONTACT EDDY CURRENT AND/OR NONCONTACT EMAT(ELECTROMAGNETIC ACCOUSTICAL TRANSMISSION) ULTRASONIC SYSTEM TO PROVIDE QUENCH CYCLE TEMPERATURE TIME TRANSFORMATION INFORMATION ON REAL TIME BASIS.						
(8510) TITLE - AUTOMATED INSPECTION OF RECOIL COMPONENTS				140	300	
PROBLEM - MANY COMPONENTS ARE UNSALVAGEABLE BECAUSE CYLINDRICITY IS LOST AFTER A MANUFACTURING PROCESS OR UNACCEPTABLE SURFACE INTEGRITY. THESE COMPONENTS ARE USUALLY UNDETECTED UNTIL NEEDLESS STEPS IN THE PROCESS ROUTINGS HAVE BEEN PERFORMED.						
SOLUTION - A COMPUTERIZED MEASURING AND RECORDING SYSTEM WILL BE ASSEMBLED AND APPLIED TO THE DETERMINATION OF CYLINDRICITY OF HOLES AND ROUND STOCK PRIOR TO AND THROUGHOUT FABRICATION.						

	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- GUN SYSTEMS (CONTINUED)						
(8573) TITLE - GENERIC GUN GYMNASTICATOR			105	552	500	350
PROBLEM - LIVE FIRINGS ARE CURRENTLY USED TO RESOLVE ACCEPTANCE TESTS AND MALFUNCTION PROBLEMS ASSOCIATED WITH AUTOMATIC CANNONS (20-40MM). CYCLING THESE WEAPONS USING LIVE AMMUNITION IS EXCESSIVELY COSTLY AND TIME CONSUMING.						
SOLUTION - FABRICATE A GENERIC GUN GYMNASTICATOR TO CYCLE AUTOMATIC CANNONS MECHANICALLY. THIS WILL ELIMINATE LIVE TEST FIRINGS AND THE ASSOCIATED COSTS (AMMUNITION, FIRING RANGE COSTS, TRANSPORTATION CHARGES, ETC). TESTING TIME WILL BE REDUCED.						
(8602) TITLE - NDT OF RAW MATERIAL FOR WEAPON COMPONENTS						300
PROBLEM - PRESENT INSPECTION OF MATERIAL CLEANLINESS IS INADEQUATE. CONSEQUENTLY, MATERIAL DEFICIENCIES GO UNDETECTED UNTIL THE FINAL STAGES OF THE MANUFACTURING PROCESS WHICH RESULTS IN HIGH SCRAP/REWORK COSTS AND LOSS OF LABOR.						
SOLUTION - APPLY A SCANNING TYPE NDT SYSTEM FOR AUTOMATIC CLEANLINESS INSPECTION OF RAW MATERIAL TO DETECT DETRIMENTAL DEFECTS IN THE MATERIAL BEFORE MACHINING.						
COMPONENT -- MISCELLANEOUS						
(8629) TITLE - ULTRASONIC TEST APPLICATION FOR WEAPON COMPONENTS						270
PROBLEM - PRESENT PROCESS CONTROL TESTING OF CASTINGS, FORGINGS, AND METAL PARTS TO ENSURE MATERIAL INTEGRITY IS SLOW AND COSTLY. ULTRASONIC TESTING IS BEING APPLIED IN INDUSTRIAL OPERATIONS TO REPLACE OTHER HIGH COST, INEFFICIENT NDT METHODS.						
SOLUTION - IDENTIFY POTENTIAL AREAS FOR APPLICATION OF ULTRASONIC TESTING AT RIA. IDENTIFY THE POTENTIAL FOR APPLYING ULTRASONICS AND DETERMINE THE TYPE OF ULTRASONIC SYSTEM TO BE USED.						
(8653) TITLE - A THREE DIMENSIONAL NON-CONTACT MEASURING SYSTEM			125		25	
PROBLEM - THE MFG + PURCHASE PARTS REQUIRES THAT THE DIMENSIONS BE CHECKED TO INSURE THE SPECIFIED TOLERANCES. IN THE PAST THIS HAS BEEN DONE MANUALLY OR WITH COORDINATE MEASURING MACHINES. BOTH OF THESE METHODS ARE TIME CONSUMING.						
SOLUTION - TECHNOLOGY EXISTS TO CHECK PART DIMENSIONS IN THREE DIMENSIONS WITHOUT CONTACTING THE PART. THIS GREATLY REDUCES THE TIME REQUIRED TO CHECK DIMENSIONS.						

	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- MISCELLANEOUS (CONTINUED)						
(6719) TITLE - AUTOMATED INSPECTION OF MINOR COMPONENTS					80	
PROBLEM - FINAL INSPECTION OF MINOR COMPONENTS INVOLVES MOVING PARTS TO REMOTE INSPECTION SITES AND FIXTURE AND SET-UP TIME DELAYS.						
SOLUTION - DEVELOP INSPECTION SYSTEM INCORPORATING IN-PROCESS INSPECTION AT MACHINE SITE AND FIBER OPTIC, 3-D MEASURING SYSTEM IN CENTRALLY LOCATED INSPECTION STATIONS.						

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* CATEGORY *
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*SMALL CALIBER *
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COMPONENT -- BARRELS						
(7985) TITLE - SMALL ARMS WEAPONS NEW PROCESS PRODUCTION TECHNOLOGY	1668	728	890	813		
PROBLEM - GUN BARREL MFG PROCEDURES REFLECT ANTIQUATED TECHNOLOGY AND RELY ON MASS REMOVAL OF MATERIAL BY CONVENTIONAL MACHINING METHODS. CURRENT EQUIP REPRESENTS 1940-50 TECHNOLOGY. NEW MATERIALS COMPOUND THE PROBLEM.						
SOLUTION - REDUCE TO PRACTICE NEW TECHNIQUES FOR CAL 50 TO 40MM BARRELS BY ESTABLISHING THE TECHNOLOGY AND PROCESS EQUIPMENT REQUIRED TO BRIDGE GAP BETWEEN CAPABILITIES AND REQUIREMENTS.						
(8524) TITLE - REFRACTORY METAL COATING FOR GUN TUBES					520	350
PROBLEM - THERE IS A NEED TO PROVIDE IMPROVED RAPID FIRE GUN TUBES, AND A NEED TO REPLACE LINER MATERIALS MADE OF COBALT AND ITS ALLOYS (A CRITICAL STRATEGIC MATERIAL).						
SOLUTION - DEVELOP AND OPTIMIZE THE PROCESS VARIABLES OF THE REFRACTORY METAL COATINGS AND THE APPLICATION PROCEDURES OF THESE COATINGS ON GUN BARREL LINERS.						
(8553) TITLE - TECHNOLOGY FOR EROSION RESISTANT COATING FOR GUN BARRELS						260
PROBLEM - GUN BARRELS SUFFER EROSION AT THE BREECH END OF THE WEAPON. CERAMICS OR REFRACTORY METALS MAY OFF-SET EROSION BUT THE PROBLEM OF LINING THE BARREL WITH THESE MATERIALS HAS NOT BEEN RESOLVED ON FULL SCALE WEAPONS.						
SOLUTION - DEMONSTATE THE APPLICATION OF COATINGS AND/OR LINERS ON SMALL AND LARGE CAL BARRELS. A CERAMIC (PERHAPS TITANIUM DIBORIDE) WOULD BE BEST IN SMALL BARRELS WHEREAS A REFRACTORY METAL (PERHAPS COLUMBIUM) WOULD BE BEST SUITED FOR LARGE BARRELS.						

	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- BARRELS (CONTINUED)						
(8536) TITLE - MOLYBDENUM ALLOY GUN BARREL LINERS						645
PROBLEM - METHODS FOR PROCESSING MOLYBDENUM ALLOY ARE BEING STUDIED SO THAT ITS UNIQUE PROPERTIES CAN BE USED FOR SUSTAINED RAPID FIRE WEAPONS. IT WILL BE NECESSARY TO ESTABLISH AND APPLY THE METHODS ON AN ADEQUATE SCALE.						
SOLUTION - THE APPLICABILITY OF ONE OR MORE METHODS (HOT ISOSTATIC PRESSING, EXTRUSION, INJECTION MOLDING, ETC) WILL BE DEMONSTRATED. SPECIFICATIONS FOR MATERIALS AND PROCESSES WILL BE ESTABLISHED.						
(8538) TITLE - CERAMIC LINERS FOR GUN TUBE APPLICATIONS						450
PROBLEM - A LARGE NUMBER OF REPLACEMENT BARRELS MUST BE KEPT IN INVENTORY BECAUSE OF LIMITED BARRELL LIFE CAUSED BY WEAR AND EROSION.						
SOLUTION - IMPROVE WEAR AND EROSION CHARACTERISTICS THROUGH THE USE OF CERAMIC LINERS						
(8636) TITLE - IMPROVE BOLT MFG PROCESSES + BARREL INSP TECH FOR THE MIG					200	
PROBLEM - PRESENT IN-PROCESS INSPECTION TECHNIQUES REPRESENT OUTDATED TECHNOLOGY. THEREFORE PRODUCTION CAPABILITY, QUALITY AND COSTS ARE ADVERSELY AFFECTED. CURRENT PROCESSES UTILIZED IN MFG THE BOLT REQ. IMPROVEMENT COST AND QUALITY.						
SOLUTION - AUTOMATED, NON-CONTACT INSP TECH WILL BE USED FOR BARREL MEAS AS IN PROCESS CONTROL. THIS SYSTEM WILL OPTIMIZE PRODUCTION CONTROL THRU AUTOMATED FEEDBACK. PROCESS CHANGES SUCH AS SHOT PEENING TO ROLL FORGING ARE CONTEMPLATED.						
(8670) TITLE - HOMOGENIOUS MULTI MATERIAL GUN BARRELS					320	
PROBLEM - INCREASED EROSION RESISTANCE CAN BE ACHIEVED BY USING HIGH TEMPERATURE MATERIALS.						
SOLUTION - COLD ROTARY FORGE PREVIOUSLY MANUFACTURED HOMOGENIOUSLY BONDED LAYERED TUBE PREFORMS OF VARIOUS COMPOSITIONS.						
COMPONENT -- COMPONENTS						
(3471) TITLE - SQUEEZE CASTING OF SMALL CAL WEAPONS						210
PROBLEM - A NUMBER OF SMALL ARMS WEAPONS COMPONENTS ARE FABRICATED BY COSTLY AND TIME CONSUMING MACHINING PROCEDURES IN WHICH A LARGE PORTION OF THE STARTING METAL STOCK ENDS UP AS MACHINING SCRAP.						
SOLUTION - THIXO FORGING PRESENTS A UNIQUE SOLUTION TO THE MACHINING PROBLEM. THE FORGING PROCEDURE ELIMINATES MOST OF THE TIME AND MONEY LOSSES EXPERIENCED WITH MACHINING, AND THE THIXO PROCEDURE ELIMINATES MOST OF THE CONVENTIONAL FORGING.						

MMT FIVE YEAR PLAN
RCS DRCMT 126

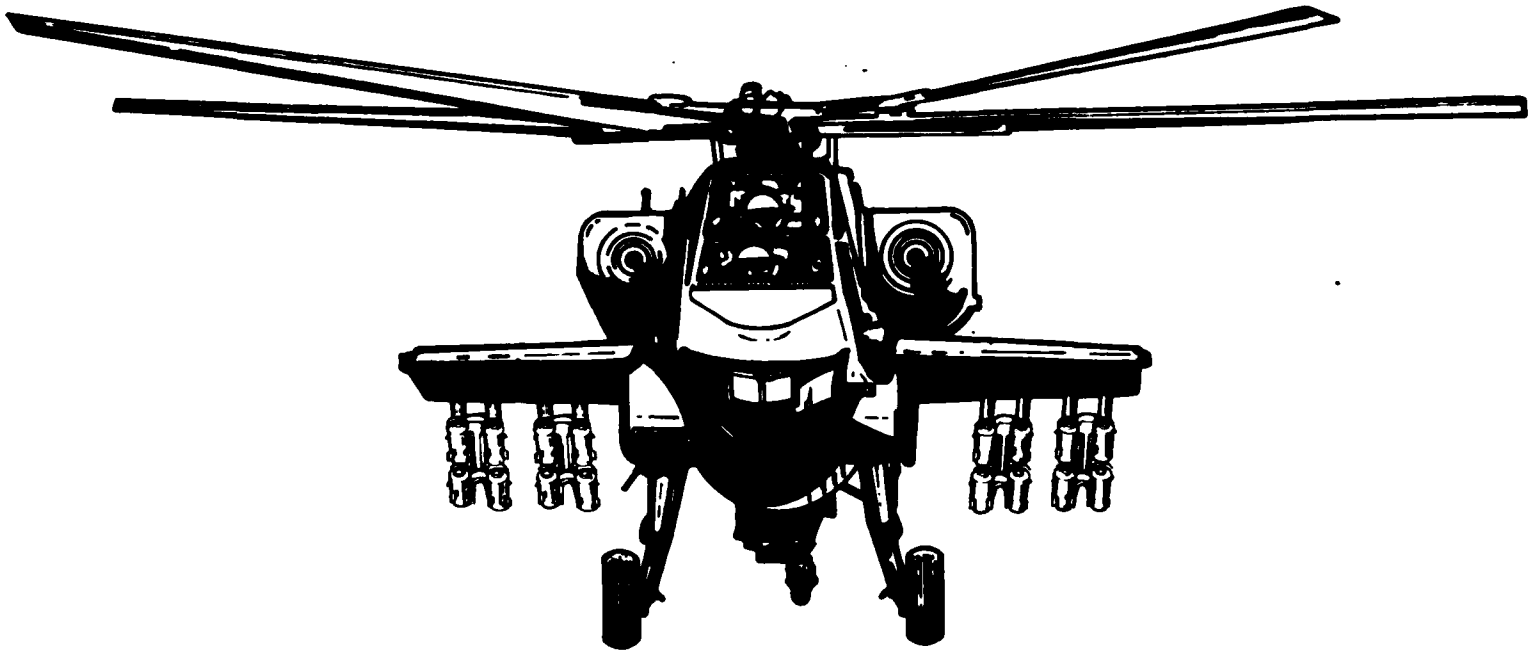
	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- GENERAL						
(8524) TITLE - PROCESS CONTROLS FOR P/M WEAPONS COMPONENTS	160	160	300	257		
PROBLEM - PRESENT METHODS OF PRODUCING WEAPON COMPONENTS IS MAINLY BY MACHINING FROM WROUGHT STOCK. THIS IS A HIGH COST METHOD WHICH PRODUCES MUCH ALLOY STEEL SCRAP.						
SOLUTION - FORGE PARTS FROM P/M STEEL FOR SAVINGS AND INCREASED DURABILITY AND REDUCED USE OF ALLOY STEEL.						
(8468) TITLE - IMPR MFG PLUS HANDLING TECHNIQUES FOR SMALL CAL WEAPONS						325
PROBLEM - CURRENT MANUAL MATERIALS HANDLING AND ASSEMBLY TECHNIQUES CAUSE NON-OPTIMAL MACHINE UTILIZATION AND HIGH LABOR COSTS.						
SOLUTION - DEMONSTRATE THE APPLICATION OF A MODIFIED GENERAL PURPOSE INDUSTRIAL ROBOT IN A PRODUCTION ENVIRONMENT FOR MATERIALS HANDLING. DEMONSTRATE THE APPLICATION OF A FLEXIBLY PROGRAMMED ASSEMBLY MACHINE FOR SMALL WEAPONS COMPONENTS.						
(8525) TITLE - GROUP TECHNOLOGY FOR S/C COMPONENT						160
PROBLEM - PRIOR YEAR ICAM RELATED MMT PROJECTS DEVELOPED PROCESS PLANNING AND PAST CLASSIFICATION SOFTWARE. HOWEVER NO DATA BASE HAS BEEN ASSEMBLED TO PERMIT THE SELECTION OF AN OPTIMUM PROCESS FOR A GIVEN PART OR ESTIMATING COSTS RELATED TO SUCH A PROCESS.						
SOLUTION - A DATA BASE WILL BE DEVELOPED FOR FAMILIES OF MAJOR SMALL CALIBER 5.56MM -40MM WEAPONS COMPONENTS USING SOFTWARE ALREADY IN USE IN OTHER AREAS. DATA ON NEW PRODUCT CONFIGURATIONS WILL BE PROGRAMMED AND PROCESS PLANNING SYSTEMS EXERCISED.						
(8526) TITLE - PROCESSING OF HIGH STRENGTH/LIGHT WEIGHT WEAPONS COMPONENTS						310
PROBLEM - UTILIZATION OF METAL MATRIX TECHNOLOGY WILL DEPEND ON THE DEVELOPMENT OF A MFG BASE FOR THE ECONOMICAL FABRICATION OF HETEROGENEOUS MATERIALS. BY 1985, MATERIAL SYSTEMS AND PROCESSING/PROPERTY RLMTS WILL HAVE BEEN IDENTIFIED.						
SOLUTION - DEFINE MATERIAL COMBINATIONS/PROPERTIES AND PROCESSING. PROTOTYPE FABRICATE COMPONENTS BY MORE ONE CONTRACTOR. EVALUATE THE MATERIAL BY RIGOROUS LAB TESTING AND IDENTIFY INSPECTION PROCEDURES.						
(8530) TITLE - LIGHTWEIGHT P/M WEAPON COMPONENTS					300	320
PROBLEM - MODERN WEAPONS REQUIRE THAT MATERIALS HAVE A HIGH SPECIFIC STRENGTH (STRENGTH TO DENSITY RATIO) IN ORDER TO REDUCE THEIR WEIGHT.						
SOLUTION - THE AF AND NAVY HAVE DEVELOPED METAL MATRIX COMPOSITE MATERIALS THAT HAVE HIGHER SPECIFIC STRENGTHS THAN STEEL OR ALUMINUM ALLOYS. DEVELOP THE PROCESSING PARAMETERS FOR PRODUCING THESE MATERIALS INTO WEAPON COMPONENTS.						

FUNDING ($000)

	PRIOR	84	85	86	87	88
COMPONENT -- GENERAL (CONTINUED)						
(6662) TITLE - FABRICATION OF PM WEAPON COMPONENTS						200

PROBLEM - THE ARMY HAS BEEN SLOW TO TAKE ADVANTAGE OF THE POWDER METALLURGY PROCESS DUE TO THE LOW CORRELATION BETWEEN WROUGHT AND PM STEELS AND THE RESULTING CONFUSION CAUSED IN PROCUREMENT WHEN A PM PART IS SPECIFIED AS AN ALTERNATE TO A WROUGHT PART.

SOLUTION - DEVELOP MILITARY PROCESS SPECS FOR HIGH DENSITY AND COPPER INFILTRATED STEELS TO PERMIT INTERCHANGEABILITY BETWEEN WROUGHT AND PM WEAPON COMPONENTS, THUS AVOIDING THE NEED TO CHANGE THE DRAWING OR TDP FOR EACH COMPONENT.



AVIATION SYSTEMS COMMAND (AVSCOM)

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US ARMY AVIATION SYSTEMS COMMAND

(AVSCOM)

The US Army Aviation Systems Command (AVSCOM) serves as the AMC lead command for current and future Army aviation research, development, and procurement. AVSCOM is headquartered in St. Louis, Missouri with subordinate activities located throughout the country. The Research and Technology Laboratories consist of the Aeromechanics Laboratory at NASA Ames Research Center at Moffet Field, California; the Propulsion Laboratory at NASA Lewis Research Center at Cleveland, Ohio; the Structures Laboratory at the NASA Langley Research Center at Langley AFB, Virginia; and the Applied Technology Laboratory at Fort Eustis, Virginia. These labs perform the majority of aeronautical research and development work.

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.

The most important criteria of aircraft materials are strength and low weight. A large part of the aviation MMT program is dedicated to establishing processes to replace metals with materials which have better strength to weight ratios. Composite materials suitable for aviation have been developed and are being used; however, techniques for the production and application of composites need further development to achieve increased use.

The use of composite materials in Army aircraft is anticipated to increase as a result of current work in R&D and MT leading to an all-composite helicopter fuselage. Raw material costs are expected to decrease with the increased use of composites in DOD and Industry. Also, as confidence in the use of composites increases, reservations held by the design and (quality control groups) will diminish, and composites will be incorporated in the earliest stages of weapon development.

Composite projects are planned for virtually every part of the helicopter. Many projects are planned for airframe applications. One project will establish automated methods to eliminate many hand layup and cutting operations required for the fabrication of the cabin section. Another will apply ultrasound techniques to the pultrusion of epoxy resin composites to improve the physical properties of the material and to speed up the processing. A project in the rotor area will establish a new method for assembling tail rotor blades which eliminate three separate cure/bond cycles. This will be accomplished by using an alternate blade core material which is compatible with a single cure cycle. In the drive area, one project will result in methods for manufacturing a filament wound composite gearbox housing.

There are many areas in aircraft in which metals can not be replaced. Projects have been submitted to improve production of these items. Since many aircraft metals used in the propulsion system are tough and expensive, machining to final shape is difficult and produces costly scrap. Improving powder metal technology will provide components 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. An effort is planned to replace metal turbine blades with ceramic blades. This will provide better operating characteristics at lower cost.

AVSCOM

COMMAND FUNDING SUMMARY
(THOUSANDS)

CATEGORY	FY84	FY85	FY86	FY87	FY88
AIRCRAFT EQUIPMENT	650	232	0	0	0
AIRFRAME	2722	1824	2371	2906	3142
AVIONICS	316	238	0	0	800
DRIVE SYSTEM	3043	1644	2155	2932	5012
GENERAL	0	0	125	125	762
ROTOR SYSTEM	1091	68	106	0	2280
TURBINE ENGINE	2053	1619	1382	785	6300
TOTAL	9875	5625	6139	6748	18296

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*   C A T E G O R Y     *
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*AIRCRAFT EQUIPMENT     *
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	PRIOR	84	85	86	87	88
	FUNDING ($000)					

COMPONENT -- GENERAL

(7470) TITLE - HAND HELD AUTOMATIC POWER CRIMPER — 250

PROBLEM - PRESENTLY UP TO 50 PERCENT OF THE WIRE TERMINATIONS OF THE HELICOPTER WIRE HARNESS ASSEMBLIES ARE ACCOMPLISHED ON THE HARNESS FORM BOARD AFTER THE WIRES ARE TIED INTO BUNDLES. TERMINALS ARE INSTALLED BY HAND WHICH IS TO TIME CONSUMING.

SOLUTION - THIS PROJECT WILL DEVELOP A LIGHT WEIGHT, HAND-HELD, POWER TOOL WITH THE ABILITIES TO CHANGE THE CRIMPING DIE HEAD, BY EITHER A SNAP ON OR BY MEANS OF THREADING INTO THE POWER TOOL, AND TO ADJUST TO FIVE DIFFERENT MANUFACTURES GAGES.

COMPONENT -- MISC COMPONENTS

(7465) TITLE - ADVANCED COMPOSITE SENSOR SUPPORT STRUCTURE — 572 | 400 | 232

PROBLEM - THE CURRENT PROTOTYPE SENSOR SUPPORT STRUCTURE IS COMPOSED OF BERYLLIUM WHICH IS TOXIC, EXPENSIVE AND SOLE SOURCE SUPPLIED.

SOLUTION - FABRICATE THE SUPPORT FROM RESIN MATRIX COMPOSITES.

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*   C A T E G O R Y     *
*-----------------------*
*AIRFRAME                *
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COMPONENT -- FUSELAGE STRUCTURES

(7462) TITLE - IMPROVED AIRFRAME MANUFACTURING TECHNOLOGY — 661 | 885 | 943 | 2142

PROBLEM - THE GREATEST MANUFACTURING COST DRIVES IN ACAP WERE FOUND IN THE CABIN SECTION DUE TO ITS DESIGN AND GEOMETRIC COMPLEXITY WHICH REQUIRES MANY HAND LAYUP AND CUTTING OPERATIONS.

SOLUTION - ESTABLISH AUTOMATED MANUFACTURING PROCESSES AND REDUCED CURING CYCLES. LOW COST TOOLING, FORMING MOLDS, AND COCURING PROCESSES WILL BE DEVELOPED.

(7468) TITLE - INTEGRATION OF ADVANCED REPAIR BONDING — 693

PROBLEM - CORPUS CHRISTI ARMY DEPOT IS EXPERIENCING PROBLEMS WITH THE ANALYSIS AND CONTROL OF BONDING QUALITY WITH ADHESIVES AND PRIMERS USED IN HONEYCOMB BONDING.

SOLUTION - ESTABLISH MANUFACTURING TECHNOLOGY REQUIRED TO INTEGRATE ALL OF THE KEY ELEMENTS NECESSARY FOR RELIABLE AND LOW COST REPAIRS OF ADHESIVELY BONDED STRUCTURES.

