AD-A124 180 FY82 POSTURE REPORT(U) ARMY MOBILITY EQUIPMENT RESEARCH 1/1
AND DEVELOPMENT COMMAND FORT BELVOIR VA 1982

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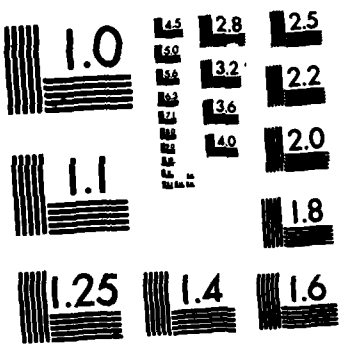

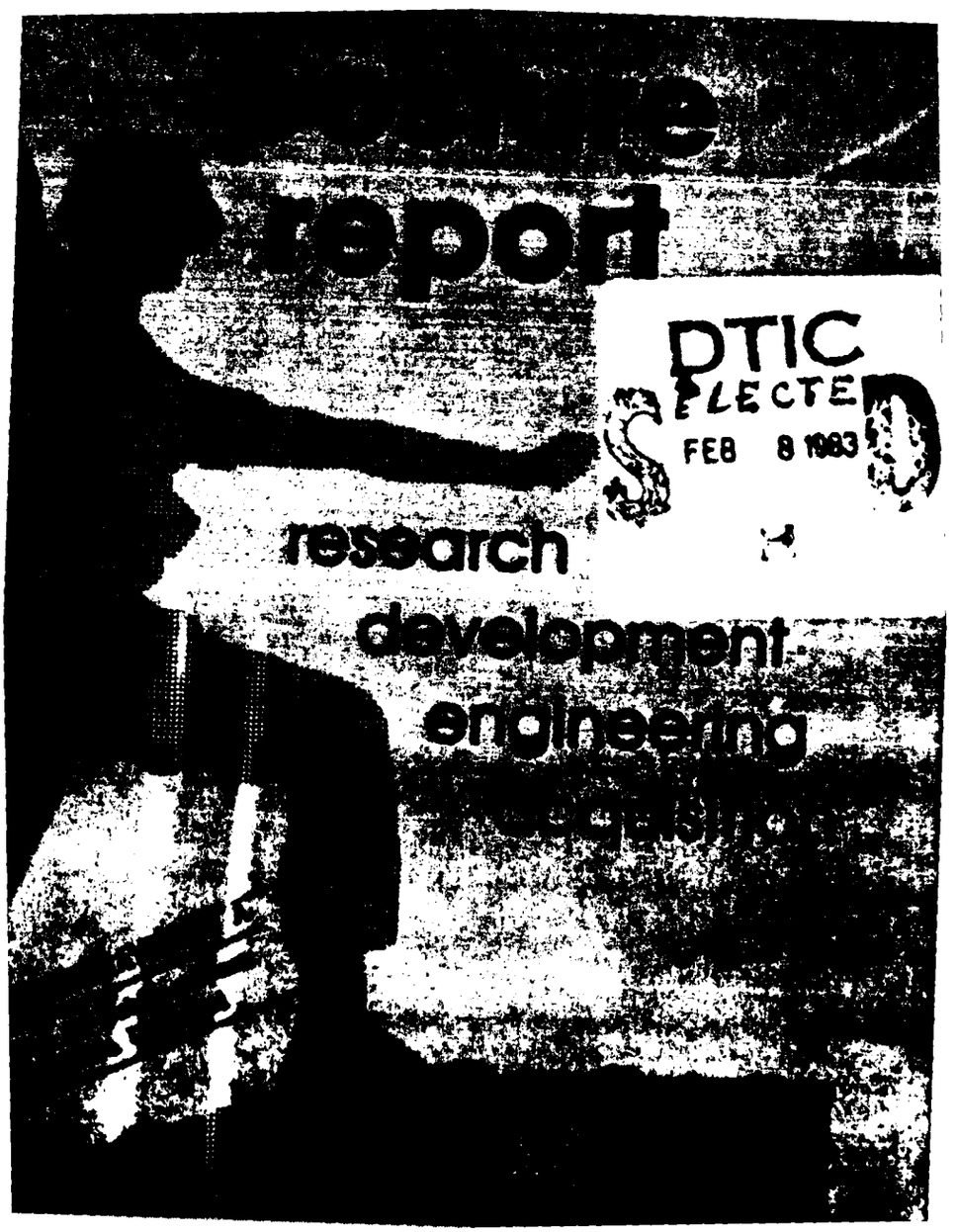
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FOREWORD

During fiscal year 1982, MERADCOM placed high priority on projects for the Rapid Deployment Joint Task Force (RDJTF), the High Technology Test Bed (HTTB), and TRADOC concepts recently introduced.

For the HTTB, the thrust has been to expedite special programs and to assist the evaluation of candidate equipment for the High Technology Light Division, such as the M-9 Armored Combat Earthmover and Small Emplacement Excavator.

In support of the RDJTF, MERADCOM procured the Tactical Water Distribution System and Small Mobile Water Chiller and fielded the LACV-30 (Lighter, Air-Cushioned Vehicle).

Combat capabilities of the Army at large were enhanced by fielding the Mine Clearing Roller and producing procurement specifications for new Airborne/Airmobile construction equipment as well as for several large construction equipment buys, such as the 14-yd^3 scraper and road grader, aimed at standardizing the Army fleet.

Efforts toward future systems included the following: assault bridging, remote minefield detection and neutralization, petroleum supply and distribution, power generation, tactical deception, and automated logistic support.

A significant management effort was devoted to improving the Command's interfaces with the TRADOC community and DARCOM Readiness Commands. These interfaces are essential to achieve economic objectives of the Deputy Secretary of Defense and the DARCOM Directions of General Keith.

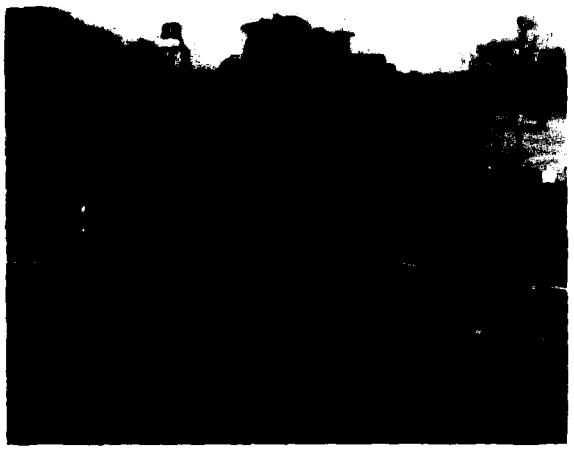
This report provides details on the major areas mentioned above and describes other achievements. MERADCOM continues to support the Army across a diverse repertoire of research and development capabilities.

Theodore Vander Els

THEODORE VANDER ELS
Colonel, EN
Commanding

MERADCOM PROGRAM AREAS

MOBILITY/COUNTERMOBILITY



To enhance the mobility of our forces and deny mobility to the enemy, MERADCOM develops mobility and obstacle systems and equipment. A major FY82 accomplishment in this area was the fabrication and initial testing of an adapter kit which permits the mine-clearing roller or its companion plow to be mounted on the M1 Abrams tank.

SURVIVABILITY

MERADCOM develops systems that increase the survivability of our forces. The Small Emplacement Excavator (SEE), a system to rapidly dig protective and fighting positions, was used successfully in a High-Technology Test Bed Exercise in October.

ENERGY

Without energy, combat forces could not move or survive. Virtually every major system needs some form of energy in order to work. Many systems also need heaters and air conditioners to perform efficiently. During FY82, this PATRIOT electric power plant was delivered to Fort Bliss for production testing and training.

LOGISTICS

MERADCOM develops logistics support equipment used to provide the material needed to sustain the fighting force. The Pipeline Outfit, Petroleum (POP) was delivered for engineering design test in FY82. It employs a hydraulic pipe-joining press to construct pipelines at rates of up to 18 miles per day.

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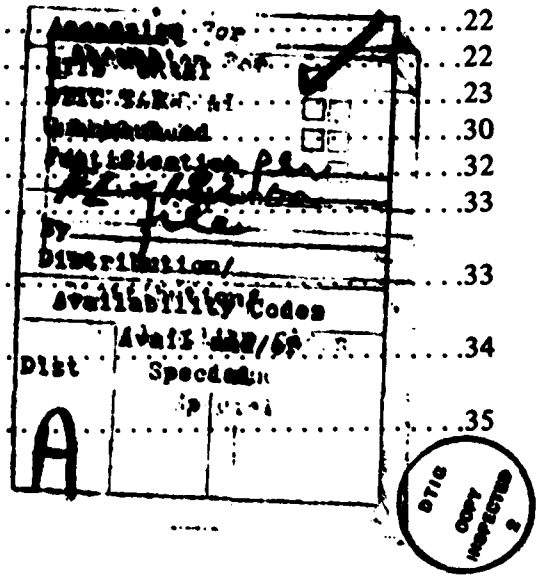
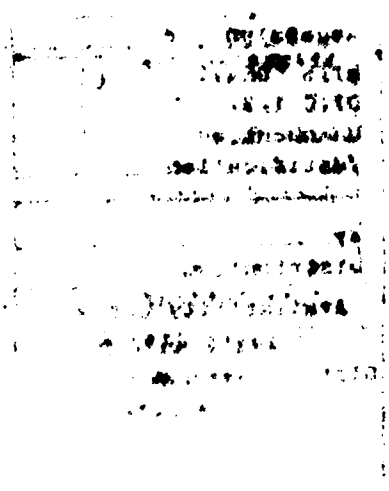




MISSION AND FUNCTIONS

INTRODUCTION

MERADCOM, located 15 miles south of the Nation's Capital at Fort Belvoir, Virginia, conducts one of the Army's most widely diversified programs in the development of combat support and battlefield support materiel designed to enhance the mobility and survivability of friendly forces and to deny mobility to the enemy. It also serves as the Army's lead laboratory for countermine and camouflage technologies. MERADCOM occupies a 240-acre wooded peninsula on the Potomac River adjacent to Mount Vernon and a 820-acre test area near Springfield, Virginia, and controls the US Army Fuels and Lubricants Research Laboratory, a Government-owned/contractor-operated facility in San Antonio, Texas.