	FUNDING ($K00)					
	PRIOR	84	85	86	87	88
COMPONENT -- FUSELAGE STRUCTURES (CONTINUED)						
(7539) TITLE - ULTRASONIC ACTIVATION OF PROCESS HARDWARE F/ADV COMPOSITES				200	138	
PROBLEM - PULTRUSION PROCESSING OF EPOXY RESIN COMPOSITES IS SLOW, AND, THEREFORE, NOT COMPETITIVE WITH OTHER PROCESSING TECHNIQUES.						
SOLUTION - ESTABLISH ULTRASONICALLY ACTIVATED PULTRUSION DIE PROCESS FOR FORMING COMPOSITE COMPONENTS. THIS APPROACH WILL INCREASE PULTRUSION SPEED, INCREASE FIBER LOADING, REDUCE VOID CONTENT, IMPROVED FIBER WETTING, AND VOID THE USE OF INTERNAL RELEASE AGENTS						
COMPONENT -- GENERAL						
(7302) TITLE - PROD OF TIB2 COATED LONG LIFE TOOLS		420	112			
PROBLEM - AIRFRAME COMPOSITE COMPONENTS REQUIRE EXTENSIVE MACHINING WHICH IS EXPENSIVE IN TERMS OF LABOR HOURS REQUIRED AND TOOL COSTS.						
SOLUTION - MANUFACTURE OF TIB2 COATED TOOLS WILL BE SCALED UP FROM LAB-SIZED ELECTROLYTIC CELLS (15 LBS) TO PRODUCTION SIZE (ABOUT 300 LBS) WITH THE CAPABILITY TO PLATE VARIOUS TOOL TYPES AND SHAPES. TOTAL TOOLING COST WILL BE ABOUT 20 PCT OF CURRENT.						
(7456) TITLE - LOW COST TOOLING FOR AIRFRAME AND ROTOR COMPONENTS		375	112	755	1325	1000
PROBLEM - HIGH COST METAL TOOLING CONCEPTS OR EXPENSIVE AUTOCLAVE CURING APPROCHES HAVE BEEN USED WHICH RESULT IN EXTENDED CURE CYCLES AND POOR ENERGY CONSERVATION.						
SOLUTION - ESTABLISH TECHNOLOGY FOR THE USE OF SELF-CONTAINED INTEGRALLY HEATED PLATIN PRESS TOOLING. THIS WILL ALLOW COMPOSITE COMPONENTS TO BE FABRICATED AT LOW COST DUE TO RAPID CURE TIME AND PRODUCIBILITY.						
(7475) TITLE - ONE PART SEALANT FOR WATER INTEGRITY		390				
PROBLEM - CURRENTLY USED TWO PART POLYSULFIDE SEALANTS REQUIRE MIXING/METERING OF BULK CHEMICALS, QUICK FREEZING OF THE MIX, LIMITED FROZEN STORAGE, AND THAWING BEFORE USE. WASTE IS HIGH DUE TO ITS CURE IN THE CONTAINER.						
SOLUTION - TO QUALIFY A ONE PART POLYURETHANE SEALANT FOR USE IN AIRCRAFT, WHICH CAN ELIMINATE MUCH OF THE EQUIPMENT USED TO PROCESS AND STORE TWO PART SEALANTS. IT CURES ONLY WHEN EXPOSED TO THE ATMOSPHERE, THUS PROVIDING LONG STORAGE LIFE AND MINIMAL WASTE.						

	FUNDING ($000)				
	PRIOR	84	85	86	87	88
COMPONENT -- SECONDARY STRUCTURES						
(7344) TITLE - RIM MOLDING OF LOW COST SECONDARY STRUCTURES		207	256			
PROBLEM - PRESENT METHODS OF FABRICATING AIRCRAFT SECONDARY STRUCTURES (ESPECIALLY ACCESS DOORS) INVOLVE EXCESSIVE LABOR AND EXPENSIVE MATERIALS. STRUCTURES MADE FROM FIBER REINFORCED SANDWICH PANELS AND/OR FORMED SHEET METAL OFTEN REQUIRE COMPLEX ASSEMBLY.						
SOLUTION - ESTABLISH A PROCESS TO PRODUCE THESE SECONDARY STRUCTURES FROM REACTION INJECTED MOLDED (RIM) URETHANES. RIM IS A LOW PRESSURE MOLDING TECHNIQUE WHICH CAN USE LOW COST COMPOSITE MOLDS TO GIVE EXTREMELY COST EFFECTIVE STRUCTURES.						
(7473) TITLE - FIBER REINFORCED THERMOPLASTIC STRUCTURES		187	407	531	500	
PROBLEM - CURRENT AIRFRAME SECONDARY STRUCTURES ARE CONSTRUCTED FROM SHEET METAL OR THERMOSETTING COMPOSITES. SHEET METAL CONSTRUCTION REQUIRES MANY DETAIL PARTS AND LABOR, AND THERMOSETTING COMPOSITES REQUIRES EXPENSIVE STORAGE, FORMING AND CURING STEPS.						
SOLUTION - USE FIBER REINFORCED THERMOPLASTIC COMPOSITE MATERIALS. THEY ARE LESS EXPENSIVE TO STORE AND FORM. THEY ARE ALSO MORE DAMAGE TOLERANT AND EASIER TO REPAIR IN THEIR APPLICATION. KNITTED AND BRAIDED FABRICS WILL BE USED.						
COMPONENT -- STRUCTURAL MEMBERS						
(7389) TITLE - SUPERPLASTIC FORMING OF ALUMINIUM COMPONENTS	404	450	256			
PROBLEM - CURRENT METHODS OF MACHINING ALUMINIUM FORGINGS ARE EXPENSIVE AND REQUIRE AN EXCESSIVE NUMBER OF PARTS.						
SOLUTION - ESTABLISH FABRICATION TECHNOLOGY NECESSARY TO MANUFACTURE ALUMINUM AIRFRAME COMPONENTS THRU THE APPLICATION OF SUPERPLASTIC FORMING OF ALUM ALLOY SHEET MATERIAL.						

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* CATEGORY *
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*AVIONICS *
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COMPONENT -- GENERAL						
(7418) TITLE - COMPOSITE ELECTRO-OPTICAL SYSTEM(EOS)						800
PROBLEM - MECHANICAL RIGIDITY, STABILITY, OVERALL WEIGHT, AND COSTS ARE PRINCIPLE AREAS AFFECTING THE UTILITY AND AFFORDABILITY OF A SOPHISTICATED EOS.						
SOLUTION - A COMPOSITE BASED EOS WILL BE FABRICATED UTILIZING THE RESULTS OBTAINED IN THE SLOS PROGRAM.						

	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- GUIDANCE SYSTEMS						
(7383) TITLE - USE OF MOLDED PLASTIC HARDWARE IN TWO AXIS DRY GYROSCOPES		316	238			
PROBLEM - THE PRIMARY COST DRIVER IN THE MANUFACTURE OF CURRENT INERTIAL GYROSCOPES IS THE MACHINING OF SMALL PRECISION COMPLEX METAL PARTS. THE MACHINED PARTS ARE HIGH COST AND ALSO REPRESENT PRODUCTION LEAD TIME PROBLEMS.						
SOLUTION - MOLD THE GYROSCOPES FROM CARBON FIBER COMPOSITES.						

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* C A T E G O R Y *
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*DRIVE SYSTEM *
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COMPONENT -- GEARS						
(7187) TITLE - POWDER MET GEARS FOR GAS TURBINE ENGINES		500	688			400
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.						
(7298) TITLE - EVALUATION OF HIGH TEMPERATURE CARBURIZING	865	475				
PROBLEM - GEAR CARBURIZING IS PRESENTLY CARRIED OUT WITH A RELATIVELY SLOW ENDOTHERMIC PROCESS, TYPICALLY AT 1700 DEG F, WHICH REQUIRES SURFACE PROTECTION AGAINST DECARBURIZING DURING THE CYCLE OR A POST HEAT TREAT REMOVAL OF THE DECARBURIZED LAYER.						
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.						
(7469) TITLE - NEAR NET SHAPE FORGED SPIRAL BEVEL GEARS				450	686	3062
PROBLEM - THE PRESENT METHOD OF MANUFACTURING AIRCRAFT SPIRAL BEVEL GEARS IS BY METAL REMOVAL PROCESSES INVOLVING HIGH LABOR AND MATERIAL COSTS.						
SOLUTION - HOT FORGE & NEAR NET SHAPE GEAR REQUIRING INTERNAL AND TOOTH GRINDING ONLY.						

	FUNDING ($000)				
	PRIOR	84	85	86	87	88

COMPONENT -- GEARS (CONTINUED)

(7472) TITLE - SURFACE HARDENING GEARS BY LASER — 706 | 56 | 250 | 250

PROBLEM - HELICOPTER TYPE GEARS HAVE BEEN SUCCESSFULLY SURFACE HARDENED BY LASER. THE PROCESS NEEDS TO BE PRODUCTIONIZED AND EXPANDED FOR USE ON GEARS SUSCEPTIBLE TO HEAVY LOADS IN ORDER TO OBTAIN HIGHEST COST BENEFITS.

SOLUTION - LASER TECHNIQUES WILL BE APPLIED TO SURFACE HARDENING OF HEAVILY LOADED GEARS AND DEMONSTRATE BY TEST THE GENERIC APPLICABILITY OF THE TECHNIQUES TO SPUR GEARS. BOTH MANUFACTURING AND QUALITY CONTROL METHODS WILL BE DEMONSTRATED.

(7555) TITLE - AUTOMATED PRECISION GRINDING OF SPUR GEARS BY CNC — 755 | 836 | 1150

PROBLEM - THE CURRENT MFG METHOD FOR AIRCRAFT SPUR/HELICAL GEARS IS LABOR INTENSIVE IN FINAL GRINDING THE GEAR TEETH, REQUIRING SEVERAL GRINDING CYCLES INTERSPERSED WITH IN PROCESS INSPECTION FOLLOWED BY 100 PERCENT FINAL INSPECTION.

SOLUTION - DEVELOP A PROTOTYPE -SMART- GEAR GRINDING MACH WHICH WILL INSPECT THE GEAR TEETH IN PROCESS AND GRIND THEM TO NEAR EXACT DIMENSIONS, ALL WITHOUT THE USE OF INDEXING PLATE OR DRESSER CAM.

COMPONENT -- TRANSMISSION HOUSING

(7378) TITLE - STAINLESS STEEL FABRICATED HOUSING — 500 | 450 | 450 | 685 | 400

PROBLEM - HELICOPTER TRANSMISSION HOUSINGS ARE MADE FROM MAGNESIUM CASTINGS. THEY ARE COSTLY AND HAVE HIGH REPLACEMENT RATES AT OVERHAUL DUE TO CRACKS AND CORROSION.

SOLUTION - APPLY VARIOUS FABRICATION TECHNIQUES TO VARIOUS MATERIALS SUCH AS STAINLESS STEEL TO PRODUCE A LIGHTER WEIGHT, NON-CORROSIVE, AND LESS COSTLY HOUSING.

(7364) TITLE - COMPOSITE ENGINE GEARBOX — 862 | 450 | 250 | 475

PROBLEM - CONVENTIONAL GEAR HOUSINGS CONSISTING OF MAGNESIUM EXHIBIT LOW MODULUS, LOW FATIGUE STRENGTH, AND SUSCEPTABILITY TO CORROSION.

SOLUTION - ESTABLISH A COST EFFECTIVE FILAMENT WINDING MANUFACTURING METHOD FOR A GRAPHITE FIBER/HIGH TEMPERATURE RESIN COMPOSITE HOUSING.

CATEGORY
GENERAL

	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- ALL						
(7362) TITLE - ENG DESIGN HANDBOOK FOR TITANIUM CASTINGS				125	125	232
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 -- NONMETALS						
(7538) TITLE - RIGID FOAM IN HELICOPTER STRUCTURES						530
PROBLEM - THE CURRENT USE OF NOMEX HONEYCOMB CORE MATERIAL IS EXPENSIVE.						
SOLUTION - ESTABLISH A MANUFACTURING PROCESS FOR POLYMETHACRYLIMIDE FOAM. THIS MATERIAL IS EASIER TO MACHINE AND PROCESS THAN NOMEX.						

CATEGORY
ROTOR SYSTEM

COMPONENT -- BLADE/COMPOSITE STRUCTURES						
(7382) TITLE - LOW COST COMPOSITE MAIN ROTOR BLADE FOR THE UH-60A	4321	925				
PROBLEM - MANUFACTURING TECHNOLOGY FOR COCURING GLASS AND GRAPHITE FILAMENT WOUND MAIN ROTOR BLADES HAS NOT BEEN ESTABLISHED FOR THE PRODUCTION ENVIRONMENT.						
SOLUTION - DEVELOP FILAMENT WINDING TECHNOLOGY FOR FABRICATING D SPARS THROUGH OPTIMIZED WINDING OF WET FILAMENTS.						
(7467) TITLE - ADVANCED COMPOSITE ROTOR HUB						2260
PROBLEM - A MANUFACTURING TECHNIQUE FOR PRODUCING COMPOSITE ROTOR HUBS HAS NOT BEEN DEMONSTRATED.						
SOLUTION - DEMONSTRATE THE INTEGRATION OF FILAMENT WINDING TECHNIQUES WITH OTHER MANUFACTURING TECHNIQUES REQUIRED TO PRODUCE A STRUCTURALLY EFFICIENT, THICK LAMINATE COMPONENT.						

	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- BLADE/COMPOSITE STRUCTURES (CONTINUED)						
(7474) TITLE - SINGLE CURE TAIL ROTOR		166	68	106		

PROBLEM - THE CURRENT METHOD OF CURING COMPOSITE TAIL ROTOR BLADES IS TO PRECURE EACH MAJOR DETAIL SEPARATELY AND THEN BOND THEM TOGETHER AS A FINAL ASSEMBLY. THIS APPROACH IS NECESSARY IN ORDER TO PROVIDE A STABLE ELEMENT FOR FORMING AND HOLDING NOMEX CORE.

SOLUTION - REPLACE THE NOMEX CORE MATERIAL WITH A MOLDABLE, RIGID, STRUCTURAL FOAM. THE USE OF THIS MATERIAL WILL ENABLE ASSEMBLY OF PREPREGED MAJOR DETAILS IN THE FINAL MOLD AND A SINGLE CURE CYCLE TO COMPLETE THE BLADE.

****
* C A T E G O R Y *
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*TURBINE ENGINE *
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COMPONENT -- COMBUSTOR

(7377) TITLE - SPF/DB STATIC STRUCTURE FOR TURBINE ENGINES				250	516	975

PROBLEM - TITANIUM STATIC COMPONENTS OF TURBINE ENGINES USE FORGINGS OR CASTINGS WELDED TO SHEET STOCK AND MACHINED ALL OVER. THIS PROCESS IS TOO COSTLY AND HAS POOR UTILIZATION OF CRITICAL MATERIAL.

SOLUTION - ADAPT THE SPF/DB TECHNOLOGY TO THE MANUFACTURE OF A TITANIUM STATIC COMPONENT OF A TURBINE ENGINE.

COMPONENT -- COMPRESSOR

(7465) TITLE - AXIAL COMPRESSOR ROTORS BY ISOTHERMAL FORGING						915

PROBLEM - AXIAL COMPRESSOR ROTORS ARE MACHINED PARTS WHICH START WITH FORGINGS AND REQUIRE SIGNIFICANT MACHINING AND MATERIAL OFFAL COSTS USING SOPHISTICATED NUMERICALLY CONTROLLED EQUIPMENT.

SOLUTION - USE ISOTHERMAL FORGING TECHNIQUES TO OBTAIN NEAR NET SHAPE DISKS IN ONE SUPERPLASTIC FORGING OPERATION.

COMPONENT -- COMPRESSOR/TURBINE DISK

(7457) TITLE - APPLICATION OF FINE GRAINED PREFORMS						975

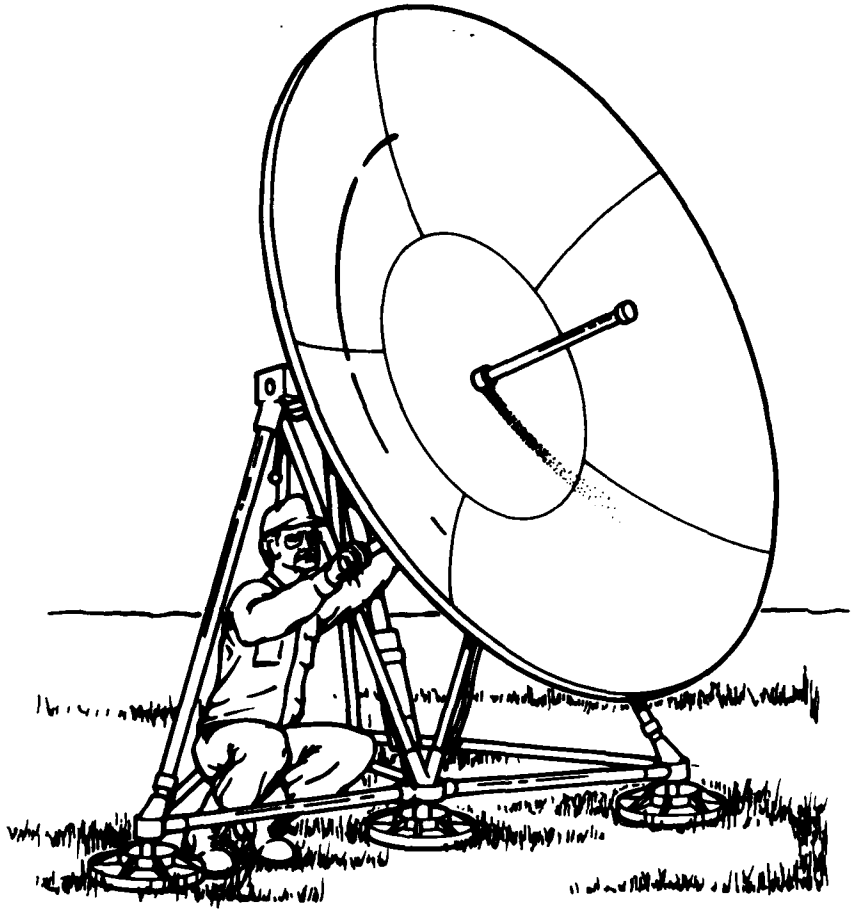
PROBLEM - INGOT METALLURGY RESULTS IN LARGE GRAIN SIZES AND SEGREGATION/MICROSTRUCTURAL EFFECTS THAT YIELD POOR METAL FLOW AND EXPENSIVE LOW LIFE TOOLING.

SOLUTION - ESTABLISH THE PROCESSES FOR GAS TURBINE COMPONENTS FROM FINE-GRAIN INGOT TECHNOLOGY. ISOTHERMAL FORGING TECHNIQUES WILL PRODUCE A FINE-GRAINED, LOW FLOW STRESS PREFORM WITHOUT THE USE OF A POWDER METALLURGY STEP.

	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- MISC COMPONENTS						
(7484) TITLE - TITANIUM ALUMINIDE ENGINE COMPONENTS						1010
PROBLEM - MANY GAS TURBINE COMPONENTS RESPOND TO MODERATE STRESSES IN THE INTERMEDIATE TEMPERATURE RANGE AND ARE MADE FROM SUPERALLOYS SINCE THIS RANGE IS BEYOND THE USABLE LIMITS OF TITANIUM AND ALUMINUM.						
SOLUTION - TITANIUM ALUMINIDES, WHICH HAVE RECENTLY BEEN EXPLORED AS ENGINE MATERIALS, DEMONSTRATED UNIQUE 800 TO 1600 DEGREE F CAPABILITIES WITH ONE HALF THE DENSITY OF STEEL AND NICKEL BASE SUPERALLOYS.						
COMPONENT -- TURBINE BLADES						
(7371) TITLE - INTEGRATED BLADE INSPECTION SYSTEM (IBIS)	1170	566				
PROBLEM - INSPECTION OF TURBINE ENGINE BLADES AND VANES NECESSITATES HIGH ACCURACY. THE EFFORT IS TIME CONSUMING AND SUSCEPTABLE TO ERROR.						
SOLUTION - THIS PROJECT WILL IMPROVE THE INFRARED, X-RAY, AND INFRARED THERMOGRAPHY INSPECTION MODULES BY INCREASING RELIABILITY, REPEATABILITY AND SENSITIVITY. ALSO, INSPECTION COSTS WILL BE REDUCES.						
(7416) TITLE - ADVANCED TURBINE AIRFOIL CASTINGS		512	425	412		
PROBLEM - TURBINE AIRFOLS ARE DESIGNED TO A STRESS RUPTURE LIMIT WHETHER COOLED OR UNCOOLED. THIS LIMIT IS LOW DUE TO EQUIAXED CAST SUPERALLOY MATERIALS CURRENTLY USED AND THEIR INHERENT GRAIN BOUNDARY LIMITATIONS.						
SOLUTION - ADVANCED CASTING TECHNIQUES PERMITTING DIRECTIONALLY-ALIGNED GRAIN GROWTH ELIMINATE THE GRAIN BOUNDRIES PERPENDICULAR TO THE STRESSED DIRECTION WHICH INCREASES THE LONGITUDE STRENGTH, CREEP RESISTANCE, AND RUPTURE LIMITS.						
(7471) TITLE - PROCESS CONTROL SYSTEM FOR N/C AND CNC MACHINES		250	550			
PROBLEM - PRESENT PROCESS CONTROL SYSTEMS FOR NC AND CNC MACHINES DO NOT INCLUDE REAL-TIME MONITORING AND FEEDBACK COMPENSATION.						
SOLUTION - DEVELOP A STATISTICAL PROCESS CONTROL SYSTEM CAPABLE OF PERFORMING REAL TIME PROCESS CONTROL ANALYSIS DURING THE MACHINING OPERATION, USING IN-PROCESS GAGING AND AN ADVANCED ELECTRONIC ADAPTIVE CONTROL SYS TO PERFORM GOAL CHECKS DURING MACHINE CYCLE.						

MMT FIVE YEAR PLAN
RCS DRCMT 126

	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- TURBINE DISKS						
(7417) TITLE - LOW COST DISKS BY CAP		375	538	450		
PROBLEM - POWDER METAL DISKS FORM A SIGNIFICANT PART OF THE ENGINE COST DUE TO EXPENSIVE TOOLING/DIE REQUIREMENTS AND HIGH PRESSURE CONSOLIDATION EXPENSE.						
SOLUTION - RECENT DEVELOPMENTS IN CONSOLIDATION BY ATMOSPHERIC PRESSURE HAS SHOWN THAT SUPERALLOY POWDERS CAN BE CONSOLIDATED TO 98 PERCENT DENSITY AT A REDUCED COST. LOWER COST GLASS DIES CAN ALSO BE USED WHICH REDUCES THE COST FURTHER.						
(7453) TITLE - CERAMIC-FREE ATOMIZATION OF SUPERALLOY POWDER				270	269	825
PROBLEM - CERAMIC CONTENT IN SUPERALLOY POWDERS USED FOR TURBINE COMPONENTS LIMITS THE BENEFITS OF POWDER METALLURGY. GAS ATOMIZATION REPRESENTS A HIGH VOLUME, LOW COST APPROACH BUT IT HAS NOT PREVENTED CERAMIC ADDITIONS TO THE POWDER.						
SOLUTION - THIS PROJECT WILL EVALUATE SUPERALLOY ATOMIZATION TECHNIQUES, DEMONSTRATE QUANTIFIABLE CERAMIC REDUCTIONS AND IMPROVE GAS TURBINE ENGINE COMPONENT COST AND MATERIAL PERFORMANCE.						
COMPONENT -- TURBINE ROTORS						
(7360) TITLE - IMPROVED LOW CYCLE FATIGUE CAST ROTORS	608	350	106			
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.						
(7460) TITLE - DUAL PROPERTY COMPRESSOR IMPELLER						1600
PROBLEM - CENTRIFUGAL COMPRESSOR BLADES REQUIRE PROPERTIES WHICH CAN NOT BE ECONOMICALLY PRODUCED FROM A SINGLE MATERIAL.						
SOLUTION - THIS PROJECT WILL ESTABLISH A PROCESS WHEREBY TWO DISIMILIAR METALS WILL BE JOINED TOGETHER TO PRODUCE THE DESIRED PROPERTIES.						



COMMUNICATIONS AND ELECTRONICS COMMAND (CECOM)

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US ARMY COMMUNICATIONS AND ELECTRONICS COMMAND (CECOM)

The US Army Communications and Electronics Command (CECOM), headquartered at Fort Monmouth, NJ, is responsible for research, development and acquisition of communications, tactical data, and command and control systems for the Army. In addition to logistics, materiel management, engineering, maintenance engineering, and product assurance activities, the command organization includes three technical centers, seven project managers, and one program manager. The three technical centers include the Center for Tactical Computer Systems (CENTACS), the Center for Communications Systems (CENCOMS), and the Center for Systems Engineering and Integration (CENSEI). The seven Project Managers include those for the Position Location Reporting System/Tactical Information Distribution System (PLRS/TIDS); the Field Artillery Tactical Data Systems (FATDS); the Operations Tactical Data Systems (OPTADS); the Satellite Communications (SATCOMA); the Single Channel Ground & Airborne Radio System (SINCGARS); the Multi-Service Communications Systems (MSCS) and the Army Tactical Communications Systems (ATACS). The Program Manager identified above is for Test, Measurement, and Diagnostic Equipment (TMDE).