The Command's research, development, engineering, and initial production buys are geared to satisfy approved Army requirements to provide the United States with a superior combat and deterrent force in the major program areas of Mobility/Countermobility, Survivability, Energy, and Logistics. The principal thrust of these program areas is the fielding of combat support and combat service support equipment, but additional development falling within the Command's many areas of expertise is performed for other commands, project managers, DOD organizations, and government agencies. The following are MERADCOM's FY82 principal fields of endeavor within the four major program areas:

FIELDS OF ENDEAVOR

MOBILITY/COUNTERMOBILITY	SURVIVABILITY
• Bridging	• Field Fortifications
• Countermine/Counterobstacle	• Camouflage
• Construction Equipment	• Physical Security
• Barriers	• Tunnel Detection
	• Topographic Equipment
	• Tactical Sensors
	• Tactical Deception

ENERGY	LOGISTICS
• Electric Power	• Water Supply
• Fuels and Lubricants	• Fuels Handling
• Heaters and Air Conditioners	• Supply Distribution
	• Marine Craft
	• Support Equipment
	• Material Handling

The MERADCOM organization is comprised of seven laboratories, six directorates, a variety of technical and administrative staff offices, and the Product Manager, Physical Security Equipment. The Command has a total authorized workforce of 1187 civilians and 60 military personnel. Six of the seven laboratories are commodity oriented and have the responsibility for technology base, development, nondevelopment, engineering, and acquisition support activities related to their assigned commodity areas. The seventh laboratory, Material Technology, investigates, develops, tests, and prescribes the metals, plastics, fabrics, coatings, elastomers, composites, and packaging used in a wide variety of military equipment. The laboratories and directorates are discussed in more detail in the next section.

The wide range of advanced technology resident in MERADCOM's scientific and engineering workforce attracts substantial reimbursable funding for research, development, and engineering projects from many other government organizations. Included in a long list of "customers" are the Project Managers for the Army's main battle tank (M1 Abrams), PATRIOT Air Defense Missile, and FIREFINDER Artillery Locating System, as well as several DARCOM Commands (TSARCOM, TACOM, MICOM, and ARRADCOM), the Defense Nuclear Agency, the Department of Energy, and the Army Materials and Mechanics Research Center.

In addition to research, development, engineering, and acquisition, the fielding of material for the Army hinges on several other factors. Some of these include:

- **Threat**
- **Operational Concepts**
- **Doctrine**
- **Army Organizational Structure**
- **Training**
- **Management of Resources**

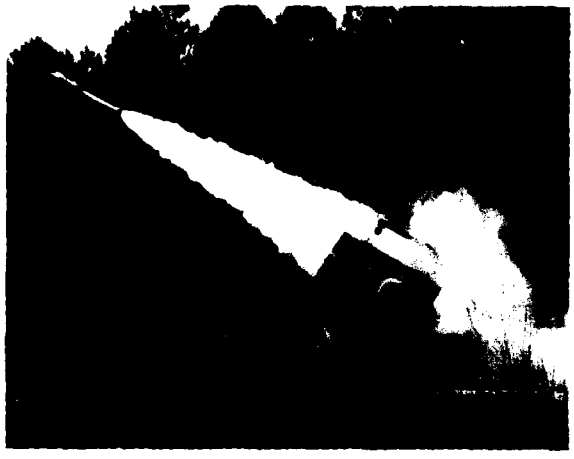
As a result, MERADCOM has established direct working relationships with a variety of other agencies. Foremost among these are Headquarters TRADOC and several proponent TRADOC schools representing the user community, logistics support agencies, and readiness commands. Additionally, MERADCOM uses the services of more than 130 contractors to accomplish its mission.

ORGANIZATIONAL RESPONSIBILITIES

The MERADCOM organizational structure is designed to achieve maximum economy of facilities and personnel by the grouping of similar functions. Within this structure each laboratory and directorate is assigned responsibilities that relate directly to specific program areas and fields of endeavor. These responsibilities are defined in the following pages and illustrate MERADCOM's mission and continued growth as an independent subordinate Command.

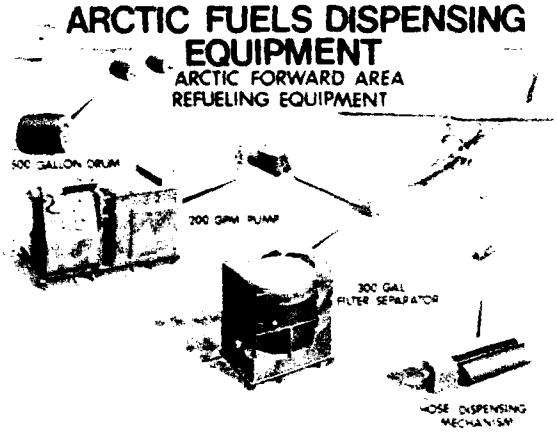
MERADCOM—DIVERSIFICATION IN SCIENCE AND ENGINEERING

COUNTERMINE LABORATORY



The Countermine Laboratory is DARCOM's lead laboratory for countermine technology. It strives to advance the technology base and develop and field equipment for mine detection and neutralization. In addition, a program for the development of a counterobstacle vehicle to overcome manmade barriers has been established. The laboratory also devises techniques for effective deployment of its systems and provides material and technical consultation for the Army's training effort. The countermine program is responding to the needs of today's Army by emphasizing technology for neutralization and remote detection of minefields.

ENERGY AND WATER RESOURCES LABORATORY

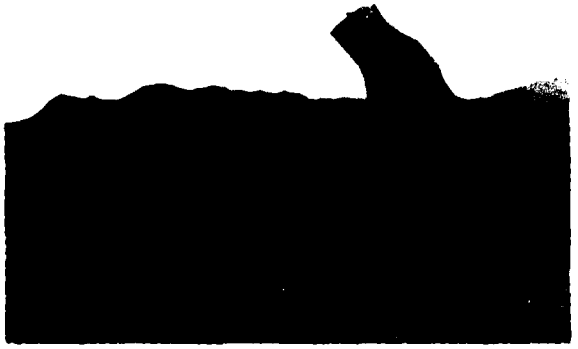


The Energy and Water Resources Laboratory is concerned with providing fuels, lubricants, grease, preservatives, power transmission fluids, and related products to the Army. In addition, the laboratory studies alternatives to conventional fuels such as gasohol, shale oil products, and coal products. Also included in the laboratory mission is the development of systems for the handling, distribution, and storage of bulk petrol (gasoline), oil, lubricants (POL), and water; equipment to purify water; equipment and techniques for pollution abatement; and support of fire fighting and fire suppression equipment. The laboratory continues to serve as the focus for Army Mobility Energy Research and Development and supports the critical water supply equipment needs of the Rapid Deployment Joint Task Force.

ELECTRICAL POWER LABORATORY

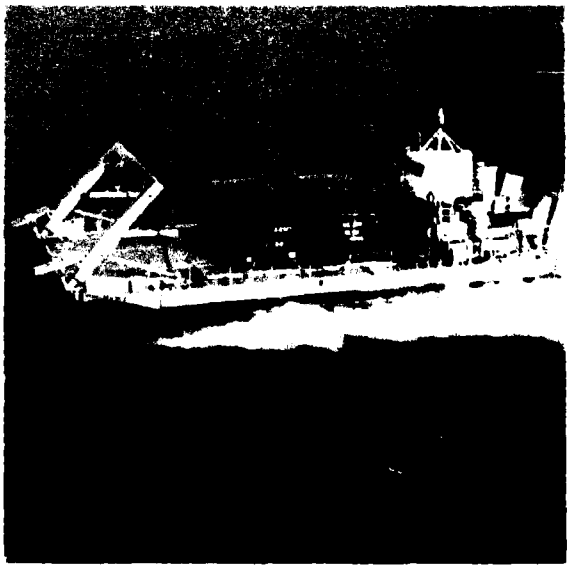
The Electrical Power Laboratory is responsible for research, development, and engineering support for the Army's mobile electric power sources, heaters, air conditioners, general-purpose lighting, and power distribution systems. Electric power sources and environmental control systems are essential to nearly all weapons, communications, and support systems in the modern Army. The laboratory provides engineering support for the acquisition and improvement of the Army's standard families of these items and conducts research and development programs for new items to meet Army requirements. Included are fuel cell power units for silent power needs, solid-state power conditioner units, energy-efficient air conditioners, compact gas-turbine-driven generators, multifuel space heaters, and solar cell power systems.

COUNTER SURVEILLANCE/ COUNTER INTRUSION LABORATORY



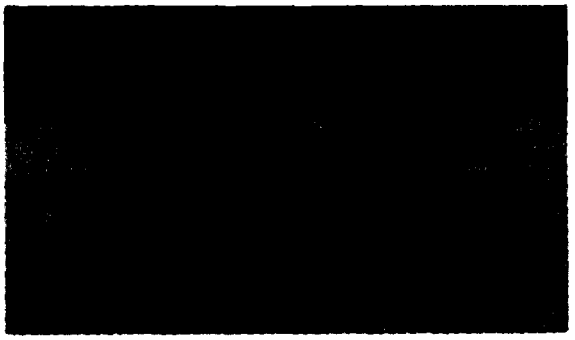
The Counter Surveillance/Counter Intrusion (CS/CI) Laboratory has been designated as the developer of all DOD Interior Physical Security Equipment as well as Exterior Perimeter Lights and Barriers. This joint service responsibility is designed to thwart theft, vandalism, and sabotage and is focused on the protection of nuclear and chemical storage sites as well as other sensitive installations. Other major mission areas of the laboratory are field fortifications, including rapid excavation to enhance battlefield survivability, tunnel detection, and tactical sensors. As DARCOM's lead laboratory for camouflage technology and tactical deception, the CS/CI Laboratory is responsible for countering and deceiving threat detection and target acquisition systems across the electromagnetic spectrum, including ultraviolet, visual, near and thermal infrared, radar, and certain laser wavelengths. Currently major emphasis is on increasing the survivability of Army units and systems through a new tactical deception program. The CS/CI Laboratory is responsible for the program management and system integration efforts as well as the development responsibilities for the multispectral aspects of the program. In the topographic area, the CS/CI Laboratory has the mission of production engineering, technical support to procurement, and field support for topographic, surveying, mapping, and materiel testing equipment.

MARINE AND BRIDGE LABORATORY



The Marine and Bridge Laboratory is responsible for research and development to improve the Army's capabilities in marine supply distribution and gap crossing systems. The supply distribution area covers a broad development and modernization effort in marine vessels including boats (tugs, harbor service), logistic support vessels, landing craft, barges, and amphibians. The most noteworthy current project is the recent fielding of the first production LACV-30 air-cushion craft for use in logistics over-the-shore (LOTS) supply operations. Counterbarrier programs include the military design of tactical bridging and associated systems to provide land forces the means to cross both wet and dry gaps. Priorities are the development of both light and heavy assault bridges for dry gaps and light assault rafts for wet gaps. Work is also underway on bridge access/egress systems and the use of new composite materials in bridge structures.

MECHANICAL AND CONSTRUCTION EQUIPMENT LABORATORY



The Mechanical and Construction Equipment Laboratory performs application and development engineering of equipment to meet the Army's combat, mobility, and logistic support needs for construction equipment, supply distribution and materials-handling equipment, railway equipment, diving equipment, maintenance equipment, compressors, and gas generating equipment. The laboratory also conducts a commercial equipment evaluation program to determine whether commercial construction and materials-handling equipment can be procured off-the-shelf or adapted to satisfy the user's need. Emphasis in the logistics area is on evaluation of materials-handling problems at the interface of the various modes of transportation including off-and-on loading of ships, trucks, and planes and operations in depots and forward storage areas. Considerable effort is performed in the containerization and ammunition-handling areas. The laboratory is the point of contact for all Army diving equipment and prepares the DOD handbook for container equipment.

MATERIAL TECHNOLOGY LABORATORY

The Material Technology Laboratory supports MERADCOM's total program through basic and supporting development, testing, evaluation, and engineering in the fields of chemistry, chemical coatings, organics, plastics, ceramics, metallurgy, composite materials, rubber, adhesives, coated fabrics, radiation, packaging, and transportability. The laboratory is the Command's representative for all transportability matters related to materiel development and manages the Materials Testing Technology (MIT) program for MERADCOM. This laboratory also develops and evaluates materials to conform to Federal, Environmental Protection Agency (EPA), and Occupational Safety and Health Act (OSHA) regulations; provides DARCOM health physics support in testing and evaluating radiation problems; serves as the Office of Primary Responsibility for packaging of hazardous materials; is a primary DARCOM laboratory for the Materiel Deterioration and Control (MADPAC) program; and offers technical assistance and consultation services to the military and civilian community.

PROGRAMS AND ANALYSIS DIRECTORATE

The Programs and Analysis Directorate is the focal point for program planning, budget formulation, and integration in the areas of research technology, development, engineering, and acquisition. The directorate's principal functions include research, development, and acquisition program planning, and execution support; systems analysis; management of international programs; foreign intelligence support; life-cycle management support; production base support; management of first-time-buys; and management of product improvements. Other functions include crisis management, contingency planning, and evaluation of the Command's readiness posture and environmental quality. The directorate also maintains liaison with Headquarters TRADOC, the TRADOC schools, and the 9th Infantry Division High-Technology Test Bed.

INTEGRATED LOGISTICS SUPPORT AND ENGINEERING DIRECTORATE

The Integrated Logistics Support and Engineering Directorate manages and provides the focal point for programs in integrated logistics support, force modernization, configuration and data management, value engineering, producibility engineering and planning, equipment improvement recommendations, and metric conversion planning. The directorate also manages the DOD Standardization Program at MERADCOM; operates a system which microfilms, reproduces, and distributes engineering data; and provides logistic support and procurement data for production of newly developed equipment. MERADCOM has established a centralized ILS management program along with a functional ILS capability in the laboratories. The milestones in the Integrated Logistic Support Milestone Reporting System (ILSMRS) has been incorporated into the MERADCOM computerized Life-Cycle Management Model (LCMM). The Directorate also maintains an automated data base for the Logistic Support Analysis Record (LSAR).

MANAGEMENT INFORMATION SYSTEMS DIRECTORATE

The Management Information Systems Directorate supports MERADCOM and DARCOM scientists, engineers, and administrators in the areas of Command Information Systems, Project Management, analysis, programming, computer simulations and models, specialized experimental design and analysis, software development, and office automation. The Computer Center has continued to upgrade services by providing increased capacity and faster access disk file storage, a higher line speed communications front ends, and a high-speed swap device for interactive jobs. Facilities now include Control Data 170-730 and PRIME 750 Computer Systems; a color graphics terminal with paper and transparency printer; a mini-micro computer laboratory; and a complete library of mathematical, statistical, graphics, scientific, engineering, and data base management software. The addition of upgraded terminals, word processors, multifunction workstations, and an IBM 4341 mini-computer in 4Q82 will provide significant new service capabilities.

PROCUREMENT AND PRODUCTION DIRECTORATE

The mission of the Procurement and Production Directorate is to set procurement policy for the Command to procure supplies and services applicable to the research and development and initial production missions of MERADCOM. In addition, this Command directorate provides procurement support to tenant activities such as Night Vision and Electro-Optics Laboratory, Facilities Engineering Support Agency, Engineer Topographic Laboratory, Computer Systems Command, and Defense Systems Management College. In FY82, the directorate executed 13,287 individual procurement actions aggregating about $302 million. Of this, the tenant activities awards amounted to $58 million. Also included were Small and Disadvantaged Business awards totaling about $109 million.

PRODUCT ASSURANCE AND TESTING DIRECTORATE

The Product Assurance and Testing Directorate manages and executes a comprehensive program of evaluation and testing of MERADCOM's equipment during the research, development, preproduction, and production phases. The Quality and Reliability Division monitors the Command's first-time-buys to determine the acceptability of material for fielding and implements MERADCOM's Test Policy and Independent Assessment functions. The Electrical and Mechanical Division and the Environmental and Field Division are dedicated to testing materiel used in a variety of facilities under different environmental conditions. These include actual field testing of mobile equipment or testing equipment under simulated conditions through the use of hi-lo temperature and altitude chambers, shock and vibration machines, rain test fixture, and others.

SERVICES AND SUPPORT DIRECTORATE

The Services and Support Directorate provides assistance to the Command and customers in support of their missions by furnishing library, administrative, supply, and property services. Control, management, and maintenance of installation equipment is provided by the MERADCOM Equipment Manager. A mission accountable office serves MERADCOM and tenant activities and provides consolidated property book accountability. The directorate provides complete support for processing travel requests, official mail, publications, blank forms, telecommunications, and passport services. Shop facilities are available for the fabrication and modification of items ranging from precision instruments to mobile bridges. Audio-visual facilities provide the still photography, graphic arts, motion pictures, video tapes, photo instrumentation, and technical reports required to support RD&E programs.

PERSONNEL AND FISCAL RESOURCES

PERSONNEL RESOURCES

Fiscal Year 1982 was a significant year for MERADCOM with regard to personnel. As a result of the lifting of the hiring limitation imposed by Headquarters DARCOM during the end of FY81, MERADCOM began FY82 with 1214 civilians assigned and 37 new hires waiting to be assigned. Consequently, manpower resources assigned by the end of the first month of FY82 (October 1981) exceeded the Command's authorized strength. This condition continued through most of FY82, until Headquarters DARCOM imposed a decremented year-end ceiling of 1177 (23 below the authorized civilian strength). The Command met the lower ceiling through use of a hiring freeze during 4QFY82 and a number of other carefully selected personnel management techniques.

Other actions that have impacted on the manpower profile of the Command during FY82 are the reassignment of PM-M9/ACE, formerly PM FAMECE/UET, from MERADCOM to TACOM and the transfer of accountability and control of the Test, Measurement, and Diagnostic Equipment (TMDE) Division from the Product Assurance and Testing Directorate of MERADCOM to a centralized Army TMDE Headquarters at Redstone Arsenal, MICOM. These two actions reduced MERADCOM's authorized strength from 1219 civilians and 74 military to 1187 civilians and 60 military at the beginning of FY83. While this was a loss of 34 civilian authorizations and 14 military authorizations, the Command received a gain of two civilian spaces in Procurement for FY82.

Increased emphasis in recruiting within the Command and liberal use of the RESHAPE Overhire Initiative accounted for the high strength figures throughout FY82. However, a continuing problem with CIVPERSINS, the official strength report originating with input from the Fort Belvoir CPO, resulted in a distorted view of not only MERADCOM's workforce, but also for all of the Department of the Army, as evidenced by a letter to all DARCOM Commands from Headquarters DARCOM's Director of Personnel, Training and Force Development. The monthly CIVPERSINS Reports have consistently overstated the strength of the Command. The CIVPERSINS average Command strength for FY82 was 1293, while actual figures maintained by the MERADCOM Force Development and Training Office reflected an

average strength of 1248. However, a concerted effort on the parts of both MERADCOM and the Fort Belvoir CPO brought this report within one of the actual end strength on 30 September 1982.

In accordance with DARCOM Regulation 10-1, MERADCOM requested approval on 22 June 1981 to combine the Camouflage and Topographic Laboratory and the Counter Intrusion Laboratory. DARCOM approved the request on 24 September 1981 and the Counter Surveillance/Counter Intrusion Laboratory was fully operable at the beginning of the fiscal year. Four Concept Plans were approved for element reorganizations below the LAB/DIR/OFC level. These reorganization efforts were required to meet increasing missions with decreasing resources. The Command closed out FY82 with an end strength of 1167, which is well within its decremented ceiling of 1177.

During 4Q82, MERADCOM initiated planning and laid the groundwork for an internal reorganization designed to improve the alignment of the technical structure with user activities and requirements. A second primary focus is increased attention to readiness considerations as developments proceed. An interim organization of the headquarters staff, slightly modifying existing structure, was implemented 1 Oct 82. Committees of senior managers continue work on details of the overall organization. Targets are delivery of a concept plan briefing early in 1983 and subsequent execution of the plan during FY83.

Profile of MERADCOM Workforce

A. TOTAL WORKFORCE

	Required	Authorized	Actual
Civilians	1358	1200	1167
Military	78	71	66
Aggregate Total	1436	1271	1233

B. ON-BOARD STRENGTH

Civilian:	SS	1
	Permanent GS	1057
	Temporary GS	13
	Part-Time GS	8
	WAE	0
	Permanent WG	88
	Temporary WG	0
	Total Civilian	1167
Military:	Officers	21
	Warrant Officers	1
	Enlisted	44
	Total Military	66
Special Programs:	Cooperative Office Ed	0
	Summer Employment Youth	0
	DA Interns	41

C. PERSONNEL DATA

	Auth	On-Board	Doctors	Masters	Bachelors	Tech	Av Grade
Military	71	66	0	10	10	23	—
Civilian	1200	1167	37	106	348	116	9.58595
Total	1271	1233	37	116	358	139	9.58595

FISCAL RESOURCES

The total budget from which MERADCOM financed its operation in FY82 was $454.3 million. Of this, $271.2 million was FY82 funds and $183.1 million was carryover funds from prior years. This budget represents a 22-percent increase over the FY81 budget. As in FY81, the largest portion of the FY82 budget (70 percent) came from Procurement funds. Approximately $233M million was in support of first-time-buy programs.