CECOM's planned projects cover a variety of electronics problems with special emphasis on computer applications and circuit technology. Projects support efficient manufacturing of custom components for use in future tactical radios.

Three projects proposed for FY 85-88 funding will develop advanced methods for production of detector materials and components needed for night vision devices. Currently, infrared detectors are produced on a small scale under laboratory conditions. Unit costs are high and repeatability is low. One near term project deals with scaling up the distillation of tellurium, a raw material for mercury-cadmium-telluride (HgCdTe) detectors. A critical measurement for determining the quality of HgCdTe wafers involves a time consuming manual procedure. For FY 88, a project that will apply automated scanning techniques for high resolution inspection of the wafer is planned. Another FY 88 project will use chemical vapor deposition techniques to apply HgCdTe onto gallium arsenide wafers.

Additional program funding largely anticipates micro-electronics as the driving force in componentry and built-in test capability for command, control, and communications systems. Computer-dominated methodologies are inherent in such areas as design, manufacture, and manufacturing documentation for communications systems and are expected to be of particular value for the short lead time, low volume production anticipated for future equipment and systems.

CECOM

COMMAND FUNDING SUMMARY
(THOUSANDS)

CATEGORY	FY84	FY85	FY86	FY87	FY88
DETECTORS	0	450	0	0	1100
FREQUENCY CONTROL	0	0	0	0	500
GENERAL	0	385	400	680	2425
IMIP	1352	785	882	0	0
INTEGRATED ELECTRONICS	0	0	0	75	675
LASER	0	0	0	320	430
OPTICS	0	275	275	0	1500
POWER SOURCES	0	0	0	75	225
SOLID STATE	250	195	250	100	600
TOTAL	1602	2090	1807	1250	7455

CATEGORY

DETECTORS

FUNDING ($000)

	PRIOR	84	85	86	87	88
COMPONENT -- INFRARED/UV						
(3138) TITLE - CHEM VAPOR DESPOSITION OF HGCDTE ON NON-HGCDTE SUBSTRATES						900
PROBLEM - MERCURY CADMIUM TELLURIDE MATERIALS IS HARD TO PRODUCE. SOME IS LIQUID PHASE EPITAXY. ALLOYING TAKES TWO MONTHS AND LPE TAKES 8 HOURS. THE MATERIAL IS USABLE ONLY AT LOWER WAVELENGTHS.						
SOLUTION - APPLY CHEMICAL VAPOR DEPOSITION OF MERCURY-CADMIUM-TELLURIDE MATERIAL ONTO GALLIUM ARSENIDE WAFERS. GROW VERY NARROW LAYERS OF HG-CD-TE ON GA-AS SUBSTRATES. OBTAIN UNIFORM THICKNESS AND A WAVE-FREE SURFACE.						
(3139) TITLE - AUTOMATED INTEROVEN TRANSFER OF GLASS PREFORMS			200			
PROBLEM - DEWAR FABRICATION REQUIRES MUCH HAND LABOR AND MOVING MATERIALS FROM PROCESS TO PROCESS CAN INTRODUCE CONTAMINATION AND PRODUCT NONUNIFORMITIES.						
SOLUTION - ROBOTICS WILL BE IMPLEMENTED FOR EMPLOYEE SAFETY AND PRODUCT QUALITY.						
COMPONENT -- PHOTODETECTORS						
(3101) TITLE - AUTOMATIC PURIFICATION OF TELLURIUM			250			
PROBLEM - PART PER BILLION PURITY OF TELLURIUM IS A LIMITING FACTOR IN ACHIEVEMENT OF HIGH PURITY MERCURY-CADMIUM-TELLURIUM DETECTOR MATERIAL.						
SOLUTION - IMPLEMENT NEW TECHNIQUE FOR DISTILLATION AND SENSITIVE IMPURITY ANALYSIS.						
(3104) TITLE - AUTO INFRARED SCANNING OF HGCDTE WAFERS						200
PROBLEM - MANUAL INFRARED SCANNING OF WAFERS TO DETERMINE THEIR QUALITY IS SLOW, REQUIRES LENGTHY SETUP AND PRODUCES INCONSISTENT RESULTS.						
SOLUTION - ESTABLISH AUTOMATIC SCANNING TECHNIQUES WITH CONTROL SOFTWARE.						

CATEGORY

FREQUENCY CONTROL

COMPONENT -- OSCILLATORS						
(3048) TITLE - MICROPROCESSOR COMPENSATED CRYSTAL OSCILLATOR						500
PROBLEM - LOW POWER TEMPERATURE COMPENSATED CRYSTAL OSCILLATORS WITH STABILITY (1-5X10E-7) SUITABLE FOR USE IN JAM PROOF ARMY RADIOS (SINCGARS) ARE NOT AVAILABLE IN PRODUCTION QUANTITIES.						
SOLUTION - ESTABLISH PRODUCTION CAPABILITY FOR COST EFFECTIVE, LONG LIFE, STABLE TCXO WHICH UTILIZE MICROPROCESSOR FOR TEMPERATURE COMPENSATION FUNCTION.						

CATEGORY
GENERAL

FUNDING ($000)

	PRIOR	84	85	86	87	88
COMPONENT -- CIRCUITRY						
(3167) TITLE - DESIGN BASE FOR FABRICATION OF MICROWAVE SYSTEMS						150
PROBLEM - HIGH PRODUCTION COSTS ARE ASSOCIATED WITH MICROWAVE SYSTEM MANUFACTURING PROCEDURES WHICH RELY ON THE ACCUMULATED LONG TERM EXPERIENCE OF MANUFACTURING TECHNICIANS.						
SOLUTION - ESTABLISH A KNOWLEDGE BASE AND PRODUCTION RULES FOR PROVIDING A COMPUTER BASED EXPERT SYSTEM TO ALLOW UTILIZATION OF LOWER PERSONNEL SKILLS WITH NO REDUCTION IN QUALITY.						
COMPONENT -- COMPONENTS						
(3132) TITLE - SOFTWARE TOOLS FOR PROGRAMMING ATE					250	300
PROBLEM - TEST PROGRAM SETS (TPS) ARE COSTLY TO PRODUCE. THESE COMPUTER PROGRAMS ARE PREPARED BOTH MANUALLY AND WITH THE ASSISTANCE OF SPECIAL SOFTWARE TOOLS. THESE SOFTWARE TOOLS ARE EXPENSIVE AND ARE NOT UNIFORM IN THEIR APPROACH.						
SOLUTION - ESTABLISH A CENTRALIZED FACILITY AND STANDARD PROCEDURES FOR DEVELOPING TPS. PURCHASE EXISTING SOFTWARE TOOLS AND PREPARE COMPUTER PROGRAMS TO ADDRESS REQUIREMENTS NOT SATISFIED BY AVAILABLE SOFTWARE. AN INTEGRATED FACILITY WILL BE ESTABLISHED.						
(3153) TITLE - VIDEO DISK PRE-MASTER QUALITY ASSESSMENT						125
PROBLEM - PRESENT RECORDING OF RESOURCE FRAMES ON VIDEO DISC MACHINES WITH BROADCAST QUALITY SIGNAL/NOISE RATIO IS NOT FEASIBLE.						
SOLUTION - INDUSTRIAL DISC RECORDER ACQUISITION WILL IMPROVE BROADCAST QUALITY AND BE USED TO GENERATE DATA IN THE FIELD.						
(3157) TITLE - TPS GENERATION TOOLS AND METHODS					300	150
PROBLEM - TEST PROGRAM SETS (TPS) ARE COSTLY TO PRODUCE. THESE COMPUTER PROGRAMS ARE PREPARED BOTH MANUALLY AND WITH THE ASSISTANCE OF SPECIAL SOFTWARE TOOLS. THESE SOFTWARE TOOLS ARE EXPENSIVE AND ARE NOT UNIFORM IN THEIR APPROACH.						
SOLUTION - ESTABLISH A CENTRALIZED FACILITY AND STANDARD PROCEDURES FOR DEVELOPING TPS. PURCHASE EXISTING SOFTWARE TOOLS AND PREPARE COMPUTER PROGRAMS TO ADDRESS REQUIREMENTS NOT SATISFIED BY AVAILABLE SOFTWARE. AN INTEGRATED FACILITY WILL BE ESTABLISHED.						

	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- LASER						
(3141) TITLE - MATERIALS SELECTION FOR ND-YAG BOULE						450
PROBLEM - REDUCED SOLID-STATE LASER PERFORMANCE IS THOUGHT TO BE DUE TO IMPURITIES IN HOST MATERIAL.						
SOLUTION - CHARACTERIZATION OF HOST YAG MATERIAL AND IMPURITY DOPED YAG TO DETERMINE IMPURITY EFFECTS.						
COMPONENT -- MISCELLANEOUS						
(3152) TITLE - VIDEO DISC PRE-MASTER						500
PROBLEM - EXISTING ARMY VIDEO STUDIOS ARE NOT SUITABLE FOR ECONOMICAL OR QUALITY PREMASTER TAPE PRODUCTION. PREMASTER TAPES ARE UTILIZED TO BUILD MASTER VIDEO DISCS. APPLICATION IS TECHNICAL DATA RECORDS, TRAINING + MAINTENANCE.						
SOLUTION - HARDWARE AND SOFTWARE NECESSARY FOR STUDIO VAGRADING WILL BE OBTAINED. PROCESSES WILL BE AUTOMATED.						
(3162) TITLE - EQUIPMENT HOUSING/ANTENNA OF COMPOSITE MATERIAL						150
PROBLEM - OUTER CASES FOR ELECTRONIC SYSTEMS ARE MADE OF ALUMINUM CASTINGS/EXTRUSIONS WHICH ABSORB HEAT FROM CIRCUITRY. THE HEAT RADIATES TO THE ATMOSPHERE CREATING UNACCEPTABLE IR PATTERNS. METAL CASES ARE EXCESSIVELY HEAVY AND EXPENSIVE TO MANUFACTURE.						
SOLUTION - USE COMPOSITE MATERIALS (REINFORCED THERMOPLASTICS) IN LIEU OF ALUMINUM. DETERMINE SPECIFIC COMPOSITION AND ESTABLISH TECHNIQUES FOR MANUFACTURING. FABRICATE PROTOTYPE CASES, INSTALL COMPONENTS AND SUBJECT TO TESTS INCLUDING FIELD EVALUATION.						
(9269) TITLE - AUTOTEST OF MICROWAVE DEVICE WAFERS (CAM)			195	200	50	
PROBLEM - THE NEED TO WAIT UNTIL PACKAGING IS COMPLETE BEFORE TESTING MICROWAVE DEVICES (DIODES, TRANSISTORS) RUNS UP THE COST BECAUSE PACKAGING COST IS APPRECIABLE. BUT TESTING OF DEVVICE CHIPS CANNOT NOW BE DONE.						
SOLUTION - DEVELOP AN AUTOMATED MEASURING SYSTEM FOR EVALUATION THE SEMICON MTL. AT THE WAFER LEVEL, CHECKING EACH DIE AUTOMATICALLY. PERFORM BOTH DC AND RF PROBE MARK UNDER-SPEC DIES. PROVIDE DIAGONISTIC DATA TO PERMIT CHANGING THE PROCESS TO IMPROVE YIELD.						
(9290) TITLE - AUTOMATIC MICROWAVE SEMICONDUCTOR DEVICE TESTING (CAM)			190	200	100	
PROBLEM - PRESENT PRODUCTION TESTING METHODS FOR HIGH FREQUENCY DEVICES ARE INADEQUATE. DEVICE CHARACTERIZATION IS SLOW AND EXPENSIVE, AND IS MOSTLY DONE BY HAND. SMALL SIGNAL READINGS CAN BE TAKEN BUT NOT LARGE SIGNAL READINGS.						
SOLUTION - MODIFY AND EXTEND PRESENT AUTOMATIC TEST EQUIPMENT, FIXTURES AND COMPUTER ROUTINES TO NON-DESTRUCTIVELY TEST HIGH FREQUENCY DEVICES, CAPTURE DATA ON DEVICE PARAMETERS AND QUALITY. MODIFY AN AUTOMATIC NETWORK ANALYZER TO DO THIS. USE DATA IN DESIGN						

	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- PRINTED CIRCUIT BOARD						
(3135) TITLE - SURFACE-MOUNTED COMPONENT BOARD CLEANING PROCESS						250
PROBLEM - EXISTING METHODS FOR REMOVAL OF SOLDER FLUX AND OTHER CORROSIVE RESIDUES FROM COMPONENT INTERFACE WITH PRINTED CIRCUIT BOARD (PCB) MOUNTING SURFACE ARE INADEQUATE.						
SOLUTION - A NEW CLEANING PROCESS THAT CONCENTRATES LOW FREQUENCY SOLVENT AGITATION TO DISLODGE, DISSOLVE AND REMOVE SOLDERING FLUX AND CORROSIVE ADDITIVES TRAPPED BETWEEN COMPONENTS AND SUBSTRATE WILL BE AUTOMATED AND INTRODUCED INTO PRODUCTION.						
(3137) TITLE - LASER SOLDER/INSPECTION SYSTEM FOR PWB						350
PROBLEM - PRINTED CIRCUIT BOARD COMPONENTS ARE PRESENTLY ATTACHED BY WAVE SOLDERING. LASER TECHNIQUES THAT VAPORIZE THE SOLDER AND THEN AUTOMATICALLY INSPECT THE FORMED JOINT WILL BE DEVELOPED.						
SOLUTION - A PROTOTYPE LASER SOLDERING AND INSPECTION SYSTEM WILL BE CONSTRUCTED. HARDWARE INCLUDING FIXTURES, SCANNER AND CONVEYERS WILL BE PREPARED. SOFTWARE WILL BE DEVELOPED.						

CATEGORY
IMIP

COMPONENT -- MISCELLANEOUS						
(3094) TITLE - COMMUNICATIONS TECHNOLOGY TECHMOD FOR JTIDS	1054	1352	785	882		
PROBLEM - COMMUNICATIONS EQUIPMENT IS MANUFACTURED USING LABOR INTENSIVE, LOW VOLUME PROCESSES. MACHINES ARE OLD AND UNAUTOMATED. NEW METHODS, PROCESSES AND EQUIPMENT ARE NEEDED.						
SOLUTION - USE FLEXIBLE MANUFACTURING TECHNIQUES, COMPUTER AIDED MANUFACTURING, GROUP TECHNOLOGY, COMPUTER CONTROLLED EQUIPMENT, ROBOTS, AND MOTORIZED CONVEYORS. USE AUTOMATIC INSERTION, VAPOR PHASE AND WAVE SOLDERING, AND NUMERICALLY CONTROLLED MACHINING.						

CATEGORY
INTEGRATED ELECTRONICS

	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- CIRCUITRY						
(3111) TITLE - AUTOMATIC ADJUSTMENT OF IMPEDANCE					75	250
PROBLEM - PRESENT METHODS FOR IMPEDANCE MATCHING ARE LABOR INTENSIVE. TECHNIQUES FOR AUTOMATIC ADJUSTMENT AND MATCHING INTERFACE CIRCUIT IMPEDANCES WILL BE ESTABLISHED.						
SOLUTION - AN AUTOMATIC NETWORK ANALYZER WILL BE USED TO MEASURE CRITICAL IMPEDANCE VALUES. CIRCUIT CORRECTIONS WILL BE PERFORMED BY AUTOMATIC LASER ADJUSTMENT (TRIM) OF LINE WIDTHS, RESISTOR VALUES AND CAPACITOR LEVELS ETC.						
(3168) TITLE - MILLIMETER FREQUENCY PACKAGING TECHNIQUES						175
PROBLEM - FABRICATION METHODS ARE NEEDED FOR A PACKAGE WHICH PROVIDES ENVIRONMENTAL PROTECTION AND HEAT REMOVAL FOR THE IC CHIPS. ALSO NEED MEANS OF INTERCONNECTING FOR REPEATABILITY AND TRANSPARENCY TO THE RF SIGNAL.						
SOLUTION - PROVIDE MANUFACTURING TECHNOLOGY TO UTILIZE MICROSTRIP AND/OR TRANSMISSION LINE STRUCTURE WITH BERYLLIA SUBSTRATE ON A METAL MODULE CARRIER WITH AN ALL CERAMIC GLASS ENCLOSURE.						
(3169) TITLE - MONOLITHIC FREQUENCY SYNTHESIZERS CIRCUITS						250
PROBLEM - PRESENT FREQUENCY SYNTHESIZERS ARE HEAVY,OCCUPY A LARGE VOLUME,AND ARE EXPENSIVE. THESE CHARACTERISTICS RESTRICT THEM SIGNIFICANTLY. INDUSTRY IS RELUCTANT TO MAKE IMPROVEMENTS, SINCE APPLICATION IS COMPLETELY MILITARY.						
SOLUTION - MONOLITHIC GAAS OPERATIONAL AMPLIFIER, DIVIDER, SAMPLER AND OTHER PHASE LOCK CIRCUIT CHIPS WILL BE FABRICATED AND USED TO BUILD FREQUENCY SYNTHESIZERS. AVAILABLE IC MONOLITHIC TECHNIQUES WILL BE UTILIZED.						

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* CATEGORY *
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*LASER *
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COMPONENT -- GENERAL						
(3170) TITLE - SINGLE MODE LASER DIODE MODULES					320	430
PROBLEM - PROBLEMS INCLUDE- LOW YIELD OF LIQUID EPITAXY PROCESS, NEED FOR RAPID + ACCURATE FIBER MICROALIGNMENT, PACKAGE SEALING, DEVICE DETERIORATION DUE TO OUTGASSING OF EPOXY MATERIALS.						
SOLUTION - OPTIMIZE TECHNIQUES FOR MATERIAL DEPOSITION, FIBER ALIGNMENT, PACKAGE EVALUATION + SEALING TO QUALIFY TO JAN-TXV REQUIREMENTS OF MIL-S-19500.						

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* CATEGORY *
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*OPTICS *
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	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- FIBER						
(3090) TITLE - GAINASP LIGHT EMITTING DIODES			275	275		
PROBLEM - THE PRESENT METHOD OF FABRICATION IS LOW VOLUME AND LABOR INTENSIVE. LEDS ADAPTABLE TO MILITARY SYSTEMS ARE AVAILABLE BUT INDUSTRY WILL NOT DEVELOP WITH ITS OWN FUNDS BECAUSE OF LIMITED PRODUCTION PROCUREMENT.						
SOLUTION - SEMI-AUTOMATIC PROCESSES WILL ADDRESS MOUNTING, CONTACT WIRE ATTACHMENT,PACKAGE ASSEMBLY,ALIGNMENT OF THE FIBER OPTIC AND FINAL ACCEPTANCE TESTING. OTHER AREAS ARE EPITAXY,ETCHING,MASKING,DICING,COATINGS AND SEALING.						
COMPONENT -- MISCELLANEOUS						
(3124) TITLE - AUTOMATIC OPTICAL MEASUREMENTS						1500
PROBLEM - MEASUREMENT OF THE PROPERTIES OF OPTICAL MATERIALS IS PERFORMED MANUALLY, A SLOW PROCESS WITH POOR REPEATABILITY OF RESULTS.						
SOLUTION - AUTOMATE THE MEASUREMENT TECHNIQUE TO GIVE CONSISTANT REPEATABLE RESULTS.						

CATEGORY

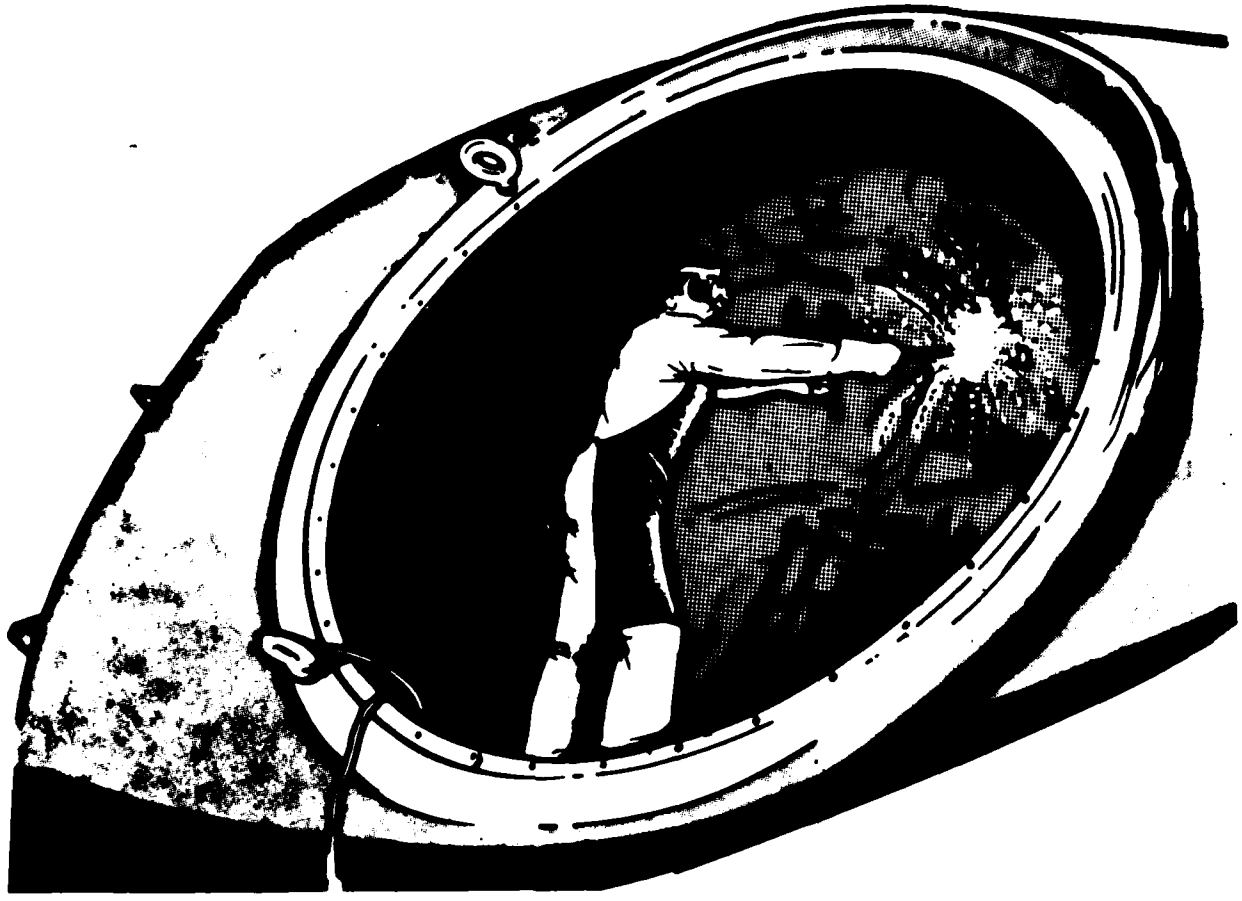
POWER SOURCES

COMPONENT -- BATTERIES						
(3161) TITLE - AUTOMATED PROCESSING OF LITHIUM (CAM)					75	225
PROBLEM - FABRICATION OF LITHIUM METAL IS A VERY LABOR INTENSIVE, DIFFICULT PROCESS. A DRY ROOM WITH ONLY 2 PCT RELATIVE HUMIDITY IS REQUIRED. ALSO, LITHIUM HAS POOR TENSILE STRENGTH AND IT HAS GREAT AFFINITY TO OTHER METALS AS WELL AS MOST PLASTICS.						
SOLUTION - ESTABLISH AN AUTOMATED PRODUCTION LINE FOR THE PRODUCTION OF LITHIUM AND LITHIUM DEVICES. SINCE CURRENT DOMESTIC CAPACITY FOR THESE ITEMS NOW MEETS ONLY 10 PCT OF MOBILIZATION REQUIREMENTS, THE LINE SHOULD PERMIT MUCH HIGHER PRODUCTION RATES.						

CATEGORY

SOLID STATE

	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- MISCELLANEOUS						
(3108) TITLE - CONTROL OF GAAS BOULE DIAMETER			195	250	100	
PROBLEM - THE MANUAL CONTROL OF LEC GAAS SINGLE CRYSTAL BOULE GROWTH RESULTS IN WIDE BOULE DIAMETER VARIATIONS, WASTED MATERIAL, WASTED UNIFORMITY GRINDING LABOR AND AS A SOURCE OF DEFECTS.						
SOLUTION - AUTOMATION OF SENSOR READINGS AND CONTROLS SUCH AS TEMPERATURE, PULL RATE AND ROTATION WILL ENABLE DIAMETER VARIATIONS OF LESS THAN + 2MM.						
(3112) TITLE - WAFER CORRECTION BY ION IMPLANT						600
PROBLEM - SOME OF THE WAFERS EXTRACTED FROM BOULES OF SILICON AND GALLIUM ARSENIDE ARE DIFICIENT IN IMPURITY IONS CAUSED BY PROBLEMS ENCOUNTERED DURING BOULE GROWTH.						
SOLUTION - USING THE TECHNIQUE OF ION IMPLANT ADD CRITICAL IONS IN IMPURITY DEFICIENT AREAS.						
COMPONENT -- SWITCHES						
(3068) TITLE - INCREASE PRODUCIBILITY OF VARACTORS AND PIN DIODES		250				
PROBLEM - PRESENTLY AVAILABLE VARACTORS AND PIN DIODES MADE BY SILICON DIODE TECHNOLOGY ARE EXPENSIVE. THE IR PRODUCTION TECHNIQUES ARE VERY LABOR INTENSIVE, YIELDS ARE LOW, AND UNIFORMITY IS POOR. MATCHING REQUIRES EXTENSIVE TESTING.						
SOLUTION - USE GALLIUM ARSENIDE FOR THESE DEVICES. USE AUTOMATIC CONTROL SYSTEM FOR PROCESSES INSTEAD OF MANUAL PROCEDURES TO INCREASE YIELD. DEPOSIT A MEDIUM TEMPERATURE PASSIVATION LAYER ON PIN DIODES TO IMPROVE RELIABILITY AND UNIFORMITY.						