RDTE funds totaled $102 million, with $10 million being carryover. Reimbursable funding decreased by $15.1 million, while support to Project Managers increased from $12.9 million to $17.3 million.

A significant change in direct funding was realized in the Countermine program area with an increase of approximately $4 million. Increases of approximately $1 million each were realized in Electrical Power, Bridging, and Fuels-Handling program areas; the Water Purification area decreased by approximately $1 million. Overall the direct RDTE program increased by approximately 16 percent.

The accompanying table illustrates the ratio of outside/inside obligations for FY82. Fiscal obligation targets of authorized funds established by DARCOM were 95.5 percent for RDTE, 100 percent for OMA and $99 million for OPA. Through intensive top level management, these targets were met or exceeded. OPA obligations were 122 percent of target, and RDTE obligations exceed 103 percent.

FY82 FUNDING
FROM ALL SOURCES INCLUDING CUSTOMERS
(AS OF 30 SEP)
($ in thousands)

DARCOM HQ RDTE FUNDS	FY82 SUBTOTAL	FY82+1 SUBTOTAL
6.1 RESEARCH	1,609	1,944
6.2 EXPLORATORY DEVELOPMENT	10,734	11,317
6.3 ADVANCED DEVELOPMENT 6.3A	9,406	11,085
6.3B	11,796	11,541
6.4 ENGINEERING DEVELOPMENT	12,391	13,937
6.5 MANAGEMENT AND SUPPORT	5,411	6,408
TOTAL MISSION	51,347	56,232
OTHER RDTE		
DARCOM OTHER	38,587	57,907
NON-DARCOM	4,169	6,815
NON-ARMY	7,956	9,611
RDTE TOTAL	102,059	130,565
PROCUREMENT FUNDS		
DARCOM HQ	233,319	249,939
OTHER	16,554	22,000
NON-DARCOM (OTHER ARMY)	1,692	72
NON-ARMY	67,550	29,132
OPA TOTAL	319,115	301,143
OMA FUNDS		
DARCOM HQ	14,571	12,355
OTHER	18,496	18,000
OMA TOTAL	33,067	30,355

OUTSIDE/INSIDE OBLIGATIONS
(as of 30 SEP)

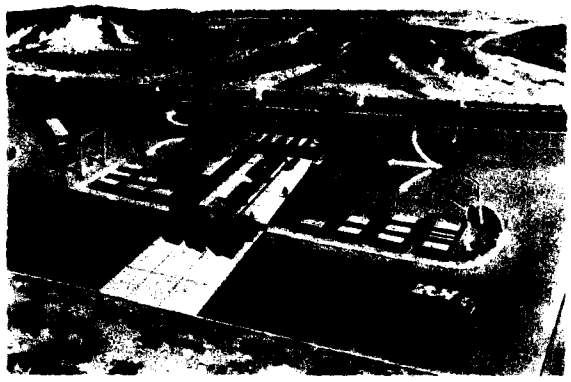
EFFORT		Industry and Academia Contract Total** Obligations		Other DARCOM Labs Contract Total** Obligations		Other Government Agencies Contract Total** Obligations		Estimated Cost to Administer*	
RDTE Funds	in $000	in $000	%	in $000	%	in $000	%	in $000	%
6.1	1600	607	38	—	—	165	10	32	2
6.2	10695	5172	48	676	6	510	5	321	3
6.3a	9388	5160	55	2128	23	217	2	282	3
b	11345	6737	59	353	3	200	2	227	3
6.4	12125	4713	39	273	2	3462	29	243	2
6.5	5409	1123	21			60	1	54	1
6.7									
MISSION TOTAL	50562	23512	47	3430	7	4614	9	1159	2
DARCOM OTHER	30074	20345	68	89		1959	7	902	3
NON-DARCOM (Other Army)	4026	825	20			356	9	121	3
NON-ARMY	9921	8125	82	87	1			298	3
RDTE TOTAL	94583	52807		3606		6929		2480	3
PROCUREMENT FUNDS									
DARCOM	139784	131034	94	8750	6			5591	4
NON-DARCOM (Other Army)	1620	1620	100						
NON-ARMY	41418	41418	100						
OPA TOTAL	182822	174072	95	8750	5			5591	4
OMA FUNDS									
DARCOM	27680	3504	13	1344	5			1107	4
NON-DARCOM (Other Army)									
NON-ARMY									
OMA TOTAL	27680	3504	13	1344	5	209		1107	4
GRAND TOTAL	305085	230383	76	13700	4	7138	2	9178	3

*In-House cost for purely administrative duties, both technical and managerial. Since these costs are to run, not use, the contract, do not include costs for parallel work, coupling with related work, testing or exploiting.

**Total obligations for each line; i.e., 6.1, 6.2, etc.

NOTEWORTHY TECHNICAL CONTRIBUTIONS

PALS
CONTAINER OUTLOADING FACILITY - SVADA



Prestaged Ammunition Loading System (PALS). Major progress was made in the Advanced Development phase of the PALS program in FY82. The Prestaged Ammunition Loading System (PALS) will enable the Army to take advantage of containerization in shipping, handling, and outloading of ammunition from igloo to rail line to commercial transporter. Palletized loads of ammunition are moved by forklift from the source to a transfer vehicle equipped with a cargo self-loading and discharge floor cable system. The transfer vehicle carries the load to the PALS outloading facility where it is discharged on a series of prestaging conveyors. The conveyors use powered rollers to move the load to an area where it is configured and centered. The configured load moves through optical scanners which read bar codes on the palletized ammunition and produce shipping and inventory documents. The load then moves onto a dock-mounted loader which places it in a commercial transporter for shipment. The PALS system provides the capability to outload 100 containers of ammunition per depot day by reducing loading from 2 hours to 15 minutes and reduces personnel requirements from 221 to 91 to outload this amount of ammunition.

Composite Bridge Components. Composite materials have been developed for use in lightweight bridge components. The application of composite materials reduces the weight of tactical bridges, resulting in a reduction in weight of vehicles required to carry and emplace them. Reduced weight due to composite materials will improve the overall mobility of Army field forces. Two bridge components have been produced to date. A panel designed to replace an all-aluminum bridge girder bottom chord was fabricated using a filament winding process. The panel is made with a 1/8-inch aluminum skin on the top and bottom with a 3/8-inch-high modulus graphite epoxy core. Proof testing of the panels incorporated into bridge bays increased the military load classification (MLC) of all aluminum bays from class 60 (69 tons) to class 70 (80 tons) for the bays with the composite sandwich panels. In addition, design and full-scale tests of an all-composite (graphite epoxy) 31-meter traversing beam for launching long-span assault bridges was completed.

Fire-Resistant Fuel (FRF). The fire-resistant fuel program involves the development of fuel with the properties to eliminate the fuel fire threat associated with ballistic penetration of combat vehicles. Currently, the approach is to use a water-in-fuel micro-emulsion where the dispersed water serves to extinguish fuel pool fires. The current formula is 10 percent water, 6 percent emulsifier and 84 percent diesel fuel. However, a potential filterability problem has occurred at 0° C (32° F) in a fuel system simulator for the family of two-cycle diesel engines. A reduction in fuel flow has occurred because of the separation of ingredients at the fuel filter surface. Additional research is being conducted to determine if this fuel flow problem occurs in all vehicle fuel systems. In addition, the research will further define the allowable variances in the amount of each ingredient and still maintain satisfactory performance and reliability of field-formulated fire-resistant fuels used to power diesel or gas-turbine engines. Considerable data have been developed regarding the fuels' flammability, performance in engines, and physical and chemical properties. Success of the fire-resistant fuel program will result in increased survivability and recoverability of vehicles, crew members, and the fuel itself.

NOTEWORTHY TECHNICAL MANAGEMENT ACTIONS

High-Technology Test Bed (HTTB) Support. Recent world events have demonstrated the need for a highly mobile, lethal, strategically deployable fighting force. In order to test new operational organizational and material concepts for the mid 1980's, the 9th Infantry Division was designated the High-Technology Test Bed (HTTB). In FY82, support for the HTTB gained increased emphasis. A Quick-Response Program (QRP) was initiated to expedite the material acquisition process and provide items for testing with the HTTB. MERADCOM currently has responsibility for QRPs for Tactical Deception Devices, Portable Mechanical Earthmover, High-Mobility Material Handler, and Palletized Loading System (PLS). HTTB support is one of this Command's highest priority programs and to date MERADCOM has been successful in providing the 9th ID the M-9 Armored Combat Earthmover (ACE), the M58A1 Mine-Clearing Line Charge (MICLIC), the Small Emplacement Excavator (SEE), and several protective shelter covers for testing.

Airland Battle 2000 Initiatives. Implementation of the TRADOC Concept Based Acquisition System and subsequent publishing of the Airland Battle 2000 Operational Concept is recognized as an important step by the Army to identify future user requirements. The concept is directed at identifying material needs early, so that the development process can field the equipment in the time frame it is required. In support of TRADOC, DARCOM has implemented a number of initiatives to insure awareness of the concept throughout the DARCOM community. In May 1982, MERADCOM participated with other DARCOM Commands in the AUSA Airland Battle 2000 Symposium where TRADOC presented its concept for how the battle will be fought in the year 2000 and beyond and what systems will be required to fight the battle, and MERADCOM presented the long-range material development plan for meeting the user's needs in its functional areas. MERADCOM has established a Future Requirements Coordinating Team which works with TRADOC user representatives to determine future material needs. These needs are now being incorporated into the MERADCOM R&D Plan and will be updated annually. These initiatives are all directed to insure timely development of the material the Army will need on the future battlefield.

Surface-Launched Unit Fuel-Air Explosive (SLUFAE) Mine Neutralization System. Despite continued strong user support, the SLUFAE program was in a state of turmoil. The system was not funded for procurement in the FY84-88 Program Objective Memorandum (POM) resulting in R&D efforts being unfunded for nearly three quarters of FY82.

Intensive management efforts were initiated to get the program back on track. While efforts continued to get the program funded, planning continued in preparation for full-scale production and improvement programs for certain components of the system. A Product Improvement Program (PIP) for the XM130 high-explosive rocket was developed to improve reliability and performance and to decrease production costs. When implemented it will result in a savings of over $4 million. A Value Engineering Proposal initiated by the user to make the XM130 training rocket more durable could result in savings in excess of $5½-million. The M985 truck was recently designated the resupply vehicle for SLUFAE; however, the XM618 rocket shipping and storage container is not compatible with the truck. A program to develop a reinforced plastic rocket container will be started to solve the compatibility problem and reduce production, maintenance, and logistics costs.