DEPOT SYSTEMS COMMAND
(DESCOM)

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US ARMY DEPOT SYSTEM COMMAND

(DESCOM)

The US Army Depot System Command (DESCOM), with headquarters at Letterkenny Army Depot, Chambersburg, Pennsylvania, commands and controls the twelve depots and seven depot activities in the United States and West Germany which comprise the US Army Depot System. Activated in September 1976, this command employs over 37,500 civilians and nearly 1,400 military personnel and manages as annual budget in excess of $1.5 billion.

DESCOM is a major interface with the soldier in the field. The depots store and ship a broad range of general supplies and munitions managed by the Army Defense Logistics Agency, and other agencies, to US and allied units worldwide. Half of DESCOM's personnel and three-quarters of its budget are dedicated to depot-level maintenance on most of the equipment in the Army's inventory. DESCOM is striving to improve the productivity of its work force through innovative management techniques and through the acquisition of modern capital equipment, such as industrial robots.

DESCOM's planned projects span repair and overhaul operations for tracked/wheeled vehicles, communications systems, and aircraft.

The vehicle and aircraft related projects include robotics applications which will reduce personnel exposure to hazardous cleaning and refinishing operations, and will improve repair procedures which are time consuming or labor intensive. Significant efforts are directed to the overhaul of track pads and road wheels. These include automated systems for the injection molding and curing processes for replacement pads and wheels. Engine overhaul operations will be improved by projects that will automate disassembly, inspection, machining, and reassembly.

In the communications/electronics area, DESCOM will conduct a project to refinish electronics shelters.

DESCLM

C O M M A N D F U N D I N G S U M M A R Y
(THOUSANDS)

CATEGORY	FY84	FY85	FY86	FY87	FY88
AIRCRAFT EQUIPMENT	0	0	0	250	0
AIRFRAME	0	0	800	0	0
DRIVE SYSTEM	0	2526	1644	200	1250
GENERAL	370	0	1725	200	1050
GENERAL MANUFACTURING	0	0	561	0	0
IMIP	2500	100	2500	900	0
POLLUTION ABATEMENT	0	0	470	245	0
SUSPENSION SYSTEM	0	550	125	0	0
TRACK	0	412	200	0	0
TOTAL	2870	3588	8045	1795	2300

	FUNDING ($000)					
	PRIOR	84	85	86	87	88

CATEGORY: AIRCRAFT EQUIPMENT

COMPONENT -- SHIPPING CONTAINERS

(6004) TITLE - AUTOMATED CONTAINER REFURBISHMENT — 87: 250

PROBLEM - SHIPPING CONTAINERS FOR ENGINES, TRANSMISSIONS, ETC. ARE CURRENTLY OVERHAULED USING LABOR INTENSIVE, LOW PRODUCTIVITY METHODS.

SOLUTION - DEVELOP A SEMIAUTOMATED CONTAINER REFURBISHMENT SYSTEM TO CLEAN, REPAIR, PRIME AND PAINT A CONTAINER IN HALF THE STANDARD TIME.

CATEGORY: AIRFRAME

COMPONENT -- GENERAL

(6002) TITLE - APPLICATION OF ROBOTIC PAINTING TO ROTARY WING AIRCRAFT — 86: 800

PROBLEM - PAINTING OF AIRCRAFT IS PRESENTLY ACCOMPLISHED USING INEFFICIENT AND OUTDATED MANUAL AIRSPRAY TECHNIQUES. PAINT OPERATORS MUST WEAR BULKY AND CUMBERSOME SAFETY AND PROTECTIVE EQUIPMENT FOR POLYURETHANE PAINTING.

SOLUTION - DEVELOP A PROTOTYPE ROBOTICS PAINT SYSTEM AND NECESSARY FEEDBACK MECHANISMS FOR ROTARY WING AIRCRAFT.

CATEGORY: DRIVE SYSTEM

COMPONENT -- ENGINE

(3001) TITLE - POWER AND INERTIA SIMULATOR (PAISI) COMBAT VEHICLE TESTING — PRIOR: 100; 85: 1796; 86: 1204

PROBLEM - THE TEST TRACK AT THE MAINZ ARMY DEPOT IS A PRIMARY BOTTLENECK IN THE REBUILD MISSION. ALTHOUGH THE TEST TRACK IS OVERLOADED AN INCREASE IN THE WORKLOAD IS PROJECTED.

SOLUTION - A POWER AND INERTIA SIMULATOR FOR TESTING COMBAT VEHICLES WILL BE DESIGNED AND FABRICATED.

(4009) TITLE - ADVANCED PAISI SYSTEM — 88: 500

PROBLEM - AT PRESENT THE M113 AND M2/M3 ARE TESTED ON AN OVAL OUTDOOR TRACK. THE TRACK IS TOO SMALL AND NOT HEAVY ENOUGH TO WITHSTAND SUSTAINED PRODUCTION TESTING. TRACK EXPANSION AND RELOCATION ARE NOT FEASIBLE.

SOLUTION - PURCHASE AN ADVANCED POWER AND INERTIA SIMULATOR (PAISI) WHICH WILL TEST THE DRIVE TRAIN AND SUSPENSION WHILE THE VEHICLE IS AFFIXED TO A TEST STAND.

FUNDING ($000)

	PRIOR	84	85	86	87	88
COMPONENT -- ENGINE (CONTINUED)						
(4010) TITLE - AUTOMATED DIESEL ENGINE DISASSEMBLY INSPECTION AND ASSEMBLY						750
PROBLEM - MANUAL METHODS FOR 6V-53 ENGINE OVERHAUL INVOLVE EXCESSIVE PARTS HANDLING, EXCESSIVE IN-PROCESS INVENTORY, AND MULTIPLE INSPECTION OF THE SAME PART. THE LABOR COSTS, PROCESS TIME, FLOOR SPACE REQUIREMENTS AND UTILITIES USE ARE TOO HIGH.						
SOLUTION - PREPARE A COMPREHENSIVE DESIGN TO AUTOMATE DISASSEMBLY, INSPECTION AND REASSEMBLY. THE AUTOMATED LINE WILL USE HARD AUTOMATION, ROBOTS AND MANUAL OPERATIONS TO PERFORM A GIVEN TASK IN THE BEST WAY.						
(7004) TITLE - AUTOMATED ENGINE BLOCK MACHINING			730	240		
PROBLEM - THE CURRENT METHOD OF MACHINING AND INSPECTING ENGINE BLOCKS IS SLOW AND LABOR INTENSIVE. BORING BARS ARE SET UP FOR EACH HOLE TO BE MACHINED AND ALL INSPECTION IS DONE BY HAND.						
SOLUTION - ESTABLISH A MACHINING CENTER FOR THE REWORK OF VARIOUS SIZED ENGINE BLOCKS, INCORPORATING AUTOMATED TOOL CHANGING, INSPECTION, AND DOCUMENTATION. MACHINE CONTROL SOFTWARE WILL BE DEVELOPED FOR INDIVIDUAL BLOCK SIZES.						
(7007) TITLE - ENGINE CONTAINER SEALING-CAM				200	200	
PROBLEM - CURRENTLY ENGINE CONTAINERS ARE CLOSED AND TIGHTENED MANUALLY. IN ONE CASE THIS REQUIRES HAND TORQUING 32 BOLTS THREE TIMES EACH IN A SPECIFIC SEQUENCE.						
SOLUTION - THIS PROJECT WILL AUTOMATE THIS PROCEDURE. SPECIAL EQUIPMENT AND ROBOTS WILL BE CONSIDERED. THE END PRODUCT WILL BE AN AUTOMATED SYSTEM TO TIGHTEN BOLTS ON ENGINE CONTAINERS.						

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*    C A T E G O R Y    *
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*GENERAL                *
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	PRIOR	84	85	86	87	88
COMPONENT -- MISCELLANEOUS						
(5002) TITLE - CAM APPLICATION OF ROBOTICS TO SHELTER REFINISHING	50	370				
PROBLEM - SPRAY PAINTING AND SANDING OF ALUM SKINNED MILITARY CONTAINERS IS LABOR INTENSIVE AND CREATES A HARSH WORKING ENVIRONMENT. DEVICES TO SENSE PRESENCE AND ABSENCE OF PAINT + TO CONTROL HEAT BUILD-UP TO PREVENT ALUM SKIN DELAMINATION ARE NEEDED.						
SOLUTION - DEVELOP A ROBOT EQUIPMENT SPECIFICATON AND DESIGN WITH NECESSARY FEEDBACK MECHANISMS.						

	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- MISCELLANEOUS (CONTINUED)						
(C050) TITLE - PORTABILITY OF DATA ACROSS ALL CAD/CAM RESOURCES					200	300
PROBLEM - THE ORGANIC MAINTENANCE FACILITIES IN DESCOM HAVE SEVEN CAD/CAM SYSTEMS FROM THREE DIFFERENT VENDORS. THESE SYSTEMS DO NOT HAVE THE CAPABILITY TO EXCHANGE PART GEOMETRY DATA BASE INFORMATION.						
SOLUTION - IMPLEMENTATION PLAN FOR THE INITIAL GRAPHICS EXCHANGE SPECIFICATION WILL BE ESTABLISHED FOR DESCOM. SPECIFICATION REQUIREMENTS AND OPERATING PROCEDURES WILL BE DEVELOPED FOR IGES TRANSLATORS.						
(2C05) TITLE - ENHANCED PAINT REMOVAL PROCESS THRU CAVITATION						750
PROBLEM - CURRENT BLAST REMOVAL METHODS HAVE LIMITATIONS. THE EQUIPMENT IS BULKY AND INCOMPATIBLE WITH ROBOT MANIPULATORS. A RELIABLE FLOW OF ABRASIVE MEDIA IS SELDOM PROVIDED AND DENSE CONCENTRATIONS OF DUST ARE GENERATED.						
SOLUTION - ESTABLISH A CAVITATION WATER JET PROCESS FOR REMOVING PAINT AND CORROSION. THE PHYSICAL SIZE OF THE CAVITATION GUN AND HOSE ARE MUCH SMALLER AND MORE COMPATIBLE WITH ROBOTIC UNITS.						
(2C02) TITLE - APPLICATION OF GROUP TECHNOLOGY TO ROTARY WING AIRCRAFT				150		
PROBLEM - COMPONENTS FOR THE POWERTRAIN OF ROTARY WING AIRCRAFT ARE TYPICALLY MANUFACTURED IN SMALL LOT SIZES. THIS LEADS TO DUPLICATION OF PART DRAWINGS AND DESIGNS WHICH CAUSES INEFFICIENT PROCESSES AND INCREASED OVERHAUL COSTS.						
SOLUTION - APPLY A CLASSIFICATION AND CODING/GROUP TECHNOLOGY SYSTEM TO MANUFACTURE PARTS IN FAMILIES.						
COMPONENT -- PRINTED CIRCUIT BOARDS						
(1C05) TITLE - MULTILAYER PRINTED CIRCUIT BOARD REPAIR				1575		
PROBLEM - LACK OF PROVEN REPAIR METHODS FOR MULTILAYER CIRCUIT BOARDS RESULTS IN EXCESSIVE COSTS. REPLACEMENT BOARDS COSTING UP TO $30K EACH MUST BE PURCHASED FROM THE OEM EVEN WHEN REPAIR OF THE BOARDS IS FEASIBLE.						
SOLUTION - ESTABLISH A REPAIR CAPABILITY FOR MULTILAYER PRINTED CIRCUIT BOARDS. DEVELOP THE REPAIR METHODOLOGY AND NECESSARY TECHNOLOGY.						

CATEGORY
GENERAL MANUFACTURING

MMT FIVE YEAR PLAN
RCS DRCMT 126

	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- PROCESSES						
(1001) TITLE - AUTOMATION OF PLATING OPERATIONS				471		
PROBLEM - THE HANDLING OF PARTS AND PROCESS CONTROL THROUGH THE DEPOT PLATING SHOP IS ACCOMPLISHED MANUALLY. THIS EXPOSES EMPLOYEES TO TOXIC FUMES AND AIRBORNE CONTAMINANTS.						
SOLUTION - DEVELOP A ROBOTIC CELL TO HANDLE PARTS THROUGH PLATING OPERATIONS. THIS INCLUDES INTEGRATION OF PROCESS CONTROLS FOR ALL PRIMARY VARIABLES IN THE PLATING OPERATION.						
(1002) TITLE - ROBOTIC VAN DRILLING AND RIVITING				110		
PROBLEM - INSTRUMENT VAN FABRICATION REQUIRES DRILLING OF NUMEROUS HOLES. THIS IS BEING ACCOMPLISHED MANUALLY USING COMPLEX TEMPLATES. ONE TEMPLATE IS REQUIRED FOR EACH INTERIOR SURFACE.						
SOLUTION - DEVELOP A MOBILE ROBOTICS SYSTEM TO PERFORM VAN DRILLING AND RIVITING OPERATIONS.						
CATEGORY: IMIP						
COMPONENT -- MISCELLANEOUS						
(2002) TITLE - LONG RANGE DEPOT PRODUCTIVITY IMPROVEMENT PROGRAM - LEAD	2500	100	1500			
PROBLEM - THE LACK OF UP-TO-DATE MANUFACTURING AND PROCESSING TECHNOLOGY HAS RESULTED IN HIGHER OVERHAUL/REBUILD COSTS AND ALSO IN LIMITATIONS TO BOTH PRESENT AND FUTURE MISSION NEEDS THROUGHOUT THE DEPOT.						
SOLUTION - UPDATE THE DEPOT WITH THE LATEST STATE-OF-THE-ART EQUIPMENT AND PROCESS TECHNOLOGY AVAILABLE TO SUPPORT THE PRESENT AND FUTURE WORKLOADS AND MISSIONS.						
(6003) TITLE - CCAD ANALYSIS FOR INTEGRATED MODERNIZATION PROGRAM				1000	900	
PROBLEM - THE LACK OF STATE-OF-THE-ART MANUFACTURING AND PROCESSING TECHNOLOGY HAS RESULTED IN HIGHER OVERHAUL REBUILD COSTS AND IN LIMITATIONS TO BOTH PRESENT AND FUTURE MISSION NEEDS.						
SOLUTION - CONDUCT A TOP-DOWN ANALYSIS TO DEFINE AND THEN IMPLEMENT THE LATEST TECHNOLOGY TO SUPPORT PRESENT AND FUTURE WORKLOADS/MISSIONS.						
CATEGORY: POLLUTION ABATEMENT						

FUNDING ($000)

	PRIOR	84	85	86	87	88
COMPONENT -- PROPELLANTS/EXPLOSIVES						
(7008) TITLE - LASER MELTING OF EXPLOSIVES IN BOMBS AND PROJECTILES				470	245	

PROBLEM - MUNITIONS CANNOT BE DEMILITARIZED BY CUTTING AND BURNING OR EXPLODING IN THE OPEN ATMOSPHERE DUE TO ENVIRONMENTAL PROBLEMS AND DANGER TO LIFE AND/OR PROPERTY.

SOLUTION - UTILIZE A CO2 LASER TO MELT OUT THE VARIOUS EXPLOSIVE ITEMS TO HELP RECOVER SOME OF THE COST OF DEMILITARIZATION.

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* C A T E G O R Y *
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*SUSPENSION SYSTEM *
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COMPONENT -- ROAD WHEELS						
(4008) TITLE - RUBBER INJECTION MOLDING OF ROADWHEELS			550	125		

PROBLEM - ROADWHEELS OF TRACKED VEHICLES ARE CURRENTLY BEING REBUILT USING WWII TECHNOLOGY TO BOND RAW RUBBER TO THE ROADWHEEL. THEN IT MUST BE CURED IN A STEAM MOLD PRESS FOR A FULL HOUR. A NUMBER OF MOLDS ARE REQUIRED AND EXCESS RUBBER MUST BE TRIMMED.

SOLUTION - PROCURE A SHUTTLE INJECTION ROTARY MOLD MACHINE WITH A CAPABILITY OF CURING THE ROADWHEEL IN 20 MIN OR LESS WITH LITTLE OR NO EXCESS RUBBER TO TRIM OFF. IN FY85 PROCURE A ROBOT TO OPEN THE MOLDS, LOAD AND UNLOAD AT EITHER END OF THE SHUTTLE POSITION.

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* C A T E G O R Y *
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*TRACK *
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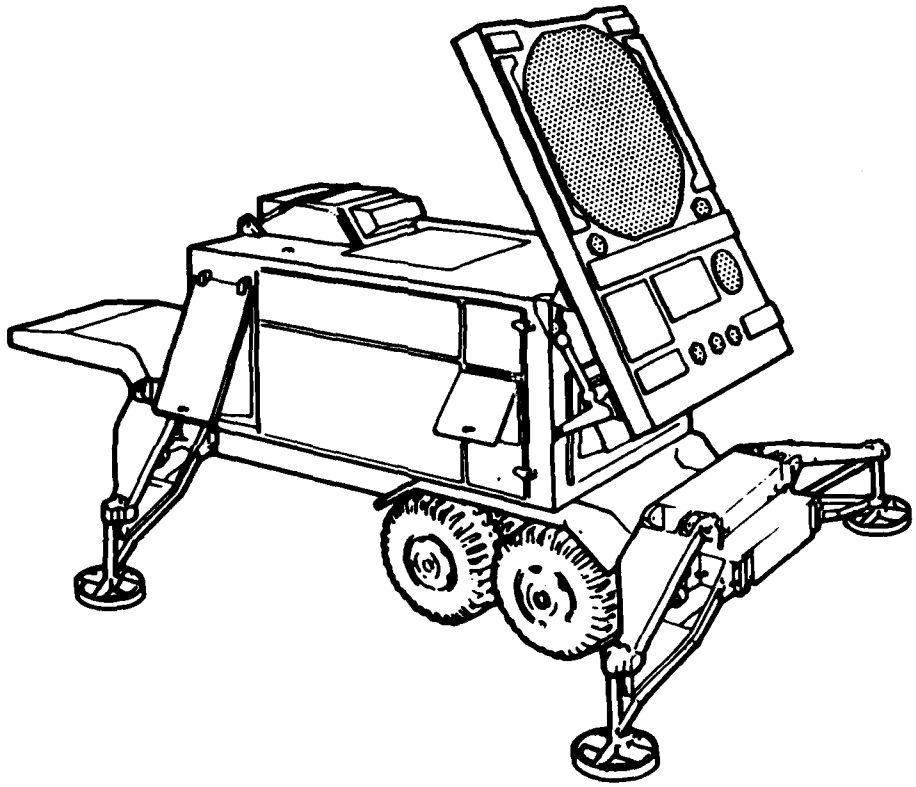
COMPONENT -- RUBBER PADS						
(4003) TITLE - RUBBER INJECTION MOLDING OF DOUBLE PIN TRACK			412	200		

PROBLEM - REBUILD OF TRACK BLOCKS IS CURRENTLY BEING ACCOMPLISHED USING 1940S TECHNOLOGY TO BOND RAW RUBBER TO THE STEEL BASE COMPONENT AND THEN CURING THE TRACK BLOCK BETWEEN STEAM PLATENS FOR 2 HOURS.

SOLUTION - ESTABLISH AN AUTOMATED (ROBOT) INJECTION MOLDING PROCESS THAT WILL CURE THE RUBBER TRACK PAD ON THE TRACK SHOE IN TEN MINUTES OR LESS.



ELECTRONICS
RESEARCH AND DEVELOPMENT COMMAND
(ERADCOM)

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US ARMY ELECTRONICS RESEARCH AND DEVELOPMENT COMMAND

(ERADCOM)

The Army Electronics Research and Development Command in Adelphi, Maryland develops a broad range of electronics and electro-optical equipment. ERADCOM maintains programs in such areas as high performance optical systems which enable soldiers to see deep into the battlefield day or night, in any kind of weather, and through any type of obscurant. Some ERADCOM products can neutralize the enemy's electronic warfare efforts, while others make our weapons less vulnerable to enemy sensors. The command also specializes in electronic fuzes, radars and radar detection systems, electronic surveillance devices, meteorological equipment, thermal imaging devices and lasers.

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

In the category of integrated electronics, ERADCOM will pursue the establishment of various technologies for Very High Speed Integrated Circuits (VHSIC). These projects include a tape automated bonding process that is compatible with VHSIC chips; a process to improve the productivity for ceramic packages; improved processes for grid array and perimeter chip carriers; and, in-process screening and quality control methods.

Another major area of interest is the Common Module detector components which are used in night vision systems for the TOW and DRAGON missiles, night observation devices and thermal sights and viewers for tanks, helicopters and fighting vehicles. A project is underway to eliminate the hand fabrication of up to 1000 gold wire bond connections in each detector and to demonstrate the use of non-glass materials in the manufacture of the dewar structure. Another project is establishing techniques for growing a thin epitaxial film of mercury-cadmium-telluride (HgCdTe) onto CdZnTe wafers. A planned project will improve production methods in order to maintain critical dimensions in the miniature linear drive motor that powers the cyrogenic cooler. Other planned projects will address the high rate production of thermoelectrically-cooled (Peltier effect) detectors which operate at 3-5 micron wavelengths.

ERADCOM

COMMAND FUNDING SUMMARY
(THOUSANDS)

CATEGORY	FY84	FY85	FY86	FY87	FY88
DETECTORS	4670	946	1826	1658	0
ELECTRON TUBES	574	316	0	0	0
IMIP	1096	0	0	0	0
INTEGRATED ELECTRONICS	1600	4700	1000	1000	0
POWER SOURCES	235	485	903	1093	0
SOLID STATE	976	1578	685	575	0
TEST EQUIPMENT	0	1000	0	0	0
TOTAL	9151	9025	4414	4526	0

CATEGORY
DETECTORS

FUNDING ($000)

	PRIOR	84	85	86	87	88
COMPONENT -- ARRAYS						
(5057) TITLE - 3-5 MICRON TE COOLED FOCAL PLANE MODULES				778	1453	
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.						
(5151) TITLE - LIQUID PHASE EPITAXIAL HGCDTE	539	2526				
PROBLEM - LOW YIELD ON CURRENT METHOD OF MANUFACTURE OF COMMON MODULE DETECTOR ARRAYS. GROWTH OF HGCDTE CRYSTALS REQUIRES MANUAL LAPPING, POLISHING + THINNING TO ACHIEVE PERFORMANCE SPECIFICATIONS.						
SOLUTION - USE LIQUID PHASE EPITAXIAL GROWTH OF THIN-FILM ON CDTE SUBSTRATE ELIMINATING MANUAL STEPS.						
COMPONENT -- INFRARED/UV						
(5045) TITLE - THERMOELECTRIC COOLER MATERIALS				296	400	
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.						
(5059) TITLE - LINEAR RESONANCE COOLERS - PHASE I			465	533		
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.						
(5160) TITLE - MMT FOR METAL DEWAR AND UNBONDED LEADS	1391	2144	211			
PROBLEM - THE GOLD WIRE BONDED CONNECTIONS ARE MADE BY HAND WHICH IS A TEDIOUS AND EXPENSIVE PROCESS. THE GLASS STEM IS HAND FASHIONED AND IS PRONE TO DAMAGE.						
SOLUTION - FABRICATING THE STEM WITH THIN METAL WALLS USING PRINTED CIRCUIT FEED THROUGHS WILL REDUCE THE DEFECTS IN PRODUCTION AND DECREASE COST.						

	FUNDING ($000)				
PRIOR	84	85	86	87	88

COMPONENT -- LASER

(5066) TITLE - 1 TO 3 MICRON AVALANCHE DETECTORS — 85: 250; 86: 225

PROBLEM - MANUF. COSTS, VOLUME PROD. TECHNIQUES AND RELIABILITY HAVE TO BE ADDRESSED.

SOLUTION - ESTABLISH MANUFACTURING CAPABILITY FOR VOLUME PRODUCTION OF RELIABLE, LOW COST 1-3 MICRON AVALANCE DETECTORS.

****
* C A T E G O R Y *
----
*ELECTRON TUBES *
****

COMPONENT -- CATHODE

(5111) TITLE - VAPOR ORGANO METALLIC EPITAXIAL GROWTH PROCESS — 84: 574; 85: 316

PROBLEM - LIQUID EPITAXIAL GROWTH PROCESS REQUIRES- A)LARGE AND COSTLY HIGH TEMP REACTORS, B)LARGE QUANTITIES OF SATURATION MELT MATERIALS, C) COSTLY QUALITY GALLIUM ARSENIDE SUBSTRATES, D)LENGTHY OPERATION PROCESS PER SINGLE GROWTH.

SOLUTION - THE VAPOR-ORGANO-METALLIC PROCESS WILL ENABLE MINIMUM FACILITIZATION REQUIREMENTS, USE OF CONTROLLED GASES REQUIRING NO MELT MATERIALS, POSSIBLE USE OF LESS EXPENSIVE SUBSTRATES, AND MULTIGROWTH PRODUCTION ORIENTED PROCESS.

****
* C A T E G O R Y *
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*IMIP *
****

COMPONENT -- MISCELLANEOUS

(5196) TITLE - INDUSTRIAL PRODUCTIVITY IMPROVEMENT (ELECTRONICS) — PRIOR: 893; 84: 1096

PROBLEM - MANY ELECTRONICS ITEMS PRODUCED FOR ARMY ARE BUILT IN FACTORIES NOT USING MODERN METHODS AND EQUIPMENT, AUTOMATIC MATERIALS HANDLING SYSTEMS, OR COMPUTERIZED MANAGEMENT INFORMATION SYSTEMS. THESE PLANTS MUST BE UPDATED TO IMPROVE PRODUCTIVITY.

SOLUTION - ANALYZE A CONTRACTORS FACILITY, EVALUATING BOTH MANUFACTURING TECHNIQUES AND MANAGEMENT SYSTEMS. INCLUDE MATERIALS HANDLING, LAYOUT, INVENTORY CONTROL, CAM, PRODUCTION EQUIPMENT, AND MIS. IDENTIFY NEW METHODS ' EQUIPMENT. DEVELOP A CAPITAL ACQ. PROG.

CATEGORY
INTEGRATED ELECTRONICS

FUNDING ($000)

	PRIOR	84	85	86	87	88
COMPONENT -- CIRCUITRY						
(5168) TITLE - AUTOMATIC RETICLE INSPECTION SYSTEM, PHASE I	590	600	700			
PROBLEM - THERE IS NO WAY TO CHECK TAPE-GENERATED RETICLE PATTERNS AGAINST THE COMPUTER-GENERATED MASTER TAPE. VISUAL INSPECTION OF RETICLES FOR PINHOLES OR DUST PARTICLES IS VERY DIFFICULT.						
SOLUTION - USE PATTERN RECOGNITION EQUIPMENT TO COMPARE THE RETICLE PATTERN WITH THE ORIGINAL COMPUTER OUTPUT. MAKE A RECORD OF DEFECTS THAT WILL PERMIT REPAIR OF THE RETICLE.						
(5248) TITLE - ADVANCED WAFER IMAGING SYSTEM (AWIS)		1000	1800			
PROBLEM - VHSIC REQUIREMENTS FOR RESOLUTION AND INTER-LEVEL ALIGNMENT ACCURACY CANNOT BE MET WITH CURRENT WAFER PATTERNING SYSTEMS. RESOLUTION OF 1.0 MICROMETERS AND OVERLAY ALIGNMENT OF 0.1 MICROMETER ARE NEEDED.						
SOLUTION - DEVELOP A WAFER IMAGING SYSTEM INCLUDING ULTRASONIC HEIGHT MEASUREMENT, ULTRAVIOLET OPTICS SYSTEM AND AN AUTOMATIC RETICLE INSERTION AND REGISTRATION SYSTEM WITH TEMPERATURE AND HUMIDITY CONTROLS TO ATTAIN 0.1 MICROMETER ALIGNMENT ACCURACY.						
(5272) TITLE - TAPE AUTOMATED BONDING (TAB)			800			
PROBLEM - PRESENT TAB PROCESSES ARE NOT COMPATIBLE WITH VHSIC CHIP I/O COUNTS, SMALL PAD SIZES AND COMPLEXITY.						
SOLUTION - ESTABLISH TECHNIQUES FOR PRODUCING TAPE COMPATIBLE WITH VHSIC CHIPS. TAPE WILL PROVIDE OVER 200 I/O WITH PAD SIZES ON THE ORDER OF 2 MILS.						
(5273) TITLE - FIRST LEVEL PACKAGING AND INTERCONNECTIONS (VHSIC)			1200			
PROBLEM - NEITHER THE GRID ARRAY CHIP CARRIER NOR THE PERIMETER CHIP CARRIER IS CURRENTLY VHSIC COMPATIBLE. THERE IS NO ADVANCED TECHNIQUES FOR THEIR MANUFACTURE.						
SOLUTION - IMPROVED PROCESSES FOR BOTH TYPES OF PACKAGES WILL BE DEVELOPED.						
(5274) TITLE - MULTICHIP PACKAGES (VHSIC)			200			
PROBLEM - MANUFACTURING FACILITIES ARE EXTREMELY LIMITED FOR THE PRODUCTION OF VHSIC COMPATIBLE MULTICHIP CERAMIC PACKAGES.						
SOLUTION - TOOL UP A PILOT PRODUCTION LINE FOR A SELECTED NUMBER OF TYPES OF PACKAGES. ADVANCED COFIRED AND THICK FILM TECHNOLOGY WILL BE IMPLEMENTED.						

	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- CIRCUITRY (CONTINUED)						
(6009) TITLE - 94 GHZ MILIMETER WAVE MONOLITHIC RECEIVER SYSTEM				1000	1000	
PROBLEM - MILLIMETER WAVE RECEIVERS ARE HAND ASSEMBLED OF SEMICONDUCTOR CHIPS IN STRIPLINE SUBSTRATES. MUCH HAND LABOR IS NEEDED IN ASSEMBLY, INTERCONNECTION AND TESTING.						
SOLUTION - GROW GA-AS LAYERS EPITAXIALLY ON GALLIUM ARSENIDE WAFERS AND DIFFUSE CIRCUIT ELEMENTS IN-SITU THRU SILICON DIOXIDE MASKING. FORM GUNN DIODES, CONDUCTING LINES AND CAPACITORS TO FORM A LOCAL OSCILLATOR. ADD MIXER CHIP + FET AMPLIFIER CHIP.						

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* CATEGORY *
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*POWER SOURCES *
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COMPONENT -- BATTERIES						
(5162) TITLE - EXJAM BATTERY MANUFACTURING TECHNOLOGY, PHASE I	45	235	485	185		
PROBLEM - PRESENT R AND D MODELS OF UNATTENDED EXPENDABLE JAMMER RESERVE POWER SUPPLY (UEJPS) ARE HAND MADE 1 OR 2 AT A TIME. UNLESS FABRICAION/ASSEMBLY ARE PRODUCTION ENGINEERED, LABOR COSTS WILL MAKE THE BATTERY PROHIBITIVELY EXPENSIVE.						
SOLUTION - EVALUATE THE VARIOUS STEPS IN FABRICATION/ASSEMBLY FOR UEJPS HOW BEST TO MAKE IN HIGH VOLUME. DESIGN, BUILD AND VALIDATE PROTOTYPE TOOLING AND MACHINERY FOR CONVERTING TO HIGH VOLUME PRODUCTION.						
(6005) TITLE - LOW COST RECHARGEABLE LITHIUM-T152 BATTERIES				225	600	
PROBLEM - RECHARGEABLE LITHIUM BATTERIES REQUIRE HIGH PURITY MATERIALS AND PROCESSING IN A MOISTURE-FREE ENVIRONMENT. ELECTRODE FABRICATION IS PRESENTLY CONDUCTED ON AN INDIVIDUAL ELECTRODE BASIS USING MOLD PRESSING TECHNIQUES.						
SOLUTION - ESTABLISH A LOW COST MANUFACTURING PROCESS FOR THE PREPARATION OF THE CATHODE AND ELECTROLYTE SOLVENT AND SOLUTE. IN ADDITION, CONTINUOUS MACHINERY AND TECHNIQUES WILL BE ESTABLISHED FOR HIGH RATE, LOW COST ELECTRODE FABRICATION.						
(6006) TITLE - IMPROVED, HIGH CAPACITY BATTER, BA-5598/U + BA-5590/U				493	493	
PROBLEM - THE PRESENT BA-5598/U AND BA-5590/U BATTERIES USE THE LITHIUM-SULFUR DIOXIDE CELL SYSTEM AND HAVE CAUSED PROBLEMS WITH VENTING. RE-OCCURENCES HAVE CAUSED USER RESERVATIONS. ALSO PROJECTED POWER NEEDS REQUIRE VERY HIGH ENERGY DENSITY LITHIUM CELLS.						
SOLUTION - CONVERT THESE BATTERIES TO THE MORE ADVANCED AND INHERENTLY SAFER LITHIUM-THIONYL-CHLORIDE SYSTEM. IT IS PROPOSED TO STUDY THIS SYSTEM FIRST AS A MALI PROJECT AND THEN AS AN MMT. UNDER HIGH CURRENT DRAIN CONDITIONS, DOUBLE SERVICE LIFE EXPECTED.						

CATEGORY	FUNDING ($000) PRIOR	84	85	86	87	88
SOLID STATE						
COMPONENT -- DELAY LINES						
(5174) TITLE - AUTOMATIC SPUTTERING PROCESS CONTROL F/PRODUCING ZNO PHASE I	150	200	222			
PROBLEM - GAS MIXTURE, ZNO PURITY + SPUTTERING PARAMETERS ARE MANUALLY MONITORED USING A MASS ANALYZER. CORRECTIONS IN FLOW + DEPOSITION PROCESSES ARE SLOW AND PERFORMED AFTER OCCURRENCE.						
SOLUTION - LATEST STATE-OF-THE-ART MASS ANALYSIS EQUIPMENT WILL BE COMPUTER/MICROPROCESSOR COUPLED TO THE PROCESSING EQUIPMENT USED FOR FABRICATING ZNO DELAY LINES. VACUUM DEPOSITION AND GAS FLOW RATES WILL BE OPTIMIZED.						
COMPONENT -- DIODES/RECTIFIERS						
(3010) TITLE - MILLIMETER-WAVE SOURCES FOR 60 AND 94 GHZ	1430	209	650			
PROBLEM - TO ESTABLISH A MANUFACTURING CAPABILITY FOR PRODUCTION OF IMPATT DIODES WHICH ARE UNIFORM ENOUGH TO BE FIELD REPLACEABLE IN ARMY SYSTEMS.						
SOLUTION - ESTABLISH TECHNIQUES AND PROCESSES CAPABLE OF PRODUCING SILICON DOUBLE DRIFF IMPATT SOURCES. PRECISE AND RIGOROUS COMPUTER CONTROL OF ALL MATERIAL IS REQUIRED.						
(5107) TITLE - EHF SOLID STATE AMPLIFIER	205	567	407			
PROBLEM - TUNING AND FABRICATION OF THE AMPLIFIER MODULE, ALONG WITH SELECTION OF PROPER DIODES, PRESENTLY TAKES WEEKS, RESULTING IN LOW VOLUME CAPABILITY AND EXTREMELY HIGH COSTS.						
SOLUTION - ESTABLISH AUTOMATED HIGH PRECISION MACHINING AND CASTING PROCESSES, AND UTILIZING COMPUTER CONTROLLED TUNING AND TEST PROCEDURES TO PRODUCE LOW COST, HIGH QUALITY AMPLIFIER MODULES.						
(5167) TITLE - TUNABLE MILLIMETER WAVE INP GUNN SOURCES			299	400	150	
PROBLEM - TUNABLE MILLIMETER WAVE INP GUNN SOURCES ARE CURRENTLY HAND MADE IN THE LABORATORY BECAUSE THERE ARE NO PROCESSES FOR FABRICATION AND TESTING IN VOLUME.						
SOLUTION - ESTABLISH AUTOMATED PROCESSING AND TESTING ADDRESSING VARACTOR OPTIMIZATION, ECONOMIC DIODE PACKAGING, TUNING-COUPLING-BIAS NETWORK FABRICATION. SOURCE FABRICATION AND COMPUTER AIDED TESTING.						

FUNDING ($000)

	PRIOR	84	85	86	87	88
COMPONENT -- SWITCH						
(5271) TITLE - PROD OF PLANAR GATE HI POWER SILICON FIELD EFFECT TRANSISTOR				285	425	

PROBLEM - PROJECT WILL ESTABLISH A PRODUCTION CAPABILITY FOR 300 WATT,SILICON VHF/UHF POWER CW FIELD EFFECT TRANSISTORS (FETS). PROCESSES INCLUDE SELF ALIGNED DIFFUSILN AND METALLIZATION, THIN OXIDE DEPOSITION, AND PRECISION CHANNEL ETCHING.

SOLUTION - TRANSISTOR CHIPS WILL BE FABRICATED WITH SPECIAL ETCHING + SPECIFIC DIFFUSION ORIENTATION. CAPABILITY TO MAINTAIN 500 ANGSTROM THICK GATE-OXIDE PURITY OVER A LARGE AREA WILL BE ESTABLISHED. ASSEMBLY, PACKAGING + TESTING WILL BE AUTOMATED.

CATEGORY
TEST EQUIPMENT

COMPONENT -- ELECTRONIC COMPONENTS						
(5251) TITLE - AUTOMATIC SEM WAFER INSPECTIN AND METROLOGY SYSTEM			1000			

PROBLEM - HUMAN INTERPRETATION OF SCANNING ELECTRON MICROSCOPE IMAGES OF INTEGRATED CIRCUIT PATTERNS IS LABORCUS AND PRONE TO ERROR.

SOLUTION - USE THE SIGNAL FROM A SCANNING ELECTRON MICROSCOPE, DIGITIZE IT, AND COMPARE IT WITH ORIGINAL DESIGN GRAPHICS DATA.

ARMY MATERIALS AND MECHANICS RESEARCH CENTER
(AMMRC)

CATEGORY	PAGE
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Testing	182

US ARMY MATERIALS AND MECHANICS RESEARCH CENTER

(AMMRC)

The Army Materials and Mechanics Research Center (AMMRC) is designated the AMC lead laboratory for Materials Testing Technology. In this role, AMMRC is responsible for management and direction of the AMC 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 AMC major subordinate commands project managers. The lead laboratory mission also encompasses the advising and assisting of the major subordinate commands and project managers in the utilization of MTT in order to assure a smooth transition from the developmental to the production phases of the life cycle. 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. 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 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, improved inspection techniques must be made available 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 combination of these. The development and application of techniques, such as ultrasonics, infrared, holography, spectroscopy, chromatography, etc, can significantly improve AMC materiel and offer substantial improvement in process control.

The MTT Program includes the testing of electronic materials and devices under one of four broad test method categories: nondestructive, chemical, mechanical, or electronics. The recently established "electronics" category emphasizes the importance of quality assurance inspection procedures for devices which are often used in mission critical applications.

AMMRC

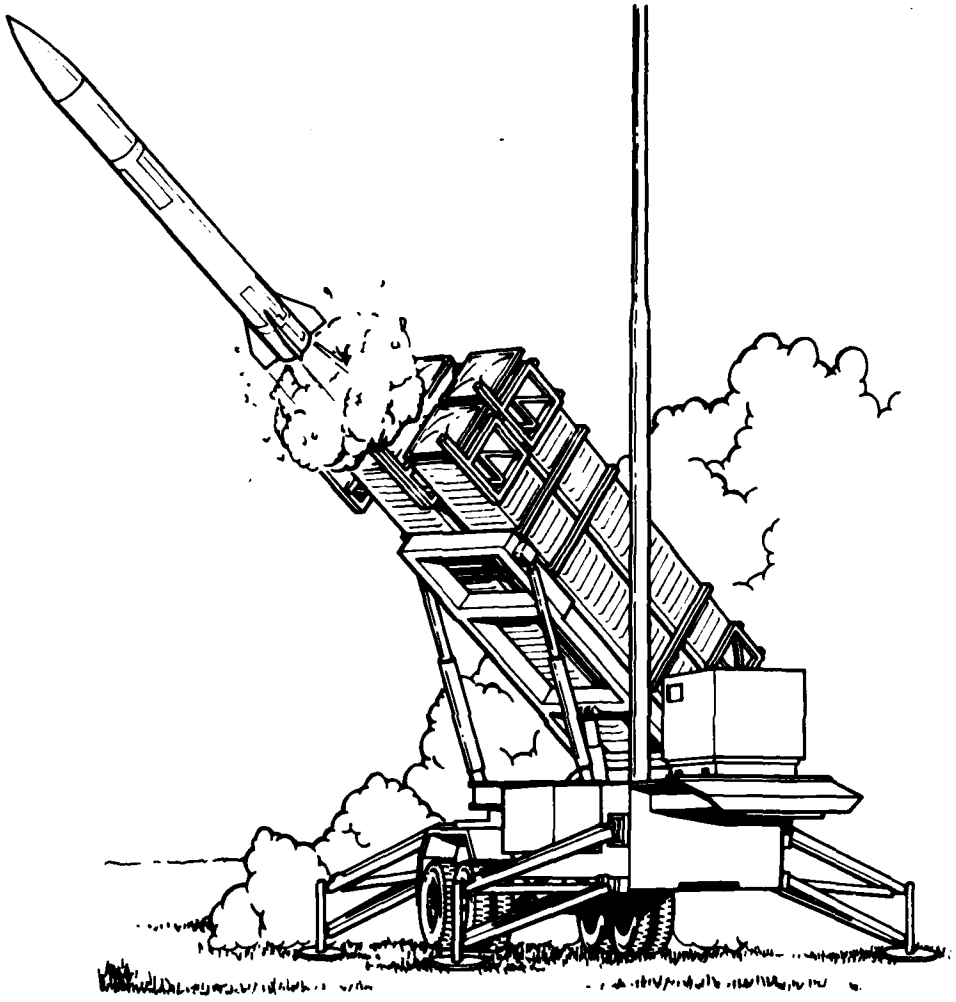
COMMAND FUNDING SUMMARY
(THOUSANDS)

CATEGORY	FY84	FY85	FY86	FY87	FY88
GENERAL	1250	750	875	875	875
TESTING	3187	5000	5500	6000	6500
TOTAL	4437	5750	6375	6875	7375

CATEGORY		FUNDING ($000)					
		PRIOR	84	85	86	87	88
GENERAL							
COMPONENT -- MISCELLANEOUS							
(6052)	TITLE - ARMY ENGINEERING DESIGN HANDBOOK FOR PRODUCTION SUPPORT	4761	500	750	675	875	875
	PROBLEM - TECHNICAL SCIENTIFIC AND ENGINEERING DATA IS CONTINALLY BEING GENERATED WITHIN THE ARMY AND NEEDS TO BE COLLECTED IN APPROPRIATE DOCMENTS.						
	SOLUTION - INITIATE REVISE AND UPDATE DATA USED IN PRODUCTION OF MILITARY HARDWARE AND EQUIPMENT.						
(6390)	TITLE - PROGRAM IMPLEMENTATION AND INFORMATION TRANSFER	893	750				
	PROBLEM - THE SUCCESS OF THE MMT PROGRAM IS VERY DEPENDENT ON WHETHER THE RESULTS OF MMT WORK GET IMPLEMENTED. THIS IN TURN IS DEPENDENT ON WHETHER INFORMATION CONCERNING THE MMT TECHNOLOGY IS MADE AVAILABLE AND USED BY CONCERNED PARTIES.						
	SOLUTION - INSURE THAT THE MMT RESULTS ARE DOCUMENTED AND GIVEN WIDE DISTRIBUTION SO AS TO ENCOURAGE IMPLEMENTATION.						
TESTING							
COMPONENT -- CHEMICAL							
(6350)	TITLE - MATERIALS TESTING TECHNOLOGY (MTT)	4400		650	700	700	780
	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 -- ELECTRONICS							
(6350)	TITLE - MATERIALS TESTING TECHNOLOGY (MMT)	5869	807	1100	1500	1700	1920
	PROBLEM - ELECTRONIC ITEMS AND ANCILLARY DEVICES ARE AMONG THE MOST TECHNICALLY SOPHISTICATED AND MISSION-CRITICAL OF THE ARMY INVENTORY. CURRENT TESTING OF THESE ITEMS IS EQUALLY SOPHISTICATED, TIME-CONSUMING, AND DIFFICULT TO ADAPT TO PRODUCTION ENVIRONMENT.						
	SOLUTION - ADAPT CURRENT AND DEVELOPING STATE-OF-THE-ART TESTING TECHNIQUES TO SIMPLIFIED, RAPID INSPECTION SYSTEMS FOR ON-LINE REAL-TIME, PRODUCTION QUALITY ASSURANCE.						

MMT FIVE YEAR PLAN
RCS DRCMT 126

	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- MECHANICAL						
(6351) TITLE - MATERIALS TESTING TECHNOLOGY (MTT)	7330	550	750	750	800	800
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 TESTING						
(6350) TITLE - MATERIAL TESTING TECHNOLOGY	19065	1830	2500	2550	2800	3000
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 MODIFYING THE EXISTING TEST PROCEDURES FOR ON-LINE PRODUCTION QUALITY ASSURANCE TESTING.						



MISSILE COMMAND
(MICOM)

CATEGORY	PAGE
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US ARMY MISSILE COMMAND

(MICOM)

The US Army Missile Command 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), MLRS (Multiple Launched Rocket System), HELLFIRE (Helicopter-Carried Air-To-Ground Missile), PERSHING (Extended Range Ground-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.

MICOM supports technological thrusts in the following electronics areas: (1) Manufacturing techniques for multiple chips employing multiple technologies that are projected to be in the mainstream of the semiconductor marketplace for many years to come. (2) Electronic computer-aided manufacturing and hybrid computer-aided design and manufacturing in order to automate microelectronic production lines and therefore improve productivity, increase fabrication speed and decrease unit cost.

The missile guidance system is a major area of effort for MICOM's MMT Program. Several projects are being applied to integrated circuits and seekers. They cover laser soldering of surface mounted devices, semiadditive fine-line electroless copper plating, an automatic hermetic sealing system for hybrid circuit assemblies, methods for producing millimeter wave receivers, growth of detector grade cadmium sulfide crystals and volume methods for 128 x 128 staring focal plane arrays. Several other guidance system projects are being planned. These deal with the fabrication of optical systems and radomes.

Propulsion system components such as motor cases, nozzles, and propellants are the subjects of several manufacturing technologies efforts. Work is underway on production processes for fabricating composite motor cases with integral pole pieces and attachments. Other projects cover a winding/cocuring process for large motor case insulators and the replacement of asbestos in insulator formulations.

Proposals in the area of test equipment include work on electrical components where efforts cover screening of chips and validation for semiconductor devices.

MICOM

COMMAND FUNDING SUMMARY
(THOUSANDS)

CATEGORY	FY84	FY85	FY86	FY87	FY88
CONTROL SYSTEM	1000	215	1200	1000	4000
GENERAL	1000	750	600	2900	3900
GUIDANCE SYSTEM	800	4750	4950	3575	3650
INTEGRATED ELECTRONICS	0	0	0	1000	3750
MISSILE STRUCTURE	0	0	0	550	1050
PROPULSION SYSTEM	1225	600	200	0	0
TEST EQUIPMENT	1000	900	1000	0	850
TOTAL	5025	7215	7950	9025	17200

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*************************
*    C A T E G O R Y    *
*-----------------------*
*CONTROL SYSTEM         *
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	PRIOR	84	85	86	87	88
	FUNDING ($000)					

COMPONENT -- CIRCUITRY

	PRIOR	84	85	86	87	88
(1075) TITLE - ELECTRONICS COMPUTER AIDED MANUFACTURING (ECAM)	1230	1000	215	1200	1000	4000

PROBLEM - ALTHOUGH INTEGRATED CIRCUITS, HYBRID CIRCUITS,PRINTED CIRCUITS AND CABLES ARE DESIGNED ON A COMPUTER, THERE IS LITTLE COMPUTERIZED CONTROL OF PROCESSES USED TO PRODUCE THESE ITEMS. A MASTER PLAN IS NEEDED TO DEFINE THE AREA AND REQUIREMENTS.

SOLUTION - DEVELOP A DOD MASTER PLAN FOR COMPUTER-AIDED DESIGN AND MFG OF ELECTRONIC SYSTEMS. USE AIR FORCE?S ICAM AND NASA?S IPAD PROGRAMS TO DEFINE CAD/CAM AND ELECTRONIC TECHNOLOGIES TO MAKE INTEGRATED CIRCUITS,HYBRID CIRCUITS,PRINTED CIRCUITS, AND CABLES.

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*************************
*    C A T E G O R Y    *
*-----------------------*
*GENERAL                *
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COMPONENT -- MISCELLANEOUS

	PRIOR	84	85	86	87	88
(1109) TITLE - ROBOTIZED WIRE HARNESS ASSEMBLY SYSTEM	1155	1000				

PROBLEM - MANUAL HARNESS PROCEDURES UTILIZE SEVERAL STATIONS + SIGNIFICANT REPEATED MATERIAL HANDLING + TRANSFER. APPROXIMATELY 50 PERCENT OF FABRICATION TIME IS DEVOTED TO HANDLING, SORTING, AND IDENTIFICATION.