MANAGEMENT ACHIEVEMENTS

Completing six years as a major subordinate Command of DARCOM, MERADCOM has grown in total capability to manage and accomplish its total mission with excellence. Establishment of priorities within MERADCOM for R&D projects, detailed analysis and critical review of technology base programs, utilization of life-cycle management techniques, successful first-time-buy programs, and maintenance of excellent relationships to assure easy transition to Readiness Commands are areas wherein resources and efforts have been concentrated.

PROGRAM MANAGEMENT

MANAGEMENT BY OBJECTIVES

The MERADCOM managerial philosophy features a high degree of decentralization of responsibility to operating organizational elements. Management by objectives (MBO) is used wherever possible. The Commander, MERADCOM, established the top objectives for FY82 to focus management performance throughout the year. These objectives are summarized as follows:

TOP TEN OBJECTIVES

OBJECTIVE:

Equal Employment—Accomplish the goals and objectives outlined in the Equal Employment Opportunity Affirmative Action Plan.

OBJECTIVE:

Merit Pay—Implement fully the Civil Service Reform Act (CSRA) for Merit Pay.

OBJECTIVE:

Workforce Improvement—Continue effective recruitment, utilization, development, and retention of the workforce.

OBJECTIVE:

ILS—Achieve early and full integration of Integrated Logistics Support into the acquisition process and an effective ILS interface with appropriate readiness commands.

OBJECTIVE:

Tech Data Packages—Accomplish timely completion of Technical Data Packages for materiel acquisition.

OBJECTIVE:

Expedite Development—Accomplish development of top-priority development/nondevelopment and first-time-buy items expeditiously.

OBJECTIVE:

Stabilized Programs—Achieve improved planning and stabilization of MERADCOM programs in response to user requirements.

OBJECTIVE:

Procurement—Achieve greater teamwork between all parties involved in the procurement process.

OBJECTIVE:

Fiscal Obligations—Goal-oriented planning and execution of fiscal obligations and disbursements.

OBJECTIVE:

Future Strategy—Develop future strategy and institutional plan for MERADCOM.

DEVELOPMENT PROGRAM

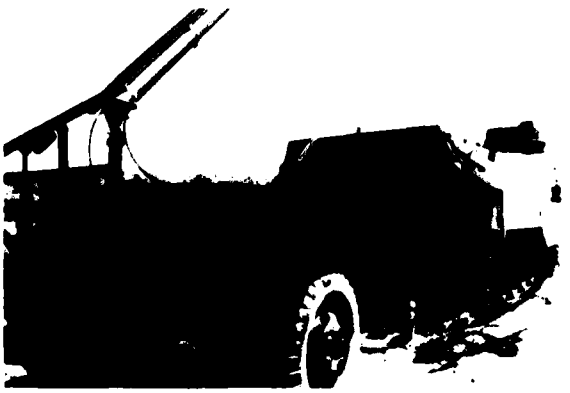
During FY82, one of the Command's Top Objectives was the intensive management of the Command-designated Top-Priority Developmental, Nondevelopmental and First-Time-Buy Items. The Top-Priority Items were selected by the Command Group based primarily on the yearly DARCOM reviews, TRADOC and DCSOPS priorities, and other contributing factors.

TOP-PRIORITY ITEMS

AIRBORNE/AIRMOBILE CONSTRUCTION EQUIPMENT

● **Airborne/Airmobile Tactical Construction Equipment.** A need exists for the replacement of tactical construction equipment in Army airborne and airmobile combat engineer units. Present equipment (i.e., scoop loaders, graders, crawler dozers, scrapers, and water distributors) is worn out, is exceeding its designated service life, and is of older design which does not provide the many technical advantages of state-of-the-art commercial equipment. The user has established a requirement for a new fleet of equipment to consist of current, state-of-the-art, construction equipment that is proven commercially and is capable of deployment in an airdrop and/or airmobile mode with current Army and Air Force aircraft. Contracts were awarded for all six types of equipment in FY82. First-article testing is underway on some of the items. Testing of the 32-foot airdrop platform by the USAF and live-drop testing of the scraper at Fort Bragg were successfully completed. Deliveries are expected to start early in 1983 for some items and extending into 1984 for some of the more complex items such as the scraper and water distributor.

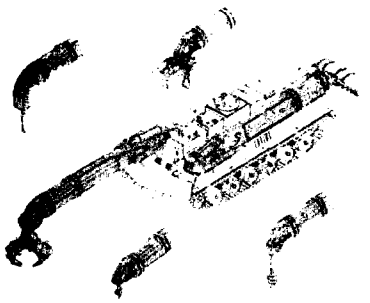
● **Small Emplacement Excavator (SEE).** The Army has identified a requirement for a small lightweight excavator with tactical mobility comparable to supported wheeled units. This tractor will be utilized to provide defilade or covered positions to improve the survivability of weapons systems, combat support systems, and the individual fighting soldier. The high mobility of the Small Emplacement Excavator (SEE) will provide the US Army Forces with an earthmoving machine capable of rapid movement between battle positions. Present mechanical excavation equipment is limited to crawler tractors, scoop loaders, and backhoe/loaders. All three machines have extremely low mobility and, therefore, must be transported by available truck/trailers for high-speed travel. The SEE will be transportable in current military aircraft and be capable of airdrop and Low-Altitude Parachute Extraction (LAPES) as well as externally transportable by medium-lift helicopter. It will be capable of highway speeds and have tactical mobility similar to supported tactical wheeled vehicles. The tractor will be equipped with a front-mounted bucket and rear-mounted backhoe. A front-mounted dozer blade can also be attached in the front with a quick-hitch assembly. Auxilliary hydraulic tools such as pavement breakers, rock drills, and augers are also being provided. Initial procurement is programmed in FY84 with a 5-year multi-year program planned. The SEE tractor will replace the current backhoe/excavator in the light and heavy combat divisions.



● **Mine-Clearing Line Charge (MICLIC).** In previous years, the user reviewed countermine line-charge equipment in the US Army inventory and decided that existing systems such as the M173 demolition kit failed to meet current requirements. Chief deficiencies were lack of mobility and reliability connected with fuzing. In order to achieve the required countermine

capability in the shortest time, DARCOM conducted an International Material Evaluation (IME) program with UK Giant Viper mine-clearing system. In FY82, the user reviewed the results of the IME program and concluded that the Giant Viper would not meet requirements on the basis of cost-effectiveness and fuze safety problems. In 3QFY82, the user identified the US Marine Corps M58A2 as a new candidate for the Mine-Clearing Line Charge and requested MERADCOM initiate the process to type classify the M58A2 for the Army. The M58A2 is a rocket-propelled line charge mounted on a trailer. The trailer is towed to the edge of the minefield by an armored vehicle and explosives can be remotely launched to clear a lane through the minefield. In July 1982 MERADCOM began formal coordination activities among the materiel and combat developer communities and the Marine Corps to adopt the M58A2 for Army purposes as a Nondevelopment Item.

● **Airborne Minefield Detection System (AMIDS).** Remote detection of minefields has been recognized as an important objective since 1953, with major research effort expended up until 1963. Because of the Southeast Asia conflict, the program received little interest and was not revived until 1977. Warsaw Pact forces have developed tactics, doctrine, and equipment that emphasize the use of flank protective minefields during offensive operations. Remote detection of minefields is now recognized as one of the highest priority requirements for US Forces. The AMIDS program has been implemented to meet this requirement. The system consists of two principal components: (1) The Alternate Mission Payload (AMP) which will be compatible with the existing Army remotely piloted vehicles (RPV) and allows acquisition of the imagery required to identify minefields from a distance; and (2) the forward Deployed Ground Station (FDGS) which will receive imagery from the AMP, processes the data and provides either a direct-image display to the operator or a cued display that analyzes the imagery for the operator. Efforts for AMIDS this fiscal year have been toward development of a miniaturized high-resolution scan, RPV Compatible Sensor Package and development of a computer algorithm that extracts minefield features from imagery. During preliminary data collection efforts with existing sensors, there has been sufficient success in identifying patterned minefields under some environmental and operational scenarios and the critical technical barriers have been identified for a concentrated R&D effort.

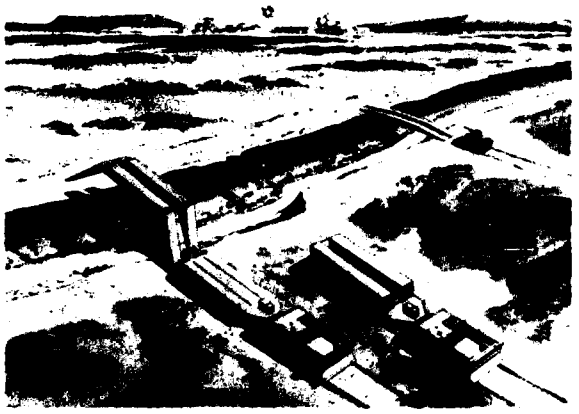


COUNTEROBSTACLE VEHICLE (COV)

● **Counterobstacle Vehicle (COV).** The COV is a MERADCOM effort to provide combat engineer units the capability to overcome obstacles, such as antitank ditches, berms, log cribs, abatis, and minefields, and clear a path through rubble in built-up areas. The program started relatively low-keyed in FY81 but took on high visibility in FY82 with a Memorandum of Understanding between the United States and Israel, signed in September 1981, to cooperate on the research and development of the COV. The COV incorporates the M88 Tank Recovery Vehicle Chassis with an improved engine to provide increased draw-bar pull and a power takeoff. The vehicle will feature articulating digging arms and a full track-width dozer blade for countermine and obstacle removal operations. BMY Corporation of York, Pennsylvania, is the prime contractor and is fabricating prototype for testing.