SOLUTION - AN INTEGRATED APPROACH TOWARDS WIRE HARNESS FABRICATION WILL USE A ROBOT ARM WITH 6 DEGREES OF FREEDOM TO INCORPORATE WIRE PREPARATION, HARNESS ASSY, AND TESTING INTO A SINGLE WORK STATION,

	PRIOR	84	85	86	87	88
(1135) TITLE - LOW COST HEMISPHERICAL SHAPED CHARGES					2900	3900

PROBLEM - THE R+D METHOD OF SHAPED CHARGE ASSEMBLY DOES NOT SUPPORT HIGH RATE PRODUCTION. THE INDUSTRIAL BASE FOR LINER PRODUCTION IS LIMITED TO ONE OR TWO FIRMS.

SOLUTION - A PRODUCTION PROCESS FOR FINAL LINERS OF VARIOUS SIZES WILL BE DEVELOPED AND DEMONSTRATED, STARTING WITH THE DU BILLET, AND ENDING WITH THE EXPLOSIVE LOADED HEMISPHERICAL LINER.

	PRIOR	84	85	86	87	88
(1150) TITLE - LITHIUM NIOBATE LASER Q-SWITCHES			750	600		

PROBLEM - LITHIUM NIOBATE CRYSTALS + CRYSTAL ANTIREFLECTIVE COATINGS CURRENTLY AVAILABLE ARE INADEQUATE FOR OPTICAL Q SWITCH APPLICATION IN ND/YAG LASER DESIGNATORS + RANGEFINDERS.

SOLUTION - METHODS FOR GROWING LARGE SIZE STRAIN FREE CRYSTAL BOULES OF HIGH OPTICAL QUALITY WILL BE OPTIMIZED. ANTIREFLECTION COATINGS WITH HIGH DAMAGE THRESHOLDS, GOOD ADHESION, + LOW REFLECTIVITY WILL BE REFINED.

CATEGORY
GUIDANCE SYSTEM

	PRIOR	84	85	86	87	88
	FUNDING ($000)					

COMPONENT -- HYBRIDS

(1066) TITLE - ADDITIVE SINGLE AND MULTILAYER HYBRID CIRCUITRY — 85: 450; 86: 450

PROBLEM - THICK FILM CIRCUITRY USES THE SCREEN AND FIRE PROCESS ON CERAMIC SUBSTRATES. A SEMIADDITIVE FINE-LINE PROCESS, ELECTROLESS COPPER PLATING, USED ON FIBERGLASS AND CERAMIC SUBSTRATES WILL PROVIDE BETTER FINE-LINE AND A COST REDUCTION.

SOLUTION - LAMINATE SURFACE CONDITIONS AND ELECTROLESS COPPER CATALYST STRENGTHS WILL BE INVESTIGATED. VARIATIONS IN PROCESSING PARAMETERS WILL BE EVALUATED. SOFTWARE TECHNIQUES FOR AUTOMATION OF MANUFACTURING PROCESSES WILL BE DEVELOPED.

(1095) TITLE - AUTOMATIC SEALING OF HYBRIDS — 85: 750; 86: 700; 87: 800

PROBLEM - HYBRID CIRCUIT ASSEMBLIES FOR MILITARY USE REQUIRE HERMATIC SEALING WHICH IS ACCOMPLISHED BY SOLDERING OR WELDING. BOTH TECHNIQUES REQUIRE AN OPERATOR, INVOLVING LABOR INTENSIVE HANDLING AND SET UP ERRORS.

SOLUTION - ESTABLISH AN AUTOMATIC HERMATIC SEALING SYSTEM USING A COMPUTER OR MICROPROCESSOR BASE AND BY MODIFYING EXISTING HERMATIC SEALING EQUIPMENT.

COMPONENT -- INTEGRATED ELECTRONICS

(1151) TITLE - AN INTEGRATED 94 GHZ SUBMUNITIONS TRANSCEIVER — 86: 725; 87: 750

PROBLEM - THE TRANSCEIVER IS VERY EXPENSIVE DUE TO THE LABOR REQUIRED TO MATCH, ALIGN AND TEST COMPONENTS AND TO INTEGRATE THESE COMPONENTS INTO A TRANSCEIVER WHICH HAS THE REQUIRED PERFORMANCE.

SOLUTION - EQUIPMENT FOR A DEPOSITION PROCESS DEVELOPED AT ERADCOM WILL BE ASSEMBLED TO PLACE TRANSMISSION MEDIA AND DEVICES ON A SUBTRATE BASE. THIS EQUIPMENT AND THE PROCEDURES FOR IT WILL CONTROL THE CRITICAL TOLERANCES REQUIRED.

(1148) TITLE - MILLIMETER WAVE MONOLITHIC/INTEGRATED RECEIVER — 85: 750; 86: 450; 87: 550

PROBLEM - NO PRODUCTION CAPABILITY CURRENTLY EXISTS FOR GAAS MILLIMETER WAVE MONOLITHIC/INTEGRATED RECEIVERS.

SOLUTION - AUTOMATED MANUFACTURING METHODS + PROCESSES WILL BE ESTABLISHED. MONOLITHIC DEVICE FABRICATIONS, CIRCUIT ASSEMBLY + TEST TECHNIQUES WILL BE REFINED TO REDUCE MATERIAL COST, LABOR CONTENT, AND IMPROVE YIELDS.

COMPONENT -- OPTICS

(1132) TITLE - SINGLE MODE FIBER FOR FOG LINK — 86: 375; 87: 475

PROBLEM - MILITARY QUALIFIED 10 MICRON CORE OPTICAL FIBERS ARE NOT AVAILABLE IN THE REQUIRED QUANTITIES.

SOLUTION - IMPROVE QUALITY CONTROL AND INSPECTION PROCEDURES FOR THE PERFORM. DRAWING TOWER CONTROLS, SENSORS AND PROCEDURES WILL BE IMPROVED.

	FUNDING ($000)				
PRIOR	84	85	86	87	88

COMPONENT -- OPTICS (CONTINUED)

(1147) TITLE - OPTICAL FIBER WINDING — 85: 500; 86: 500

PROBLEM - THE WINDING OF A FIBER ON A PAY-OUT BOBBIN IS A COSTLY, PRECISION TASK. THIS IS CURRENTLY NOT AVAILABLE AS A HIGH-SPEED PRODUCTION PROCESS FOR THE DELICATE FIBER OPTIC CABLE.

SOLUTION - THIS PROJECT WILL AUTOMATE THE WINDING OF MULTI-MODE FIBER OPTIC CABLE. THE EQUIPMENT WILL BE FLEXIBLE SO THAT THE SOFTWARE CAN CONTROL THE WINDING PARAMETERS SUCH AS TENSION, POSITION, TWIST, ANGLE OF ATTACH AND TEMPERATURE.

(2002) TITLE - CHEAP RAPID OPTICAL FABRICATION TECHNOLOGY (CROFT) — 88: 700

PROBLEM - NEW MIRROR FABRICATION TECHNOLOGY IS EMERGING FROM R+D AND NEEDS TO BE MODIFIED FOR THE PRODUCTION ENVIRONMENT. THERMALLY STABLE COMPOSITES AND LARGE AREA UNIFORM COPPER DEPOSITION NEEDS DEVELOPMENT.

SOLUTION - HIGH PRODUCTION RATE AND LOW COST TECHNOLOGY WILL BE DEVELOPED FOR DAMAGE RESISTANT COATINGS, COPPER DEPOSION AND CARBON-GLASS THERMALLY STABLE COMPOSITE SUBSTRATE MIRRORS FOR USE IN DIRECTED ENERGY WEAPONS.

(2004) TITLE - MFG LWIR FIBER OPTICS — 88: 200

PROBLEM - ABSORPTION LOSSES ARE CAUSED BY 1) SURFACE DEFECTS, CHEMICAL DEGRADATION + LOSS OF STRENGTH DUE TO MOISTURE ATTACK 2) BUBBLES AND 3) MICROSTRUCTURAL IRREGULARITIES AT THE CORE AND CLAD INTERFACE.

SOLUTION - INCORPORATE THE DEMONSTRATED PROCESS OF DRAWING CHALCOGENIDE GLASS FIBERS FROM LARGE DIAMETER RODS PERMITTING INSPECTION OF THE OPTICAL QUALITY OF GLASS PREFORMS PRIOR TO DRAWING THE FIBER.

COMPONENT -- SEEKERS

(1120) TITLE - DETECTOR GRADE CADMIUM SULFIDE (CDS) — 85: 550; 86: 250

PROBLEM - CURRENTLY AVAILABLE PROCESSES FOR PRODUCING CADMIUM SULFIDE CRYSTALS OFTEN RESULT IN SMALL BOULE SIZES THAT LOSE CRYSTALLINITY, LARGE RESISTIVITY VARIATIONS, AND HIGH DENSITY OF CRYSTALINE FLAWS.

SOLUTION - ESTABLISH A GROWTH PROCESS FOR CDS CRYSTAL THAT ALLOWS FOR AN INCREASED BOULE SIZE THAT MAINTAINS CRYSTALLINITY. A NEW SEMI-CLOSED TUBE VAPOR PHASE TRANSPORT METHOD WHICH CAN GROW CRYSTALS W/ LOW FLAW DENSITY IS ONE POSSIBILITY.

	FUNDING ($000)				
	PRIOR	84	85	86	87	88
COMPONENT -- SEEKERS (CONTINUED)						
(1123) TITLE - IMPROVED MFG PROCESSES STARING FOCAL PLANE ARRAY DETECTORS						2000
PROBLEM - THERE IS NO METHOD FOR MAKING A STARING 128X128 FOCAL PLANE ARRAY FOR SEEKERS THAT INCLUDES THE SIGNAL PROCESSING AND DEWAR ASSEMBLY. PRESENTLY, UNITS ARE HAND-MADE WITH ATTENDANT HIGH COSTS. LONGER LIFE DEWARS ARE NEEDED.						
SOLUTION - THE DETECTOR MATERIAL WILL BE MADE IN 10 MICRON THICK WAFERS BY THE LIQUID PHASE EPITAXY PROCESS. A METHOD WILL BE DEVELOPED TO FORM THE ARRAY AND ATTACH IT TO THE PROCESSING CHIPS AND DEWAR ASSEMBLY.						
(1124) TITLE - IMPROVED MFG PROC F/6-10 MICRON SCANNING TDI FPA DETECTORS		800	750	1000	1000	
PROBLEM - THERE IS NO PRODUCTION METHOD FOR MAKING A SCANNING FOCAL PLANE ARRAY FOR SEEKERS THAT INCLUDES THE SIGNAL PROCESSING AND DEWAR ASSEMBLY. PRESENTLY, UNITS ARE HAND-MADE WITH ATTENDANT HIGH COSTS. LONGER LIFE DEWARS ARE NEEDED.						
SOLUTION - THE DETECTOR MATERIAL WILL BE MADE IN 10 MICRON THICK WAFERS BY THE LIQUID PHASE EPITAXY PROCESS. A METHOD WILL BE DEVELOPED TO FORM THE ARRAY AND ATTACH IT TO THE PROCESSING CHIPS AND DEWAR ASSEMBLY.						
COMPONENT -- WINDOWS/RADOMES						
(1122) TITLE - PRODUCTION OF HIGH PERFORMANCE LOW COST CERAMIC IR DOMES						450
PROBLEM - OPTICAL GUIDANCE SYSTEMS FOR HIGH PERFORMANCE MISSILE SYSTEMS WILL REQUIRE CERAMIC DOMES. THE ONLY MATERIAL CURRENTLY AVAILABLE, SINGLE CRYSTAL SAPPHIRE, REQUIRES SPECIAL PROCESSING FACILITIES AND EXPENSIVE SECONDARY OPERATIONS.						
SOLUTION - BASED ON THE RESULTS OF ONGOING RESEARCH ACTIVITY WITH VARIOUS SPINELS, A MATERIAL WILL BE SELECTED FOR FABRICATION USING FORM TO SHAPE PROCESSES WHICH WILL ELIMINATE OR REDUCE GRINDING AND POLISHING OPERATIONS.						
(1134) TITLE - RF/LASER HARDENING OF DOMES FOR DUAL MODE SYSTEMS			1000	500		
PROBLEM - CURRENT MISSILE DOMES ARE NOT HARDENED TO RFI AND LASER THREATS WHILE RETAINING THE ABILITY TO OPERATE IN SPECIFIC SPECTRAL BANDS.						
SOLUTION - MULTIPLE LAYERS OF TIN TELLURIDE AND GOLD WILL BE DEPOSITED IN THE MISSILE DOMES AS WELL AS FINE LINE CONDUCTIVE GRID PATTERNS.						

	FUNDING ($000)					
	PRIOR	84	85	86	87	88

COMPONENT -- WINDOWS/RADOMES (CONTINUED)

(1143) TITLE - LASER SYSTEM E-GUN IMPROVEMENT 300

PROBLEM - ALUMINUM FOIL WINDOWS USED IN ELECTRIC DISCHARGE CO-2 LASERS MUST BE OF UNIFORM THICKNESS AND COOLED AROUND THE PERIMETER WITH A CHANNEL CONDUCTING DE-IONIZED WATER. THE FOIL MUST BE OF UNIFORM COMPOSITION, STRENGTH + THICKNESS.

SOLUTION - FORM ALUMINUM FOIL TO UNIFORM THICKNESS AND COOL IT WITH A RADIATOR RIM CARRYING DE-IONIZED WATER. THE WINDOW IS A SMALL RECTANGLE OF THIN FOIL WHICH PERMITS THE ELECTRIC DISCHARGE TO FLOW THROUGH AND IMPART ENERGY TO THE CARBON DIOXIDE GAS.

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*    C A T E G O R Y    *
*-----------------------*
*INTEGRATED ELECTRONICS *
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COMPONENT -- CIRCUITRY

(2001) TITLE - TAB/GLASS ENCAPSULATED INTEGRATED CIRCUITS 600

PROBLEM - TAPE MOUNTED, PASSIVATED IC CHIP POLYMER ENCAPSULATION CAN NOW BE PERFORMED ONLY BY TEDIOUS LABORATORY TYPE METHODS.

SOLUTION - MANUFACTURING TECHNIQUES, PROCEDURES AND FABRICATION STEPS WILL BE ESTABLISHED TO PRODUCE LOW COST GLASSIVATED CHIPS ON TAPE.

(2003) TITLE - AUTOMATED LSI PLACE/CARRIER SYSTEM 500 1500

PROBLEM - PROCURING THE TYPICAL SHORT PRODUCTION RUN MILITARY DEVICE OFTEN LEADS TO DIFFICULTIES. A PREMIUM, OFTEN IN THE TENS AND SOMETIMES HUNDREDS OF DOLLARS, IS NORMALLY PAID FOR THE MILITARY DEVICE.

SOLUTION - STANDARDIZE ASSY OF PKGS FOR LVLSI DEVICES TO ALLOW AN OPTIMIZED COMPUTER CONTROLLED PACKAGING LINE TO BE DEVELOPED. PRODUCE LIMITED SERIES OF PKGS (DOUBLE IN-LINE, PLATFORM + HERMETIC CHIP CARRIERS) WHICH WILL ACCOMODATE PRESS + PUT DEVICES.

(2006) TITLE - LASER SOLDERING SURFACE MOUNTED DEVICES TO PWB 500 1000

PROBLEM - SOLDER JOINT FAILURE BETWEEN SURFACE MOUNTED DEVICES (SMD) AND MATING PRINTED WIRING BOARDS (PWB) IS CAUSED BY DIFFERENT EXPANSION COEFFICIENTS. IF HEAT PIPE/SINK IS USED, VAPOR PHASE SOLDER CANNOT BE USED.

SOLUTION - PROCURE, DEVELOP + IMPLEMENT ATTACHMENT OF SMD TO PWB IN AMBIENT ENVIRONMENT BY MEANS OF MULTIPLE LASER BEAM / X-Y WORK POSITIONER SYSTEM UNDER COMPUTER NUMERICAL CONTROL.

AD-A148 828 MANUFACTURING METHODS AND TECHNOLOGY PROGRAM PLAN CY 1984(U) ARMY INDUSTRIAL BASE ENGINEERING ACTIVITY ROCK ISLAND IL G FISCHER SEP 84 SBI-AD-E700 011 3/3

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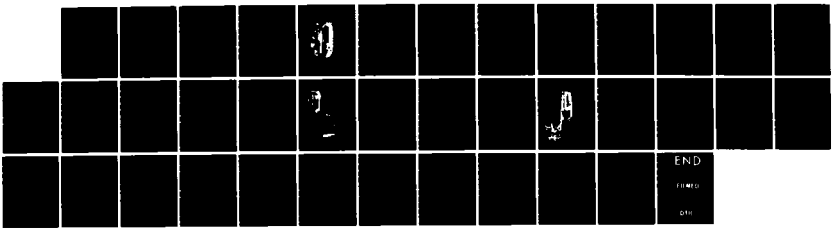
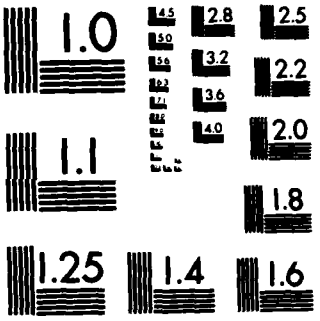




MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

	FUNDING ($000)					
	PRIOR - 84	85	86	87	88
COMPONENT -- CIRCUITRY (CONTINUED)					
(2007) TITLE - LOW COST MMW COMPONENT MFG					450

PROBLEM - MILLIMETER WAVE (MMW) GUIDANCE COMPONENTS FOR FIRE + FORGET MUNITIONS AND MULTIMODE TARGET ACQUISITION + DESIGNATION SYSTEMS WILL REQUIRE LOW COST, HIGH QUANTITY PRODUCTION METHODS.

SOLUTION - THE USE OF METAL PLATED INJECTION MOLDED PLASTIC FOAMS AND CERAMICS WILL MEET THE GOALS OF THIS PROGRAM.

CATEGORY
MISSILE STRUCTURE

COMPONENT -- AIRFRAMES-COMPOSITES

(1080) TITLE - LOW COST CARBON/CARBON NOSETIPS					500
(2008) TITLE - FIELD DEPOT REPAIR OF COMPOSITE COMPONENTS				550	550

PROBLEM - THE WEAVING PROCESS TO FABRICATE CARBON/CARBON NOSETIP PREFORMS IS LABOR INTENSIVE BECAUSE OF THE FINEWEAVE CENTER-TO-CENTER YARN SPACINGS. IN ADDITION, PREFORMS USE EXPENSIVE GRAPHITE YARN AND REQUIRE LONG IMPREGNATION CYCLES.

SOLUTION - DEVELOP OPTIMAL FABRICATING PROCEDURES FROM LOWER COST MATERIALS, PITCH RESIN AND T-300 CARBON FIBERS. UTILIZATION OF SHORTER DENSIFICATION CYCLES PREFORMS, AND FIBER SPACINGS WILL PROVIDE THE MEANS FOR REDUCING CYCLE TIMES.

PROBLEM - UNLIKE METAL MOTOR PARTS, COMPOSITES ARE SUSCEPTIBLE TO BINDER SHATTERING, FILAMENT BREAKAGE, DELAMINATION AND OTHER DAMAGE AS A RESULT OF FIELD HANDLING. THESE DEFECTS ARE NOT ALWAYS VISIBLE AND NO METHOD IS AVAILABLE TO EVALUATE THEM.

SOLUTION - USE MICROENCAPSULATION TECHNOLOGY FOR COATINGS THAT WILL GIVE SOME VISUAL INDICATIONS OF THE SIZE AND FORCE OF IMPACTS. COUPLED WITH NDT/NDI AND STRUCTURAL ANALYSIS, THE SYSTEM WILL ENABLE EFFECTIVE DECISIONS ON SERVICEABILITY OF COMPONENTS.

CATEGORY
PROPULSION SYSTEM

	PRIOR	84	85	86	87	88
	FUNDING ($000)					

COMPONENT -- MOTOR CASES

(1051) TITLE - REPLACEMENT OF ASBESTOS IN ROCKET MOTOR INSULATIONS — PRIOR 855, 84 150

PROBLEM - PRESENT ASBESTOS CONTAINING INSULATORS CAN NO LONGER BE MANUFACTURED AFTER 1981 DUE ITS BEING IDENTIFIED AS A CARCINOGEN. THUS THE GOVT HAS LOST THE CAPABILITY OF USING INSULATING MATERIALS THAT HAS PROVEN TO BE AN EXCELLENT THERMAL BARRIER.

SOLUTION - FILLER MATERIALS OTHER THAN ASBESTOS ARE AVAILABLE. FIBER GLASS AND SILICA HAVE BEEN USED IN SPECIALIZED APPLICATIONS AND WOLLASTONITE LOOKS PROMISING. MATERIALS SPECS AND MOTOR TEST VERIFICATION MUST BE DONE BEFORE A SUBSTITUTE MATERIAL CAN BE USED.

(1069) TITLE - INTEGRAL ROCKET MOTOR COMPOSITE POLE PIECES AND ATTACHMENTS — PRIOR 300, 84 475, 85 600, 86 200

PROBLEM - CURRENT FILAMENT WOUND COMPOSITE ROCKET MOTOR CASES REQUIRE FORGED METAL POLE PIECES, NOZZLE CLOSURE ATTACHMENT RINGS, AND OTHER ATTACHMENT RINGS. THESE COMPONENTS ARE EXPENSIVE, AND REQUIRE LONG LEAD TIME PROCUREMENT.

SOLUTION - ESTABLISH A FILAMENT WINDING PRODUCTION PROCESS FOR FABRICATING COMPOSITE MOTOR CASES WITH INTEGRAL POLE PIECES, AFT ATTACHMENT RINGS, AND FORWARD AND AFT DOME SECTIONS.

(1126) TITLE - WOUND ELASTOMER INSULATOR PROCESS — PRIOR 1275, 84 450

PROBLEM - LARGE TACTICAL ROCKET MOTOR INSULATORS ARE COSTLY, LACK DESIGN CHANGE FLEXIBILITY AND SUFFER LONG LEAD TIMES. CURRENT PROCESSES INVOLVE BONDING TOGETHER FINISHED SECTIONS OR LAY-UP OF GREEN STOCK FOLLOWED BY STITCHING, CURING AND FINISHING TO SIZE.

SOLUTION - THE NEW PROCESS EXTRUDES AND WINDS A STRIP OF GREEN RUBBER OF PRECISELY CONTROLLED THICKNESS DIRECTLY ONTO THE CASE MANDREL. MICROPROCESSOR CONTROL ALLOWS EXPEDIENT DESIGN CHANGES.

COMPONENT -- PROPELLANTS/EXPLOSIVES

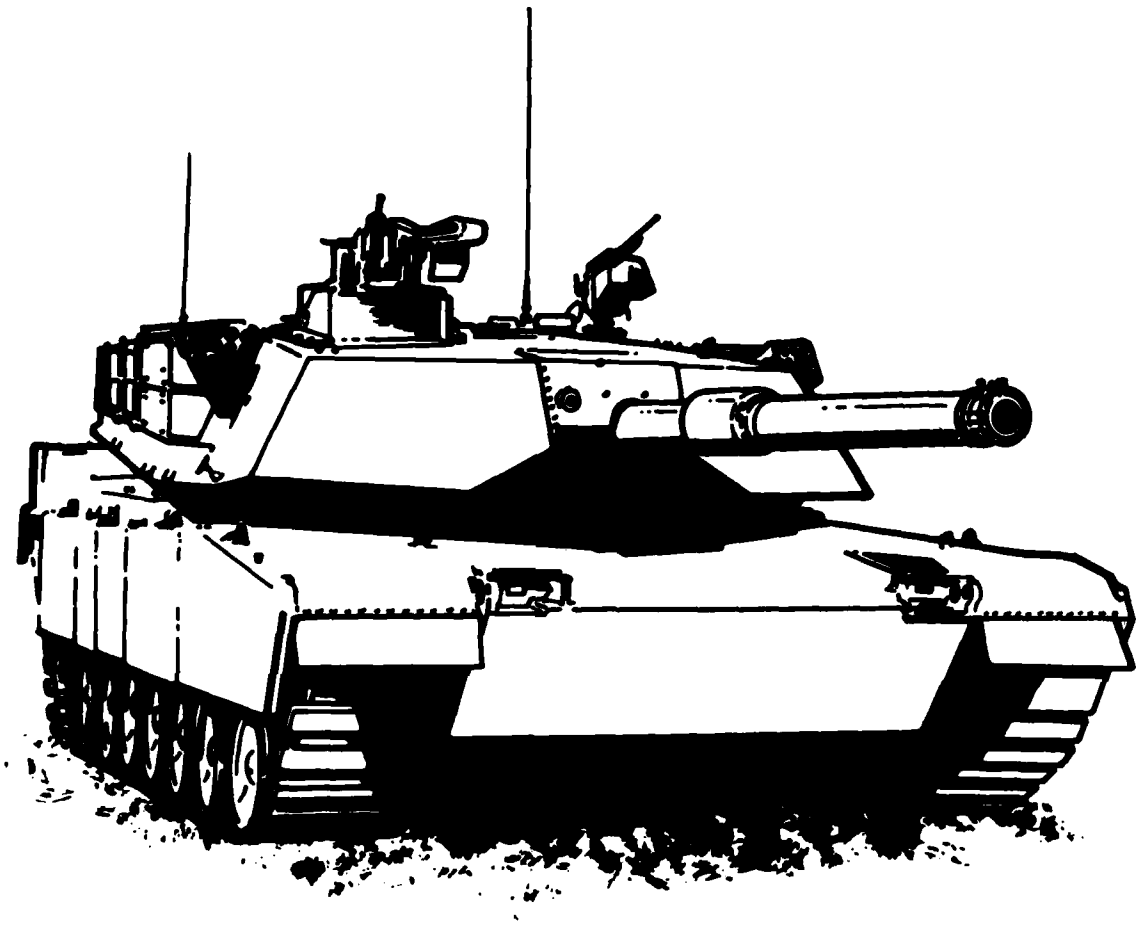
(3449) TITLE - OPTIONAL PROPELLANT INGREDIENTS — PRIOR 400, 84 150

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 ISOPHORONE DIISOCYANATE (IPDI) CAN BE MADE IN A BATCH PROCESS WITHOUT USING PHOSGENE. THIS LABORATORY PROCESS WILL BE SCALED UP.

CATEGORY
TEST EQUIPMENT

	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- ELECTRONIC COMPONENTS						
(1142) TITLE - PROCESS VALIDATION FOR SEMICONDUCTOR DEVICES						400
PROBLEM - THERE IS NO METHOD FOR VALIDATING SHORT RUNS OF SEMICONDUCTOR INTEGRATED CIRCUITS SHORT OF TESTING THEM THROUGH THEIR FULL RANGE OF TESTS. MORE CIRCUITS ARE NEEDED TO VALIDATE THE IC THAN TO FILL THE ORDER.						
SOLUTION - DEVELOP A PROCESS CONTROL MONITOR CIRCUIT FOR INCLUSION ON EVERY WAFER AND TEST IT TO VALIDATE THAT ALL PROCESSES ARE IN CONTROL. ALSO CERTIFY THE LINE AS TO PROCESS CONTROLS.						
(2005) TITLE - AUTO HYBRID MICRO CIRCUIT ASSY CHIP INSPECTION						450
PROBLEM - CHIP HANDLING IS A VERY LABOR-INTENSIVE PROCESS. THE VISUAL INSPECTION OF CHIPS AND THE MOUNTING ORIENTATION ARE SLOW, ERROR PRONE OPERATIONS.						
SOLUTION - AUTOMATE THE INSPECTION OF CHIPS WITH THE USE OF ROBOTICS, CAD/CAM AND VIDEO PROCESSES.						
(3115) TITLE - ENGINEERING FOR CALIBRATION EQUIPMENT	4898	1000	900	1000		
PROBLEM - MEASUREMENT SCIENCES OR METROLOGY MUST BE CONTINUALLY ADVANCED IN RELEVANT TECHNOLOGY AREAS TO KEEP PACE WITH MANY ARMY PROGRAMS.						
SOLUTION - ADVANCEMENTS MUST BE MADE BY DERIVING NEW TYPES OF STANDARDS.						



TANK-AUTOMOTIVE COMMAND
(TACOM)

CATEGORY	PAGE
Armor	202
Body/Frame	204
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General	207
IMIP	208
Suspension System	209
Testing	209
Track	209

US ARMY TANK-AUTOMOTIVE COMMAND

(TACOM)

The US Army Tank and Automotive Command is located in Warren, MI, and 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 main requirements for the production of armored structures are to increase their tolerance to ballistic threats while reducing overall weight. Effective firepower is essential; but, the survivability of modern combat vehicles also depends upon protection and agility. Two predominant types of armor are used in the latest combat vehicles. In tanks, hulls and turrets are complex, laminated structures consisting of steel plates and fiberglass panels. In other combat vehicles, these items are more conventional weldments which consist of thick aluminum plates. Armor fabrication requires a great deal of manual labor for plate cutting, joint preparation, multi-pass welding, weld repair and stress relief. In response to these problems, TACOM will use MT projects to establish: automated records handling systems for welding procedures and process planning documents; weld monitoring systems to detect defect producing conditions; a plasma-arc plate cutting facility with numerical controls; high deposition welding techniques for steel and aluminum; and, advanced NDT inspection systems. To take full advantage of new developments in combination type and ceramic type armors, it will also be necessary to develop practices for economical production. TACOM will sponsor projects covering deformation cycles, fabrication procedures and attachment methods for these materials.

Another major requirement is to develop production techniques for drive systems for the M1 Tank and other vehicles. The AGT 1500 gas turbine will be the subject for several efforts that will bring down production costs. Two projects cover scaled-up techniques for applying erosion and thermal coatings to internal components. Another project will provide a computer controlled balancing system for the impeller/rotor. This system will, in real time, remove precise amounts of material with a laser. The Army is developing an efficient diesel engine for tactical vehicles. This "adiabatic" engine does not have a cooling system and operates at temperatures which would char engine oils including those with synthetic bases. As a result, lubricating fluids are not used. Engine components which are subjected to thermal shock, high dynamic loads and friction are made from advanced ceramic materials. MT work is being directed to producing consistently high quality silicon nitride and silicon carbide components.

In the area of track and suspension, the goals are to introduce production techniques for more advanced systems that meet demands for higher performance over brutally adverse terrain. It is a challenge to keep production costs down and to build in high reliability. Lightweight casting and surface hardening investigations are being fostered by these requirements.

TACOM

COMMAND FUNDING SUMMARY
(THOUSANDS)

CATEGORY	FY84	FY85	FY86	FY87	FY88
ARMOR	1176	1569	1100	1165	7205
BODY/FRAME	250	800	200	0	200
DRIVE SYSTEM	720	1925	2475	4065	1105
GENERAL	600	875	0	230	2430
IMIP	2500	400	1500	739	0
SUSPENSION SYSTEM	0	0	0	0	1250
TESTING	0	0	0	0	80
TRACK	0	450	0	0	785
TOTAL	5246	6019	5275	6219	13055

CATEGORY	FUNDING ($000) PRIOR	84	85	86	87	88
ARMOR						
COMPONENT -- GENERAL						
(4011) TITLE - PULSED HIGH CURRENT RESISTANCE WELDING OF ARMOR PLATE					200	
PROBLEM - PRESENT METHODS OF WELDING ARMOR ARE TIME CONSUMING + REQUIRE MULTI PASS WELDING POST WELD TREATMENT + WELD REPAIR.						
SOLUTION - TO APPLY PULSED HIGH CURRENT RESISTANCE WELDING TECHNOLOGY TO THE WELDING OF ARMOR PLATE.						
(4031) TITLE - CAD GENERATION AND STORAGE OF WELDING PROCEDURES					65	
PROBLEM - THE TOTALLY WELDED STRUCTURE OF M1 TANK REQUIRES EXTENSIVE DOCUMENTATION OF RECORDED JOINT WELDING PROCEDURES. THE PREPARATION OF A NEW PROCEDURE TO KEEP CURRENT WITH DESIGN AND METHOD CHANGES IS INCONVENIENT AND EXPENSIVE.						
SOLUTION - DEVISE A PROCEDURE GENERATION AND STORAGE SYSTEM USING EXISTING CAD/CAM EQUIPMENT. STRUCTURAL DESIGN ISOMETRICS CONTAINED IN THE SYSTEM CAN BE USED TO DEVELOP ISOMETRIC DRAWINGS AND JOINT CROSS SECTIONS.						
(4577) TITLE - ATTACHMENT OF COMBINATION ARMOR TO COMBAT VEHICLES						1880
PROBLEM - COMBINATION ARMOR SYSTEMS PROVIDE LARGE BALLISTIC IMPROVEMENT BUT REQUIRE COMPLEX ATTACHMENT METHODS.						
SOLUTION - IDENTIFY COST EFFECTIVE METHODS FOR PRODUCTION APPLICATION.						
(6038) TITLE - HIGH DEPOSITION WELDING PROCESSES FOR ARMOR	1503					250
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.						
(6057) TITLE - M-1 COMBAT VEHICLE-MFG TECHNOLOGY	1474	1176	1569	1100	300	
PROBLEM - MATERIALS AND MANUFACTURING PROCESSES EMPLOYED IN THE MFG OF THE M1 CAN BE IMPROVED BY INCORPORATING NEW TECHNOLOGIES TO THE CURRENT SYSTEM. THIS WILL ENABLE THE M1 TO BE PRODUCED MORE ECONOMICALLY.						
SOLUTION - IMPROVE PROCESSES FOR M1 MFG. THESE INCLUDE THERMAL CUTTING, AUTOMATED METALLIZING, THERMALLY ASSISTED MACHINING, ETC.						
(6125) TITLE - WELD PROCESS PLANNING AND CONTROL						650
PROBLEM - PLANNING, MONITORING, AND INSPECTION OF THE WELDING PROCESS ARE EXPENSIVE, TIME CONSUMING, AND CAUSE PRODUCTION DELAYS WHEN A QUALITY PROBLEM IS SUSPECTED.						
SOLUTION - USE THE COMPUTER FOR PROCESS PLANNING AND THE REDESIGN OF WELDED JOINTS, USE MONITORING SYSTEMS TO DETECT WELD CONDITIONS, AND AUTOMATE VISUAL INSPECTION OF WELDMENTS.						

	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- GENERAL (CONTINUED)						
(6403) TITLE - ADVANCED CERAMIC/COMPOSITE ARMOR						1250
PROBLEM - THERE ARE NO COMMERCIAL SOURCES FOR NEWLY DEVELOPED CERAMIC ARMOR MATERIALS IN THE QUALITY, SIZES AND SHAPES NOR THE METHODS REQUIRED TO COMPLETE THE INSERTION OF THE ARMOR INTO THE END ITEM.						
SOLUTION - ESTABLISH MANUFACTURING PROCESSES.						
COMPONENT -- HULL/BODY						
(4034) TITLE - ADVANCED NDT INSPECTION TECHNOLOGY						300
PROBLEM - ADVANCED NDT METHODS SUCH AS ULTRASONICS AND HOLOGRAPHY HAVE SHOWN PROMISE AS BEING MORE EFFECTIVE AND SAFE THAN EXISTING METHODS SUCH AS X-RAY.						
SOLUTION - INVESTIGATE AND ESTABLISH ADVANCED NDT WELD INSPECTION SYSTEMS FOR INSPECTION OF ALUMINUM WELDS.						
(5091) TITLE - HEAVY ALUMINUM PLATE FABRICATION	170				100	
PROBLEM - MANY COMBAT AND TACTICAL VEHICLE HULLS AND THEIR COMPONENTS ARE FABRICATED FROM HEAVY ALUMINUM PLATE. CUTTING THIS HEAVY ALUMINUM PLATE TO SPECIFIED CONTOURS AND WELDING THE PIECES TOGETHER REQUIRES A GREAT DEAL OF MANUAL LABOR.						
SOLUTION - ESTABLISH THE CAPABILITY TO CUT HEAVY ALUMINUM PLATE RAPIDLY USING PLASMA ARC WITH NUMERICAL CONTROLS. PROCESS PARAMETERS WILL BE ESTABLISHED FOR HIGH DEPOSITION WELDING PROCESSES.						
(6065) TITLE - IMPROVED CASTING PROCESSES						375
PROBLEM - THE CASTING PROCESS IS WASTEFUL.						
SOLUTION - IMPROVE CAST ARMOR QUALITY THROUGH ADVANCED SOLIDIFICATION TECHNIQUES, SPECIAL DEOXIDATION PRACTICES, AND UNIQUE MOLDING PROCESSES.						
(6099) TITLE - MANUFACTURING METHODS FOR SPECIALIZED ARMOR MATERIALS						2500
PROBLEM - INDUSTRY PRODUCTION PRACTICES F/PROVIDING COMPLEX COMPONENTS COMPOSED OF NOVEL PROTECTIVE ARMOR MATERIALS IS UNAVAILABLE OR SUFFERS FROM MARKED DEFICIENCIES.						
SOLUTION - SPECIAL ADAPTATIONS OF COMMERCIAL PRACTICES WILL BE USED TO ACCOMPLISH THE DEFORMATION CYCLES AND FABRICATION PROCEDURES REQUIRED TO PRODUCE THESE ADVANCED MATERIALS IN THE DIMENSIONS AND SHAPES NEEDED.						

FUNDING ($000)

	PRIOR	84	85	86	87	88
COMPONENT -- TURRET						
(4033) TITLE - ROBOTIC TURRET DRILLING TECHNOLOGY					500	
PROBLEM - AN EXPENSIVE BORING MILL IS CURRENTLY USED FOR THE COMPLETE MACHINING OF A TURRET. INCREASED PRODUCTION LEVELS WILL REQUIRE PURCHASE OF MORE HIGH COST MILLS UNTIL AN ALTERNATE PROCESS IS DEVELOPED.						
SOLUTION - ESTABLISH AN AUTOMATED TURRET DRILLING SYSTEM UTILIZING ROBOTICS THAT WILL OFF-LOAD THE BORING MILL MACHINING REQUIREMENTS.						
CATEGORY						
BODY/FRAME						
COMPONENT -- COATING						
(4021) TITLE - AUTOMATED PAINT SYSTEM M1 TANK						200
PROBLEM - SPARY PAINTING THE INTERIOR COMPARTMENTS OF THE M1 TANK IS HAZARDOUS. PROTECTECTIVE GEAR REQUIRED FOR THE PAINTERS HINDERS THEIR ABILITY TO ADEQUATELY PAINT THE INTERIOR.						
SOLUTION - REVIEW AVAILABLE EQUIPMENT AND DETERMINE SURFACE COATING METHODOLOGY. PREPARE SPECIFICATIONS FOR EQUIPMENT AND FIXTURES.						
COMPONENT -- LIGHTWEIGHT/COMPOSITE STRUCTURES						
(4001) TITLE - MANUFACTURING FOR CORROSION PREVENTION IN TACTICAL VEHICLES		250	500			
PROBLEM - CURRENTLY THE ARMY HAS SEVERE CORROSION PROBLEMS WITH ITS TACTICAL TRUCK FLEET. ACHIEVING CORROSION RESISTANCE THROUGH THE APPLICATION OF RUSTPROOFING COMPOUNDS CONTRADICTS THE NBC REQUIREMENT FOR VEHICLES WITH CHEMICAL AGENT RESISTANT COATINGS.						
SOLUTION - REINFORCED COMPOSITE MATERIALS CAN REDUCE CORROSION AND WEIGHT AND SIMPLIFY MFG. TECHNOLOGY REQUIREMENTS AND PRODUCTION PARAMETERS FOR VARIOUS COMPONENTS, FROM SMALL PARTS TO COMPLETE TRUCK CABS, WILL BE DETERMINED.						
(6000) TITLE - LIGHTWEIGHT TILT-UP HOOD/FENDER ASSEMBLY	236		300	200		
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.						
CATEGORY						
DRIVE SYSTEM						

	FUNDING ($000)				
	PRIOR	84	85	86	87	88
COMPONENT -- DRIVE SHAFT						
(4008) TITLE - COMPOSITE DRIVE SHAFTS			250	350		
PROBLEM - A LARGE TRUCK DRIVE SHAFT NEEDS A CENTER BEARING FOR SUPPORT. THE BEARING IS EXPENSIVE AND MUCH MACHINING ON THE SHAFT IS PERFORMED TO INSURE PROPER FIT AND FUNCTION. A COMPOSITE SHAFT WOULD END THESE PROBLEMS BUT NO RELIABLE MASS PDN PROCESS EXISTS.						
SOLUTION - ESTABLISH A FILAMENT WINDING CAPABILITY FOR TUBULAR GRAPHITE/EPOXY DRIVE SHAFTS WITH METAL END FITTINGS. ALSO ESTABLISH QUALITY CONTROLS TO INSURE CONSISTENT PROPERTIES.						
COMPONENT -- ENGINE						
(4036) TITLE - ADVANCED BALANCING MACHINING OF AGT-1500 IMPELLERS/ROTORS					520	520
PROBLEM - BALANCING OF IMPELLER/ROTORS IS DONE ON A TRIAL AND ERROR BASIS, MANUALLY. ALTHOUGH STANDARDS EXIST, BALANCE COMPLETION TIME RANGES FROM MINUTES TO DAYS, DEPENDING ON THE CONDITION OF THE DETAILS OF CONFIGURATION AND THE EXPERIENCE OF THE OPERATORS.						
SOLUTION - ESTABLISH AN INTEGRATED COMPUTER CONTROLLED BALANCING SYSTEM UTILIZING LASER DRILLING TO REMOVE PRECISE AMOUNTS OF MATERIAL AT EXACT LOCATIONS IN REAL TIME.						
(4037) TITLE - AUTOMATED ROBOTIC WELDING PARAMETER DEVELOPMENT				80		
PROBLEM - THE EXISTING WELDING EQUIPMENT AND PROCESSES AT STRATFORD ARMY ENGINE PLANT ARE OBSOLETE. INCONSISTENT WELDS WITH LESS THAN OPTIMUM QUALITY ARE CURRENTLY BEING PRODUCED.						
SOLUTION - ESTABLISH SOFTWARE, ROBOTIC PARAMETERS, AND APPLICATION REQUIREMENTS. BASED ON THE RESULTS OF THIS PROJECT REPORTS AND HANDBOOKS WILL BE ESTABLISHED FOR FUTURE EQUIPMENT ACQUISITION AND IMPLEMENTATION.						
(4038) TITLE - ADVANCED COATING TECHNOLOGY FOR AGT-1500 ENG COMPONENTS-PH I					265	235
PROBLEM - THE ALUMINIDE COATING USED ON THE CURRENT AGT-1500 FIRST STAGE NOZZLE HAS LIMITED THERMAL FATIGUE RESISTANCE AT THE HIGHER GAS TEMPERATURES AND CYCLIC STRAINS ASSOCIATED WITH THE ADVANCED AGT-1500 ENGINE DESIGN.						
SOLUTION - ESTABLISH DEPOSITION PARAMETERS FOR THERMAL BARRIER COATINGS THAT WILL INCREASE THE DURABILITY OF THE COATED COMPONENT.						

	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- ENGINE (CONTINUED)						
(5053) TITLE - MANUFACTURE OF ENGINE COMPONENTS OF CERAMIC	965	720	315			
PROBLEM - FABRICATION OF HIGH EFFICIENCY, HIGH TEMPERATURE DIESEL ENGINES REQUIRES ADVANCED MATERIALS. ENGINES FABRICATED WITH CERAMIC COMPONENTS HAVE BEEN DEMONSTRATED IN R+D BUT MANUFACTURING METHODS FOR SERIAL PRODUCTION COMPONENTS ARE LACKING.						
SOLUTION - RECENT RESEARCH EFFORTS INDICATE THAT ENGINE COMPONENTS FROM HIGH STRENGTH STRUCTURAL CERAMICS (SILICON NITRIDE, SILICON CARBIDE) ARE FEASIBLE. THIS EFFORT WILL ESTABLISH QUANTITY PRODUCTION OF CERAMIC COMPONENTS OF CONSISTENT QUALITY.						
(6079) TITLE - AGT-1500 ENGINE	2894		750	1795	3280	
PROBLEM - THE NEED TO REDUCE COST AND IMPROVE PERFORMANCE OF THE AGT-1500 TURBINE ENGINE REQUIRES NEWER AND MORE INNOVATIVE MANUFACTURING TECHNOLOGY.						
SOLUTION - INCORPORATE NEW PROCESSES AND TECHNOLOGY INTO THE AGT-1500 MANUFACTURING METHODS.						
(6123) TITLE - CERAMIC TURBOCHARGER ROTOR			250	250		
PROBLEM - SMALL SILICON CARBIDE TURBOCHARGER ROTORS HAVE BEEN FABRICATED WITH A PROPRIETARY PROCESS IN INDUSTRY AND WERE SUCCESSFUL; HOWEVER, THE PROCESS CAN NOT BE APPLIED DIRECTLY TO ARMY COMPONENTS BECAUSE OF THE PROPIETARY LIMITATION AND SCALE PROBLEMS.						
SOLUTION - DEVELOP A PROCESS AND SCALE IT TO ACCOMMADATE THE LARGER SIZED ARMY ROTORS.						
COMPONENT -- TRANSMISSION						
(4612) TITLE - LASER VIBRATION DEPOT INSPECTION SYSTEM			360			
PROBLEM - TRANSMISSION AND TRANSFER ASSEMBLIES ARE TORN DOWN TO THE INDIVIDUAL PARTS FOR INSRECTION TO DETERMINE OVERHAUL REQ.						
SOLUTION - ADAPT A LASER VIBRATION SENSOR (LVS) DEVICE FOR NOISE IDENTIFICATION AND MEASUREMENT INSPECTION, BY MAKING THE DEVICE INSENSITIVE TO EXTRANEOUS NOISE SOURCES AND ELECTROMAGNETIC INTERFERENCE.						
(6092) TITLE - AUSROLLED GEARS FOR TACTICAL VEHICLES						350
PROBLEM - THE PRESENT PROCESS FOR MAKING HIGH PERFORMANCE GEARS IS EXPENSIVE. THE FINAL GRIND IS ESPECIALLY EXPENSIVE AND INTRODUCES SURFACE CONDITIONS WHICH CAN SHORTEN GEAR LIFE.						
SOLUTION - ESTABLISH PARAMETERS TO ENABLE USE OF THE AUSROLLING PROCESS FOR FINAL FINISH. THIS WILL ELIMINATE THE NEED FOR FINAL GRINDING.						

CATEGORY	FUNDING ($000) PRIOR	84	85	86	87	88
GENERAL						
COMPONENT -- MISCELLANEOUS						
(4024) TITLE - CUTTING FLUID SELECTION/CONTROL SYSTEM						250
PROBLEM - MANY TYPES OF CUTTING FLUIDS ARE USED AND ARE SELECTED BY LOWEST COST OR BEST SALES PITCH WITH LITTLE REGARD FOR REQUIREMENTS OR EFFICIENCY.						
SOLUTION - ESTAB A CUTTING FLUID SELECTION AND CONTROL SYSTEM FOR ALL MACHINING OPERATIONS. A MACHINING SEVERITY INDEX WILL BE DEVELOPED FOR REPRESENTATIVE OPERATIONS, AS WILL A GENERIC CUTTING FLUID AND A RECYCLING SYSTEM.						
(4025) TITLE - HIGH SPEED MACHINING FOR TANK COMPONENTS						160
PROBLEM - THE CURRENT MACHINING OPERATIONS AT GENERAL DYNAMICS MANUFACTURING FACILITIES ARE NOT REACHING OPTIMUM PERFORMANCE DUE TO FAILURE IN TAKING ADVANTAGE OF NEW TOOLS CURRENTLY ON THE MARKET.						
SOLUTION - THIS PROJECT WILL SURVEY NEW TOOLING CURRENTLY ON THE MARKET SUCH AS CERAMICS, BORAZON AND DIAMOND CUTTING TOOLS WITH SPECIAL COATINGS AND GEOMETRY. IT WILL APPLY DATA GENERATED UNDER MMT PROJ 5090 AND SPECIFICALLY TAILOR THE NEW TOOLING TO GD NEEDS.						
(4032) TITLE - ROBOTIC ASSEMBLY TECHNOLOGY						200
PROBLEM - ASSEMBLY OF TRACKED VEHICLES IS LABOR INTENSIVE AND ROBOTICS ASSEMBLY APPLICATIONS NEED TO BE DEVELOPED TO UNDERSTAND THE LIMITS FOR USE IN FUTURE VEHICLE DESIGN OR IMMEDIATE USE IN REPETITIVE ASSEMBLY APPLICATIONS.						
SOLUTION - DEVELOP A ROBOTIC ASSEMBLY APPLICATION THAT WILL PROVIDE ECONOMIC BENEFITS AND A BASE OF KNOWLEDGE FOR FUTURE APPLICATIONS.						
(4035) TITLE - LASER PROCESSING OF STEEL COMPONENTS					250	
PROBLEM - CONVENTIONAL AND INDUCTION HEAT TREATMENT OF STEEL COMPONENTS SUCH AS THE DRIVE SPROCKET, TURRET RACE RING AND MAIN RING GEAR CAN RESULT IN PART DISTORTION AND DIMINISHED PHYSICAL PROPERTIES.						
SOLUTION - PROVIDE A PRECISION INSTRUMENT TO PERFORM HARDENING OPERATIONS. A LASER IN LIEU OF PRESENT HEAT TREAT METHODS WILL REDUCE DISTORTION AND IMPROVE THE QUALITY OF HEAT TREATED COMPONENTS.						
(4041) TITLE - AUTOMATED ASSEMBLY GRAPHICS						250
PROBLEM - ASSEMBLY WORKERS FOR THE M1 TANK HAVE LONG WORK CYCLES. THE WORKERS HAVE DIFFICULTY REMEMBERING ASSEMBLY SEQUENCES AND CRITICAL ASSEMBLY REQUIREMENTS. WORKERS CANNOT EASILY REPORT ASSEMBLY PROBLEMS. TRAINING OF NEW WORKERS IS DIFFICULT.						
SOLUTION - COMPUTER SOFTWARE SYSTEMS WILL BE ACQUIRED TO DISPLAY OPERATION DESCRIPTIONS AND ROUTING RECORDS. FEEDBACK SYSTEM WILL BE ESTABLISHED FOR QUALITY CONTROL REPORTING. PROCESS CONTROL AND PROCESS PLANNING SOFTWARE WILL INCORPORATE A PICTORIAL.						