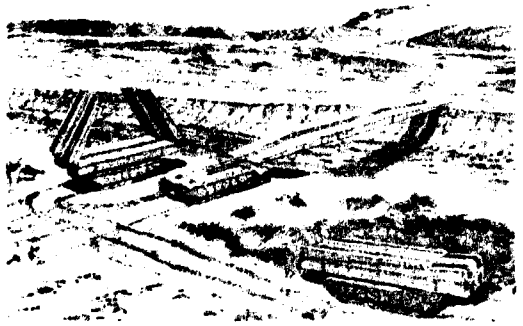
● **1.5-kW Methanol Fuel Cell Power Units.** The fuel cell approach was selected to meet the Army's requirement for a family of Silent Lightweight Electrical Energy Plants (SLEEP) because it provides virtually silent operation and the ability to use alternative fuels such as methanol. The engineering development contract for this program was awarded in May 1980. The program calls for the design, fabrication, and testing of 17 Power Units. The first 4 began Performance Quality Testing (PQT) by the contractor at his facility including 6000-hour endurance testing on 2 of the units. Ten Power Units will undergo DT-II at Aberdeen Proving Ground, Yuma Proving Ground, Cold Region Test Center, and Tropic Test Center. Three new Power Units and one refurbished unit (from PQT-C) will undergo OT-II at Fort Knox, Kentucky. DT-II is scheduled to begin March 1983, and OT-II is tentatively scheduled to begin October 1983. DEVA-IPR is scheduled for completion during the latter part of FY84.

LIGHT ASSAULT BRIDGE



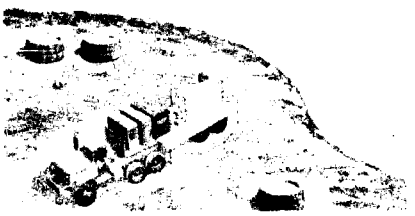
● **Light Assault Bridge (LAB).** This program was initiated in FY82 to provide rapidly deployable, air transportable assault bridging capability for the Light Infantry Division. Seven different concepts were evaluated and scale models were made of the most promising concepts. This work was analyzed by MERADCOM and the US Army Engineer School, and a double fold scissors bridge was selected as the concept to enter Full-Scale Development. The Light Assault Bridge is transported on a special-purpose trailer that can be towed by any vehicle with a 15,000-pound pintle capacity (M9 ACE, 5-ton truck, etc.). The trailer with bridge has roll-on/roll-off capability on the C141 aircraft, permitting rapid air transportability. The bridge is launched hydraulically in 5 minutes by a mechanism mounted on the trailer. The operator remains inside the towing vehicle during launching. When in place, the bridge will support Military Load Classification (MLC) 30 loads over gaps up to 23 meters wide. In addition to completing the concept evaluations, other significant events on the LAB program this year were approval of the ROC, completion of the Validation IPR, and award of the development contract. Type classification is programmed for June 1986 with IOC planned for December 1988.

HEAVY ASSAULT BRIDGE
FLIP-CANTILEVER LAUNCH (29m)

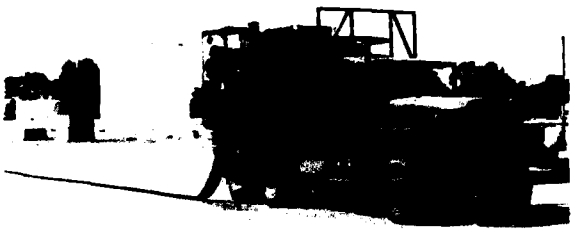


● **The Heavy Assault Bridge (HAB).** The HAB will provide improved assault bridging capability for heavy armored forces. The HAB will have increased load capacity and span and greater mobility than existing assault bridges. The HAB will be mounted on the M-1 tank chassis to provide mobility compatible with the M-1 tank forces it will support. Made of lightweight aluminum alloys and composite materials, the bridge will be light enough and strong enough to permit spans up to 29 meters while supporting Military Load Classification 70 loads. The bridge can be launched by the operator inside the chassis in 5 minutes, using the hydraulic launch mechanism mounted on the front of the chassis. During FY82, a study was conducted to evaluate five different concepts for the HAB. Scale models of these concepts were built to assist in the evaluation process. MERADCOM and the US Army Engineer School, after analyzing the results of the study, decided that two of the concepts should be evaluated further in Advanced Development. Beginning in FY83, prototypes will be built of a double-fold scissors bridge and a flip-cantilever bridge. Entry into Full-Scale Development is scheduled for FY87.

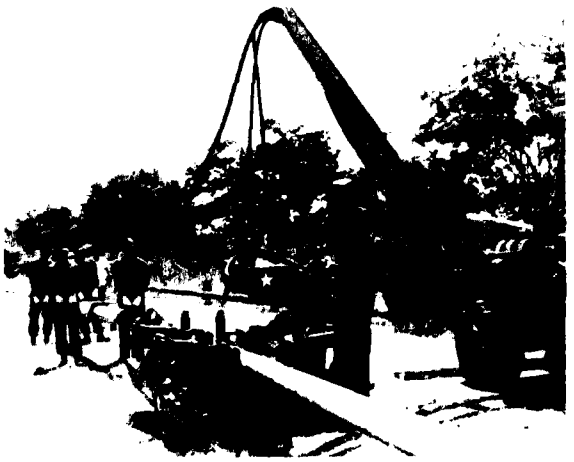
3000 GPH REVERSE OSMOSIS
WATER PURIFICATON UNIT (ROWPU)



● **3000-gal/h Reverse Osmosis Water Purification Unit (ROWPU).** DA and DARCOM directives resulted in the development of plans during FY82 to expedite the development of the 3000-gal/h ROWPU. Development will proceed along three lines: (1) Completion of a prototype unit to demonstrate the basic feasibility of the process steps; (2) redesign of the 3000-gal/h ROWPU to meet military characteristics such as low cubage, lightweight, easy maintainability, and practicable transportability; and (3) award of two competing contracts to develop a 3000-gal/h ROWPU according to performance specification criteria. The optimal 3000-gal/h ROWPU emerging from this total program will be subjected to an accelerated developmental schedule, with type classification forecast for 1QFY85. The resulting type classified unit will be capable of producing potable water from raw fresh water, sea water, brackish water, and water contaminated with NBC agents. The unit will be transported on a 30-foot flatbed semitrailer pulled by a 5-ton tractor and will be capable of being air lifted by C-130, C-141, and C-5 aircraft.



● **Petroleum Hoseline System (PHS).** The PHS consists of a trailer-mounted 600-gal/min pump operating at 150 lb/in.^{2}, 11,000 ft of 6-inch hoseline, a hoseline deployment and recovery device, and ancillary items. It is envisioned that the PHS will deploy and recover fuel hoseline at a minimum rate of 5 mi/h. The PHS will provide a throughput capacity twice that of the existing 4-inch Hoseline Outfit. The PHS will also have an improved method of recovering the hoseline for rapid re-deployment. A prototype DTI/OTI model was delivered to Aberdeen Proving Ground APG), Maryland, on 4 June 1982 for testing. It is expected that the DTI testing at APG will be completed in 1QFY83. It will be shipped to Fort Pickett, Virginia, for 10 weekks of OTI. A Special-In-Process Review was conducted at MERADCOM on 14 July 1982 and the Program Management Plan was approved. Plans call for the purchase of additional systems for further tests in 1984 with type classification scheduled for 1985.



● **Pipeline Outfit, Petroleum (POP).** The POP consists of three major components: the pipeline set composed of 5 miles of pipe and all ancillary items; the pipeline maintenance set, comprised of all necessary tools and equipment to make pipeline repairs; and the tactical pipeline construction equipment. The construction equipment includes a commercial hydraulic pipe-joining press. The press produces a 6-inch or 8-inch pipe joint, either aluminum or steel, with the integrity of a welded pipeline. A Special In-Process Review (SIPR) was conducted at MERADCOM on 14 July 1982 and a Non-Development Item (NDI) acquisition strategy was approved. Testing on the pipe-joining press has begun at Aberdeen Proving Ground (APG) and is scheduled to continue into 1QFY83. An SIPR is scheduled for 4QFY83 for the Type Classification (TC) decision.

● **Bulk-Fuel Tank Assembly (BFTA).** The BFTA is a large-capacity, self-supporting bulk-petroleum storage tank which can be rapidly deployed with little or no ground preparation. The tank assembly will be used with commercial bulk tankers and will efficiently interface with all standard military fuel storage and handling equipment. The BFTA also can be utilized on the pipeline system as intermediate tank farms, regulating stations, or head terminals. The capacity of the BFTA is 5000 barrels (210,000 gallons); it can be transported by CH47 or CH54 helicopter. The tank assembly is needed to support contingency operations in undeveloped theaters. It will be made from single-ply elastomeric coated fabric. Following air transportability testing, developmental testing (DT-I) was initiated at the US Army Tropic Test Center, Panama, with two candidate 5000-barrel collapsible tanks (one from Goodyear and one from ILC Dover). The DT-I testing of the prototype BFTA will continue through FY83, with completion scheduled for 2QFY83.

PRIORITY FIRST-TIME-BUY PROGRAM

Rapid-Deployment Joint Task Force Water Supply Equipment. The urgent acquisition of water supply equipment to equip the Rapid Deployment Joint Task Force (RDJTF) emerged as one of the Army's highest priority requirements during FY82 MERADCOM responded to this urgent requirement as the lead representative of the materiel development community by developing a "systems approach" for providing water supply equipment to the RDJTF from source to consumer. This concept delineated six functional areas of consideration: Production, Treatment, Storage, Bulk Distribution, Unit Distribution, and Cooling. These six functional areas served as the basis for the identification of major equipment shortfalls, assessment of materiel requirements, and the system layout and design of water supply equipment alternatives for the RDJTF. Type classification of the equipment occurred in FY81. The type-classified systems/items presently being procured under the First-Time-Buy Program are:

Well Completion Kit.

Tactical Water Distribution Systems.

Storage/Distribution Systems, Potable-Water, 20,000-, 40,000-, and 300,000-Gallon.

Water Purification Unit, Reverse-Osmosis, 150,000-Gallon/Day.

Small Mobile Chiller.

Initial quantities of these items funded for quantity procurement in FY82 were placed under contract and first-article acceptance testing was successfully completed. Required small quantities of the different items were delivered to the National Training Center, Fort Irwin, California, and operational and force development testing conducted. The balance of the production will be placed in depot for contingency purposes. Delivery for depot quantities was initiated.

Water Purification-600-gal/h ROWPU. Following successful completion of DT/OT IIA, the 600-gal/h ROWPU was type classified standard at an IPR conducted at MERADCOM on 30 May 1979. When fielded, the 600-gal/h ROWPU will replace four different processes and many different sizes of equipment now used by the Army in the field to produce potable water from a variety of contaminated raw water sources. There are 440 machines under production contract for all services. First-Article Testing was successfully completed and 125 units have been accepted. Of these, 69 units have been delivered to all services. Conditional release to the XVIII Airborne Corps has been achieved.

Ribbon Bridge Erection Boat (RBEB). Following intensive tests and evaluation conducted under the International Material Evaluation Program, a multimillion-dollar contract was made in September 1980 with Fairey Allday of the United Kingdom for the production of 102 RBEBs. This boat was selected for the US Army on the basis of compatibility with the MERADCOM-developed floating ribbon bridge now deployed in Europe.

Constructed of welded aluminum and powered by two diesel-engine-driven waterjets, the RBEB features a shallow draft, only 22 in. compared to 41 in. for the current 27-ft bridge erection boat it will eventually replace. The operator's station, equipped with a cab, is located forward for improved visibility. A diving platform is located aft. The boat is 27 ft long, has a top speed of 25 mi/h, a forward thrust of 4400 lb, and a reverse thrust of 2200 lb and is unsinkable.

During FY82, MERADCOM continued to provide engineering support to the first-time-buy of the RBEB. A contract option for 101 additional boats was exercised, with all boats scheduled for delivery in FY82 and early FY83. Effort also continued in FY82 to evaluate potential improvements in operation and maintenance of the RBEB.

Medium Girder Bridge (MGB) Link Reinforcement Set. In February 1982, the Link Reinforcement Set for the MGB was adopted as a Non-Development Item to meet the requirement to extend the MGB Class 60 capability from 100 to 160 ft. MERADCOM initiated a joint services (Army and Marine Corps) acquisition of the system and a contract will be awarded early in FY83. *Testing of the sytem will be accomplished at* Aberdeen Proving Ground and at the UK Government test facility at Christchurch, UK. MERADCOM is coordinating this total testing effort.

Lighter, Air-Cushion-Vehicle, 30-Ton (LACV-30). The Ligher, Air-Cushion-Vehicle, 30-Ton (LACV-30) can carry two 20-ft MILVAN containers. It can also haul wheeled and tracked vehicles, engineer equipment, pallets, and other cargo. Riding on a cushion of air, the LACV-30 can operate on water, marginal land areas, beaches, ice, and snow.

The 12 LACV-30's being produced will be formed into the 331st Transportation, Medium Lighter Company, and stationed at Fort Story, Virginia. The unit will perform *logistics over-the-shore missions and combat service* support operations and will support secondary missions in coastal, harbor, and inland waterways; search and rescue; and medical emergency missions.

The first production craft was flown 23 April 1981. After completing the initial First Article Tests, it was shipped to Aberdeen Proving Ground for extensive testing prior to acceptance. By the end of September 1982, 56 percent of the work is scheduled to be complete on the production run of 12 craft. The First-Article Test was completed and three craft were accepted by the Army in FY82. A Follow-On-Evaluation (FOE) is scheduled to begin 1 April 1983 to determine adequacy of supportability and organization. Funds have been provided and a contract awarded for a follow-on buy of additional craft for a second LACV-30 company.

OTHER ITEMS

The MERADCOM Development Program consists of the 6.3B (Systems Advanced Development) and 6.4 (Engineering Development) program elements distributed by funding category as follows:

Funding Category	FY82 (thousands)	% of Totals RDTE Program
6.3B	11975	28.4
6.4	9716	23.0
Total	21691	51.4*

*Total RDT&E Program (6.1 — 6.4) = 42,184

Efforts in Advanced Development and in Engineering Development are supported by 11 individual projects, allocated to the 4 technical areas as follows:

PROGRAM AREA	Development Program (thousands) 6.3B	6.4	Total	% of Total
Mobility/Countermobility Systems	3811	1044	4855	22.4
Energy Systems	5005	2911	7916	36.5
Survivability Systems	2959	5761	8720	40.2
Logistics System	200	0	200	.9
TOTAL	11975	9716	21691	100.0

6.3B (SYSTEMS ADVANCED DEVELOPMENT)

Mobility Countermobility Systems

Vehicle-Mounted Magnetic Signature Duplicator
Portable Mine Neutralization System
Heavy Assault Bridge
Composite Bridge Components
Tactical Bridge Access/Egress

Energy Systems

Free Piston Stirling Engine
3- and 5-kW Methanol Fuel Cell
Bulk Fuel Tank Assembly
Petroleum Hoseline Assembly
Arctic Forward Area Refueling Equipment
Pipeline Outfit Petroleum
Fire-Resistant Fuels
20-Liter Plastic Gas Can

Survivability Systems

Tunnel Detection Systems
Facility Intrusion Detection System
Electronic Alerting System

Logistic Systems

Pre-staged Ammo Loading System

6.4 (ENGINEERING DEVELOPMENT)

Mobility/Countermobility Systems

Small Inflatable Boat
Vehicle-Mounted Road Mine Detection System
Light Assault Bridge

Energy Systems

250-K Btuh Multi-Fuel Heater
3000/2000 gal/h ROWPU
1.5-kW Methanol Fuel Cell

Survivability Systems

Facility Intrusion Detection System

ENGINEERING PROGRAM

An integral part of the MERADCOM mission are the Engineering Programs consisting of Production Base Support, Product Improvement, Producibility Engineering and Planning, Configuration Management, Program Transitioning, Technical Data Package preparation, and support of Army procurements.

The Production Base Support Program consists of 11 MACI projects and 2 Manufacturing Methods and Technology (MMT) projects. The funds available for Production Base Support were $7,881,280, with $6,708,250 allocated to MACI Projects and $1,173,000 to the MMT Projects. The major Production Base Support efforts were related to Commercial Construction Equipment, Material-Handling Equipment, Hydraulic Systems and Components, Watercraft Programs, Power Generation Equipment and Components, and Physical Security Systems and Components.

The Product Improvement Program consists of 48 TSARCOM-managed projects, 5 projects in the process of being transferred to TACOM, 2 active MERADCOM-managed programs, and 5 new programs currently under coordination. The active MERADCOM-managed programs are a Payload Increase for the LACV-30 and an Improved Inflation System for the Military Amphibious Reconnaissance System (MARS). Readiness Command projects range from Army watercraft to railroad equipment and from mine detectors to bridging equipment. The programs and the program responsibility for the M9 ACE are being transferred to TACOM.

During FY82, nine items were transitioned to Readiness Command as follows:

Item	Transition Date	Readiness Command
Container Handler, 50,000-lb Rough-Terrain	15 Dec 81	TACOM
Forward Area Water Point Supply System	1 Apr 82	TSARCOM
Storage Distribution System, 1-Million-Gallon	1 Apr 82	TSARCOM
Storage Distribution System, 800,000-Gallon	1 Apr 82	TSARCOM
Kit, Sensing Control (PATRIOT)	28 Apr 82	TSARCOM
Grader, Road, Motorized, Heavy	15 Apr 82	TACOM
Distributor, Water, Self-Propelled, 2500-Gallon, Sectionalized and Non-Sectionalized	15 Jun 82	TACOM
Scraper, Elevating Self-Propelled, 9-Yd^3 Sectionalized and Non-Sectionalized	15 Jun 82	TACOM
Aerosol Generator	26 Jul 82	TSARCOM

The Technical Data Package (TDP) Planning effort included the preparation/updating of 86 TDPs in support of the FY82 planned procurement program. For the FY83 procurement program, 88 TDPs are scheduled for preparation/updating of which 40 have been completed.

First-Time-Buy Quantity Procurement. During FY82, MERADCOM obligated 138.0 million of quantity procurement funds.

MERADCOM participates in the planning of the Army Materiel Plan (AMP) by assisting the Readiness Commands in maintaining up-to-date data for the Army's procurement planning and by attending the AMP reviews held at TSARCOM, TACOM, and ARRCOM. The FY82 MERADCOM Army Procurement Program totaling $161.0 million was for the following:

Nomenclature	Standard Study Number	Quantity	(Program $M)
Hoseline Outfit, Fuel-Handling (4-In.-Diameter)	M908	49	10.7
Pump, Diesel-Engine-Driven, 350-gal/min	M639	341	8.4
Topographic Support System	MF94	75	22.8
Position Azimuth Determining System	M757	22	7.8
Bridge Erection Boat	M236	70	13.6
Lighter, Air-Cushion-Vehicle, 30-Ton	M343	4	32.8
Container Handler, 50,000-lb, Rough-Terrain	M412	67	20.7
Reverse-Osmosis Water Purification Unit, 150,000-gal/day	MA4002/M129	8	6.1
Small Mobile Chiller	MA4005/M157	570	5.7
Tactical Water Distribution System	MA4013/M274	3	21.7
Reverse-Osmosis Water Purification Unit, 600-gal/h	M180	5	1.1
Tanker Mooring System	R209	2	5.2
Link Reinforcing Set, Medium Girder Bridge	M200	7	4.4

TECHNICAL ACHIEVEMENTS

Modern Warfare as characterized by the tactics of potential adversaries of the United States consists of localized power concentration, penetration, and follow-through by insertion of a second echelon force. To counter these tactics, superior mobility of U.S. Forces is required. Friendly force mobility and tactical flexibility must be maintained in both offensive and defensive operations. Locating and clearing minefields, crossing obstacles, breaching gaps, neutralizing area denial efforts of opposing forces, establishing survivable positions, and emplacing minefields and obstacles must be conducted far more quickly than current equipment permits. Logistic support equipment must be adequate to insure that water, fuel, ammunition, and other essential military supplies are available in sufficient quantities to sustain the fighting force. The continuing decline in the supply of petroleum-based fuels requires that military standards and specifications be evaluated and revised to insure that equipment will be compatible with the fuels and lubricants that will be available in the future. An urgent requirement also exists to satisfy both the Army's increasing demands for mobile electric power and the need for more efficient energy usage. Future generators must be lighter weight, be more efficient and reliable, and have less prominent thermal and acoustic signatures. Camouflage, counter surveillance, and tactical deception equipment is essential for the survivability of US Forces.

MERADCOM is responsible for the development of materiel to meet these combat and battlefield support needs. As the materiel developer, MERADCOM has established a strong interface with the TRADOC community in order to address the practical and operational characteristics of user requirements which consists of a large number of comple[illegible]mparatively diverse fields of endeavor. As a result, MERADCOM has distributed its resources to addre[illegible]e areas of Combat Support and Combat Service Support and for FY82 established the four major program areas of Mobility/Countermobility, Survivability, Energy, and Logistics.

PROGRAM AREAS

Mobility/Countermobility program area consists of countermine, counterobstacle, wet- and dry-gap crossing, and obstacle breaching systems that eliminate or reduce the effects of natural and man-made barriers on friendly mobility and barrier systems that restrict the mobility of threat forces. FY82 Countermine systems emphasize remote detection of minefields and standoff and close-in mine neutralization. Counterobstacle systems are directed at specialized counterobstacle equipment as well as commercial and airborne construction equipment. Wet- and dry-gap crossing systems emphasize quickly emplaced tactical fixed and float bridging equipment. Barrier systems concentrate on quickly emplaced nonexplosive barrier materials and equipment.