	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- MISCELLANEOUS (CONTINUED)						
(6054) TITLE - ADVANCED METROLOGY SYSTEMS INTEGRATION	998					1000
PROBLEM - THE METROLOGY METHODS USED IN MILITARY VEHICLE MANUFACTURE, IN GENERAL, EMPLOYS CONTACT GAUGES MANUALLY EMPLOYED. THIS REPRESENTS A SUBSTANTIAL PART OF THE COST OF OUR MILITARY VEHICLES.						
SOLUTION - NON-CONTACT, IN-PROCESS GAUGING (ELECTRO-OPTICAL AND LASER) WILL BE ADAPTED TO A VEHICLE MACHINING OPERATION. SOLID PHOTOGRAPHY WILL BE ADAPTED TO MEET THE MEASURING REQUIREMENTS OF COMPONENTS SUCH AS TURBINE BLADES.						
(6086) TITLE - CAD/CAM PROCESSES FOR ALUMINUM CASTINGS (PHASE I)						550
PROBLEM - THE CASTING PROCESS IS WASTEFUL OF RAW MATERIALS AND ENERGY. ABOUT 50% MORE MATERIAL IS MELTED THAN UTILIZED IN THE FINAL CAST CONFIGURATION.						
SOLUTION - APPLICATION OF ADVANCED FLUID AND THERMAL ANALYSIS FOR THE ALUMINUM CASTING PROCESS WILL RESULT IN MORE EFFICIENT UTILIZATION OF CASTING FACILITIES. TWO MAJOR TASKS WILL ADDRESS CONVENTIONAL SAND CAST AND DIE CAST PROCESSES.						
(6121) TITLE - CAD/CAM FOR THE BRADLEY FIGHTING VEHICLE		600	875			
PROBLEM - MANUFACTURING TECHNIQUES FOR THE BFV ARE IN NEED OF IMPROVEMENT IN THE AREA MATERIAL SELECTION, MANUFACTURING PRINCIPALS, AND QUALITY CONTROL. IN ADDITION CURRENT TECHNIQUES ARE EXTREMELY LABOR INTENSIVE.						
SOLUTION - IMPLEMENT THE FOLLOWING SUBTASKS TO IMPROVE THE BFV; ROBOTIC WELDING, ROBOTIC HARNESS ASSY, ADAPTIVE CONTROL + CUTTER SENSING, AUTOMATED PART GAUGING + INSPECTION, AND MANUFACTURING CELL WITH ROBOTIC LOADING.						

CATEGORY
IMIP

COMPONENT -- MISCELLANEOUS						
(6090) TITLE - TOOELE ARMY DEPOT PRODUCTIVITY IMPROVEMENT PROGRAM	100	2500	400	1500	144	
PROBLEM - THE AGING FACILITY AND OUTDATED TECHNIQUES HAVE RESULTED IN AN INEFFICIENT OPERATION AND SLOW DELIVERIES.						
SOLUTION - DEVELOP AND DEFINE AN ENVIRONMENT AND IMPLEMENTATION PLAN TO IMPROVE PRODUCTIVITY, REDUCE REFURBISHING COSTS TO THE ARMY, AND INSURE TIMELY DELIVERY.						

	FUNDING ($000)					
	PRIOR	84	85	86	87	88

COMPONENT -- MISCELLANEOUS (CONTINUED)

(6095) TITLE - ABRAMS TRANSMISSION PRODUCTIVITY IMPROVEMENTS	334				595	

PROBLEM - A NUMBER OF TECHNOLOGICAL AREAS HAVE BEEN IDENTIFIED WHICH CAN BE APPLIED AS COST REDUCING MEASURES OR AS A MEANS OF IMPROVING THE MANUFACTURE COST OF THE M1 ABRAM TRANSMISSION.

SOLUTION - THE TECHNOLOGICAL AREAS WILL BE SEPARATED INTO 4 TASKS. A FINAL REPORT WILL BE GENERATED FOR EACH TASK ALONG WITH PILOT HARDWARE AND/OR CHANGES TO THE TECHNICAL DATA PACKAGE AS APPROPRIATE TO ACCOMMODATE IMPLEMENTATION.

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*    C A T E G O R Y    *
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*SUSPENSION SYSTEM      *
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COMPONENT -- TORSION BAR/TUBE

(5074) TITLE - PRODUCTION TECHNIQUES FOR COMBAT VEHICLE SUSPENSION SYSTEMS						1250

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.

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*    C A T E G O R Y    *
*-----------------------*
*TESTING                *
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COMPONENT -- NON-DESTRUCTIVE TESTING

(4026) TITLE - LASER INSPECTION OF INTERNAL THREADS						60

PROBLEM - THE CURRENT METHOD OF INSPECTING INSIDE DIAMETER THREADS IS WITH GO AND NO-GO GAGES. THIS IS TIME CONSUMING AND DOES NOT PROVIDE DATA ON QUALITY OF THREADS.

SOLUTION - SURVEY THE MARKET FOR LASER EQUIPMENT WHICH WILL PROVIDE A METHOD OF RAPID AND COST EFFECTIVE EVALUATION OF INTERNAL THREAD DIMENSION AND QUALITY.

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*    C A T E G O R Y    *
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*TRACK                  *
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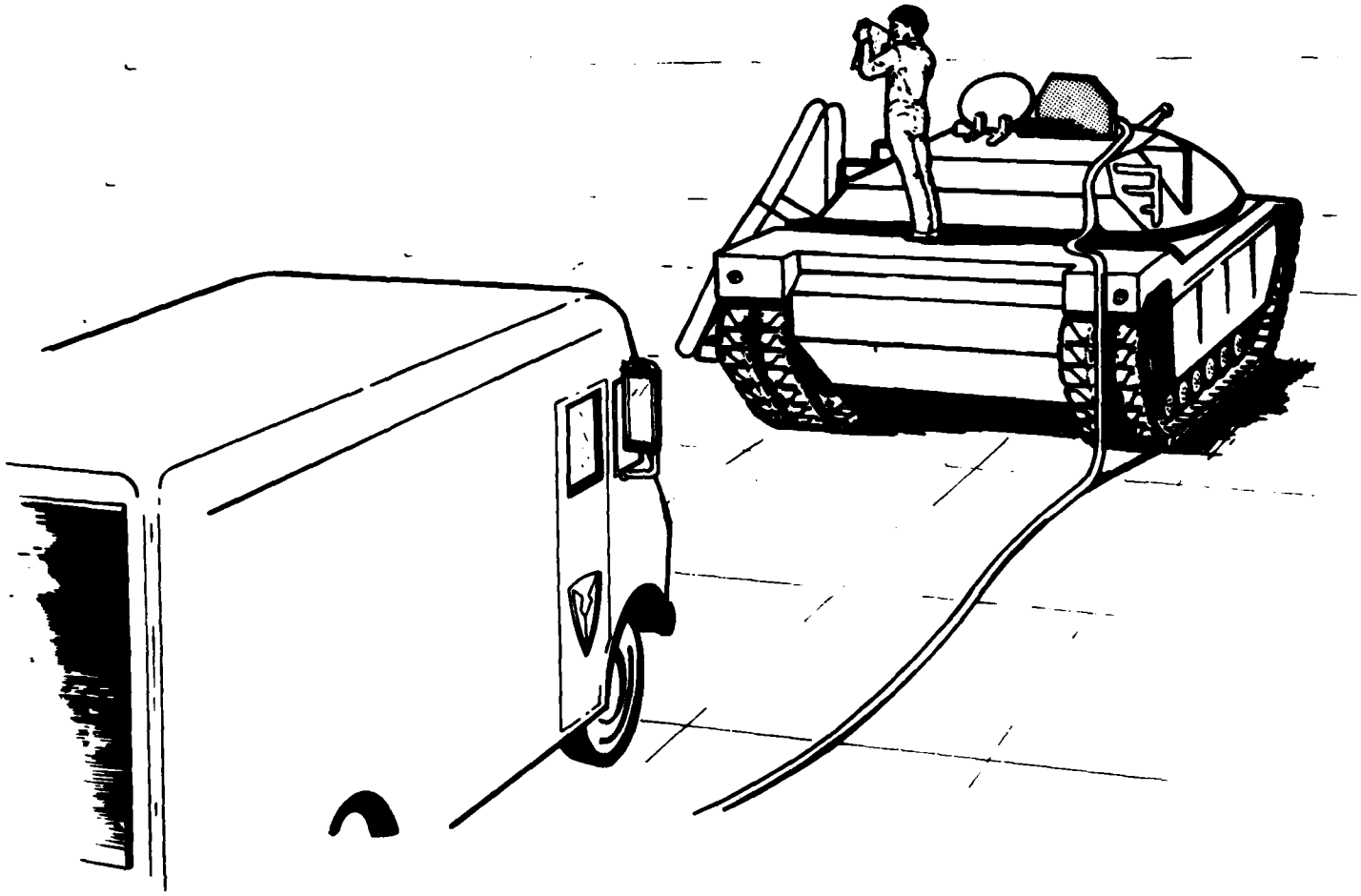
	FUNDING ($000)					
	PRIOR	84	85	86	87	88
COMPONENT -- PINS						
(4007) TITLE - ROLLER STRAIGHTENING OF TRACK PINS						425
PROBLEM - TRACK PINS ARE STRAIGHTENED AFTER CORE HARDENING AND CASE HARDENING BY BENDING BETWEEN ROLLER SUPPORTS ON A HYDRAULIC PRESS.						
SOLUTION - REPLACE PRESS STRAIGHTENING WITH AUTOMATIC ROLLER STRAIGHTENING.						
COMPONENT -- SHOES						
(4514) TITLE - HARD FACING OF TRACK SHOES						200
PROBLEM - NO DEFINITE PROCEDURE AND HARD FACING MATERIALS HAVE BEEN ESTABLISHED AS THE MOST SATISFACTORY REPAIR COMBINATION FOR TRACK SHOES. PRIOR EFFORTS HAVE BEEN MADE IN BOTH THE USA AND EUROPE BUT NOTHING DEFINITE HAS RESULTED.						
SOLUTION - THE TRACK SHOE GROUSERS WILL BE BUILT UP BY DEPOSITION USING A HARD FACING PROCESS. THE PROCESS WILL BE AUTOMATED AND TOOLING WILL BE DESIGNED TO ALLOW THE EQUIPMENT TO FOLLOW THE CONTOURS OF THE TRACK SHOE GROUSERS.						
(6107) TITLE - IMPROVED MBT TRACK	928		450			
PROBLEM - INCREASED VEHICLE PERFORMANCE REQUIREMENTS NECESSITATE HIGHER PERFORMANCE TRACKS THAN THOSE AVAILABLE TODAY. TO IMPLEMENT NEW METAL COMPOSITE, HIGHER STRENGTH FERROUS ALLOYS, AND TITANIUM NEW MANUFACTURING PROCESSES MUST BE ESTABLISHED.						
SOLUTION - TO IMPLEMENT NEW MATERIAL TRACK SHOES AND PINS, INVESTMENT CASTING AND HOT MOLDING TECHNIQUES WILL BE ESTABLISHED FOR METAL MATRIX COMPOSITES.						
COMPONENT -- TREADS						
(4010) TITLE - AUTOMATED ROADWHEEL TEST MACHINE						160
PROBLEM - NRAD HAS A ONE-STATION NON-AUTOMATED ROADWHEEL TEST MACHINE TO ASSURE CONFORMANCE TO ENDURANCE REQUIREMENTS AS SET FORTH BY MIL-N-3100C.						
SOLUTION - AUTOMATE THE EXISTING SINGLE STATION AND ADD A SECOND AUTOMATED STATION. AUTOMATION OF BOTH STATIONS WOULD PRECLUDE THE CONTINUOUS PRESENCE OF A TECHNICIAN, RESULTING IN A COST REDUCTION.						



TEST AND EVALUATION COMMAND (TECOM)

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 environmental 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.

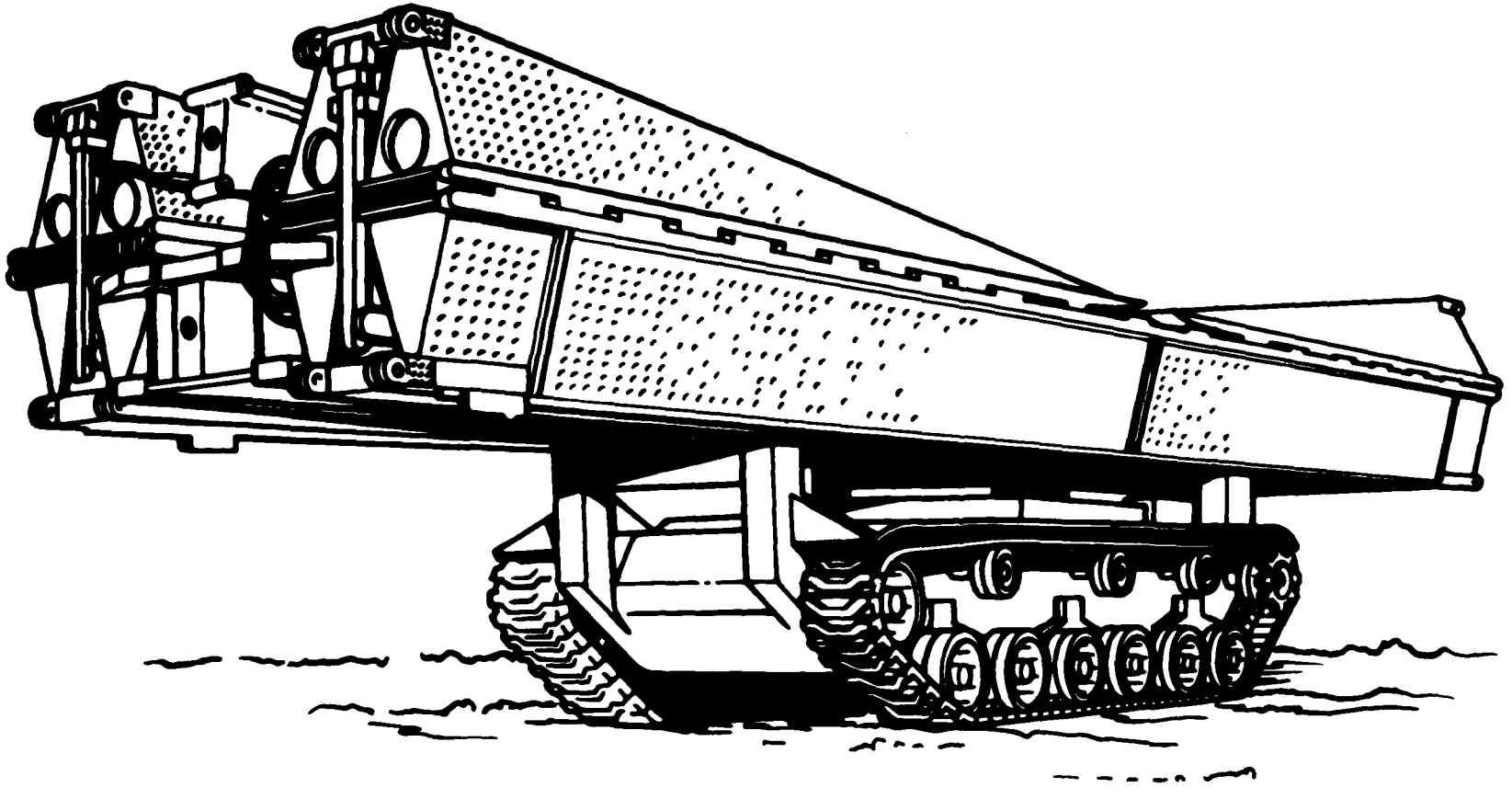
TECOM's MMT efforts are grouped under two general headings: documentation and resource conservation. Individual efforts are funded from these "parent programs." Current funding constrains TECOM to an annual program that supports approximately one-half of their planned efforts.

TECOM

COMMAND FUNDING SUMMARY
(THOUSANDS)

CATEGORY	FY84	FY85	FY86	FY87	FY88
TESTING	1000	1100	1200	1300	1400
TOTAL	1000	1100	1200	1300	1400

CATEGORY	FUNDING ($000)					
TESTING	PRIOR	84	85	86	87	88
COMPONENT -- DOCUMENTATION						
(5072) TITLE - TECOM PRODUCTION TEST METHODOLOGY ENGINEERING MEASURES		375	413	452	488	523
PROBLEM - STANDARD TEST PROCEDURES ARE REQUIRED TO INSURE THAT TEST ACTIVITIES COLLECT DATA AND CONDUCT TESTS IN A UNIFORM MANNER TO SUPPORT THE OT 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 METHODOLOGY ENGINEERING MEASURES	6844	450	494	540	564	630
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.						
(5073) TITLE - TECOM PRODUCTION TEST METHODOLOGY ENGINEERING MEASURES		175	193	208	228	247
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.						



TROOP SUPPORT COMMAND
(TROSCOM)

CATEGORY	PAGE
Bridging	221
Land Mines	221
Power Sources	222
Track	222

US ARMY TROOP SUPPORT COMMAND

(TROSCOM)

The US Army Troop Support Command (TROSCOM), located in St. Louis, Missouri has a diverse mission to improve the Army's combat readiness. The scope of their work ranges from amphibious transportation and watercraft to field support items such as rations, clothing, generators, bridges, camouflage, mine detectors, air conditioners, water purifiers, heaters, fuel storage and distribution equipment, compasses, earthmoving equipment, body armor, and parachutes.

The Belvoir Research and Development Center (BRDC) located at Ft. Belvoir, Virginia is a subordinate element of TROSCOM. All of the planned projects in this year's TROSCOM plan originated at BRDC. Major problem areas confronting BRDC include:

a. 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 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 flexibiity possible in material configuration.

b. Combat vehicle deperming. Armored vehicles have a magnetic signature which is induced by various manufacturing operations. This signature makes them vulnerable to magnetic influence land mines. Several nations, including the USA, have mines fuzed in this manner. By exploiting and implementing the knowledge gained by our NATO Allies and the US Navy, a production facility for removing the magnetic signature will be designed and fabricated.

TRUSCOM

COMMAND FUNDING SUMMARY
(THOUSANDS)

CATEGORY	FY84	FY85	FY86	FY87	FY88
BRIDGING	0	0	1290	1690	125
LAND MINES	1158	1284	0	0	0
POWER SOURCES	0	0	400	780	630
TRACK	0	0	620	770	1085
TOTAL	1158	1284	2310	3240	2040

CATEGORY	FUNDING ($000)					
BRIDGING	PRIOR	84	85	86	87	88
COMPONENT -- GENERAL						
(3803) TITLE - EFFICIENT FABRICATION OF EXTRUDED MAT PANELS.					300	125
PROBLEM - ALUMINUM DECKS AND MATS ARE LARGE EXTRUSIONS THAT ARE AVAILABLE FROM A DECLINING NUMBER OF SOURCES. AVAILABILITY OF SMALL EXTRUSIONS IS GOOD BUT METHODS FOR PREPARING A FINISHED WELDMENT FROM THEM ARE NOT QUALITY/COST EFFECTIVE.						
SOLUTION - THIS PROGRAM WILL PERFECT THE WELDING, INSPECTION, AND MANUFACTURING PROCESSES NEEDED TO ALLOW USE OF SMALLER, MORE READILY AVAILABLE EXTRUSIONS.						
COMPONENT -- STRUCTURAL MEMBERS						
(3802) TITLE - HIGH STABILITY TRUSS CHORD				300	400	
PROBLEM - USE OF BRAIDED GRAPHITE TO MAKE POSSIBLE STRONG BRIDGE SECTIONS HAS BEEN DEMONSTRATED. BUT, BARRIER TO USING BRAIDING IN PRODUCTION IS THAT A RELIABLE METHOD OF IMPREGNATING FIBERS WITH RESIN DOES NOT EXIST.						
SOLUTION - THIS PROGRAM WILL INVESTIGATE A MECHANIZED SYSTEM TO CONTINUOUSLY IMPREGNATE FIBERS DURING BRAIDING. A PILOT LINE WILL BE SET UP TO DEMONSTRATE THE PRODUCTION OF TRUSS CHORDS.						
(3804) TITLE - COMPOSITE BOTTOM CHORD FOR MILITARY BRIDGES				990	990	
PROBLEM - COMPOSITE MATERIAL FOR BOTTOM CHORDS WILL REDUCE WEIGHT BY 10 TO 20 PERCENT. USE OF GRAPHITE BOTTOM CHORDS IS LIMITED BECAUSE OF NON-AVAILABILITY OF ECONOMICAL PRODUCTION METHODS.						
SOLUTION - RDTE WORK ON COMPOSITE BOTTOM CHORDS AND TENSILE ELEMENTS HAS FORMED THE BASIS FOR THE DESIGN IN GRAPHITE. MMT PROJECT WILL INVESTIGATE TECHNIQUES AND MACHINERY AND SET UP A PILOT LINE TO DEMONSTRATE HIGH PRODUCTION RATE METHODS.						
CATEGORY						
LAND MINES						
COMPONENT -- NEUTRALIZERS						
(3796) TITLE - COMBAT VEHICLE DEPERMING PRODUCTION FACILITY	916	1158	1264			
PROBLEM - PRESENT DESIGN AND FABRICATION TECHNIQUES FOR VEHICLES RESULT IN A SIGNIFICANT MAGNETIC SIGNATURE. THIS MAGNETIC SIGNATURE CAN BE USED TO FUZE LAND MINES TO ATTACK THE VEHICLE UNDERCARRIAGE.						
SOLUTION - CONSTRUCT A PILOT DEPERMING PRODUCTION FACILITY THAT WILL ALLOW DEVELOPMENT OF A DEPERMING TECHNIQUE FOR US ARMORED VEHICLES.						

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*   C A T E G O R Y     *
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*POWER SOURCES          *
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	FUNDING ($000)				
	PRIOR	84	85	86	87	88

COMPONENT -- GENERATOR/ALTERNATOR

(3801) TITLE - FREE PISTON STIRLING ENGINE GENERATOR SET — 86: 400; 87: 600; 88: 600

PROBLEM - MANUFACTURING COSTS FOR COMPONENTS OF THE FREE PISTON STIRLING ENGINE GENERATOR SET WILL BE HIGH. GAS LUBRICATED BEARINGS, LINEAR MOTORS, MULTIFUEL COMBUSTORS AND OTHER COMPONENTS HAVE NEVER BEEN MADE IN PRODUCTION QUANTITIES.

SOLUTION - IDENTIFY OR ESTABLISH ADVANCED MANUFACTURING TECHNIQUES FOR THESE COMPONENTS AND PERFORM COST/TECHNOLOGY TRADEOFFS FOR MANUFACTURING OPERATIONS

(3833) TITLE - HIGH POWER GENERATOR STATOR COIL INSULATION — 87: 160; 88: 230

PROBLEM - CONTROLLING INSULATION THICKNESS OF THE STATOR COIL INSULATION IS CRITICAL FOR COMPACT, HIGH VOLTAGE, HIGH POWER GENERATORS. HIGH DIELECTRIC STRENGTH AND HIGH THERMAL CONDUCTIVITY ARE REQUIRED SIMULTANEOUSLY.

SOLUTION - RUTE HAS IDENTIFIED A TECHNICALLY ACCEPTABLE INSULATION SYSTEM. TECHNIQUES FOR EPOXY INSULATION APPLICATION AND HANDLING WILL BE ESTABLISHED TO REDUCE COSTS BY 50 TO 70 PERCENT.

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*   C A T E G O R Y     *
*-----------------------*
*TRACK                  *
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COMPONENT -- SHOES

(3815) TITLE - LOW VULNERABILITY TRACK + ROADWHEELS — 86: 620; 87: 770; 88: 1085

PROBLEM - IN A PRIOR PROJECT, IT WAS SHOWN THAT TRACKS AND ROADWHEELS CAN BE MANUFACTURED TO WITHSTAND ANTI-TANK MINES OF VARIOUS TYPES. HOWEVER, DURING THE MOBILITY EVALUATION HEAT BUILD-UP WAS DETERMINED TO BE EXCESSIVE. A GOOD DESIGN MUST BE LONG WEARING.

SOLUTION - EXPLORE ENERGY ABSORBING COMPOSITE MATERIALS FOR HEAT DISSIPATING QUALITIES. DEVELOP DESIGNS AND FABRICATION TECHNIQUES AND PRODUCE PROTOTYPE COMPONENTS TO DEMONSTRATE FEASIBILITY FOR MASS PRODUCTION.

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