Survivability program area involves equipment and techniques which minimize threat detection and acquisition of friendly forces, provide protection from threat fire, and deny physical access to the enemy. Emphasis is on radar and thermal IR camouflage, tactical deception, tunnel detection, intrusion detection, position locating, and quickly emplaced protective shelters.

Energy program area is associated with energy sources and support equipment needed to live, work, move, and fight in a given environment. Energy source produce electric power which must be distributed and conditioned to be available and compatible with user loads. Support equipment provides new energy-saving heaters and air conditioners that incorporate NBC protective and air filtering systems. High priority has been placed on development of integral CB air/heating/cooling units for shelter systems and on ground and air combat vehicles. Energy programs in the area of fuels and lubricants are directed at identification of engine oils which satisfy all requirements for hydraulic fluids, evaluation of diesel fuel stabilizer, long-life coolant systems, and alternative fuels.

Logistic program area provides the Marine Craft, Water Supply Equipment, Supply Distribution, Fuels-Handling Equipment, and Support Equipment required to sustain the forces. Water supply systems focus on the location, production, purification and distribution of water. Twelve systems were Type Classified to provide

near-term water support equipment for the Rapid Deployment Joint Task Force (RDJTF). Fuels-handling systems include bulk fuel tank storage equipment and petroleum pipeline, hoseline, and pumping equipment for distribution of fuel. Marine Craft systems include inland waterway and seagoing work vessels, logistic supply vessels, and over-the-shore logistic support craft. Support and Supply Distribution systems concentrate on containers, packaging, materials handling, transportation, and distribution equipment with current emphasis on containerization and robotics.

In Material Technology a program of development, engineering, testing, and evaluation is conducted in fields of chemistry, chemical coatings, organics, plastics, ceramics, metallurgy, composite materials, rubber, adhesives, coated fabrics, radiation, packaging, and transportability. The following charts indicate the detailed technical accomplishments in these program areas during 1982.

SUMMARY OF TECHNICAL ACCOMPLISHMENTS

MOBILITY/COUNTERMOBILITY SYSTEMS

BRIDGING

- Conducted studies of concepts for the Light Assault Bridge. Scale models were fabricated to assist in evaluation and selection of the concept to be developed.
- Conducted studies of concepts for the Heavy Assault Bridge. Five concepts were evaluated using scale models. USAES and MERADCOM agreed that two concepts would be pursued during Advanced Development.
- Completed installation and successfully tested graphite epoxy/aluminum skin composite bottom bridge chord which was first application of composite materials to Army bridging.
- Published revised edition of Trilateral (US-UK-GE) Code for Design and Test of Military Bridges.

COUNTERMINE

- Completed DTI of Vehicle Magnetic Signature Duplicator (VEMASID) and Portable Mine Neutralization System (POMINS).
- Concluded Memorandum of Understanding (MOU) with government of Israel for development of a Counterobstacle Vehicle (COV).
- Demonstrated under the CANETIP program the feasibility of dispersing and detonating aerosoled aluminum-propellant mixtures to provide enhanced fuel-air explosive fills for second-generation mine neutralization systems.
- Significant product improvement demonstrated by AN/PRS-7 Portable Mine Detector in arid soil at Yuma Proving Ground.
- Established test sites and ground sensing instrumentation for the Mine Detection Utilizing Reconnaissance Assets (MIDURA) program.
- Developed a Product Improvement Program (PIP) for the XM130 high-explosive rocket to be used by the Surface-Launched Unit Fuel-Air Explosive (SLUFAE) Mine Neutralization System to improve reliability and performance and to decrease production costs.

CONSTRUCTION EQUIPMENT

- Completed Type Classification for Airborne/Airmobile Scraper and Water Distributor and for CCE Grader and 14- Yd^3 Scraper.

- Provided support for NDI construction equipment for the High-Technology Test Bed (HTTB) at Fort Lewis, Washington.
- Provided support to the priority replacement of Airborne/Airmobile Construction Equipment.
- Provided engineering support to the development of a dozer blade attachment for the airborne tank. Procured dozer blade for Armor Board testing.
- Conducted evaluation/surveys of several types of NDI construction equipment to support future procurements.
- Provided Technical Data Packages and engineering support to TACOM for FY82 5-year multiyear standardization procurement of CCE loaders, 14- Yd^3 Scrapers, and Heavy Road Graders.
- Conducted testing program to determine performance criteria for Small Emplacement Excavator.

BARRIERS

- Completed study and implemented solution to coating problems on Barbed Tape Concertina leading to development of a new finish.

SURVIVABILITY SYSTEMS

FIELD FORTICATIONS

- Completed evaluation of two items of foreign excavation equipment.
- Continued to provide technical support and development items of protective covers for evaluation by the High-Technology Test Bed (HTTB) at Fort Lewis, Washington.
- Conducted live firing evaluation of several tactical shelter items.
- Initiated and completed an on-site "road show" demonstration of shelters and excavators at bases throughout CONUS.

CAMOUFLAGE

- Completed preliminary laboratory evaluation of radar absorbing paint.
- Completed preliminary full-scale field tests on thermal/radar-absorbing materials (TRAM).
- Completed preliminary laboratory and field tests on multi-spectral thermal radar woven camouflage fabrics.
- Initiated system design trade-off for camouflage system 1986 (CS-86).
- Conceived, derived, and coordinated DARCOM plan for tactical Deception.
- Completed Phase I of camouflage cover and deception study for NATO, Experts Panel.
- Implemented DARCOM plan and completed testing for standardization of GE/US Camouflage Paints/Patterns.
- Continued system consulting and hardware development support efforts to Ground-Launched Cruise Missile, Firefinder, Roland PM Saudia Arabia National Guard, and Defense Nuclear Agency.

PHYSICAL SECURITY	• Provided technical desgin, commercial equipment, and installation support for upgrading the security for six CONUS Army chemical weapons storage sites.
	• Conducted an IPR for Group II sensors, covert duress sensor, and tagged material detector in March 1982 at which representatives of the Army, Navy, and Air Force agreed to continue into Engineering Development.
	• Initiated a joint American-Canadian sensor development program in August 1982.
	• Initiated Engineering Design Test (Government) of the Interim FIDS and configuration management of both hardware and software. Initiated test planning for multiservice operational tests to be conducted at Elgin AFB, Florida.
	• Evaluated commercial intrusion detection components and systems for DOD applications.
	• Generated new concepts using reflectors in perimeter artificial surfacing to enhance direct visual and television surveillance and assessment functions.
	• Completed an investigation of the adverse effects of light and sound on task performance.
	• Completed fabrication of microprocessor-based electronic alerting system for testing in Europe.
	• Developed an improved strain switch useful for detecting intrusions and pilferage.
	• Further developmental effort is proceeding on a cargo security system incorporating sensors developed for the FIDS program. These sensors include the strain sensitive switch and the fiber optics break-wire sensor. The covert duress sensor transmitter will be used as the alarm transmission link.
	• At the request of the Customs Service, conducted further outdoor tests of the tagged material detector at extended ranges. Successful demonstration of the outdoor TMD system's capability resulted in an Interagency Agreement to develop portable TMD systems for Customs.
TUNNEL DETECTION	• Continued support of OCONUS technical and field support program to detect and locate suspected tunnels.
	• Continued testing and evaluation of CONUS test sites for field evaluation of selected tunnel detection equipment.
	• Continued development of new seismic listening system with direction-finding capability.
TOPOGRAPHIC EQUIPMENT	• Awarded contract for 69 additional modules of Topographic Support System (TSS) at a cost of $15,000,000.
	• Negotiated and awarded new multiyear contract for 181 units of Position Azimuth Determining System (PADS) at a cost of $60,000,000.
TACTICAL SENSORS	• Completed contract for the development of improvements in the first generation of tactical target classifiers; i.e., REMBASS seismic/acoustic classifiers.

ENERGY SYSTEMS

ELECTRIC POWER

- Initiated Performance Qualification Test of 1.5-kW methanol fuel cell in preparation for DTII.
- Demonstrated Engineering Development Model 1.5-kW methanol fuel cell operation at Command and Control System Program Review.
- Initiated production of 150-kW regenerative gas-turbine generator set for PATRIOT.
- Initiated First-Article testing of a new 750-kW diesel-engine-driven generator set.
- Designed, constructed, and delivered a current-controlled, 4000-ampere turbine generator set for use with Navy mine-clearing experiments.
- A 3-MW power control and distribution center was designed and constructed for the Facilities Engineering Support Agency.
- Initiated production procurement of 10-kW, 28-V aviation support generator set.
- Initiated development of a 3-kW Free Piston Stirling Cycle Engine-driven generator set.

FUEL AND LUBRICANTS

- Army Energy Research and Development Plan 1982 was prepared and distributed.
- Evaluation of diesel fuel stabilizer additive in 420 new M60 Tanks at Chrysler Tank Plant Facility was completed.
- Organized working group to revise Federal Test Method Standard 791, lubricants, liquid fuels, and related products, methods of testing.
- Initiated cooperative program with government of Egypt to utilize diesel fuel stabilizer additive for insuring against possible material deterioration of new M60A3 Tanks.
- Completed laboratory testing and fabrication of two prototype long-life coolant systems.
- Completed selection and laboratory testing of candidate non-flammable hydraulic fluid.
- Developed and issued new military specification GASOHOL (MIL-G-53006).
- Developed and issued new military specification for antifreeze extender.
- Prepared draft specification for tactical/combat engine oils which includes multiviscosity oils that will eliminate seasonal oil drains.
- Prepared draft specification for diesel fuel stabilizer additive which will reduce/eliminate fuel system corrosion and/or engine malfunctioning.

HEATERS AND AIR CONDITIONERS

- Completed delivery of first production lot of noise-reduced air conditioners for PERSHING II.
- Completed preproduction model testing of noise-reduced 18,000-Btuh air conditioner.
- Fabricated and tested breadboard 18,000-Btuh air cycle air conditioner compressor.
- Designed, fabricated, and field tested three low-power demand cooling units for combat vehicle crew protection suits.
- Completed FAT on PATRIOT split-package 18,000-Btuh air conditioner and delivered first-year program production of 64 units. Started second-year program production and completed initial provisioning.

LOGISTICS SYSTEMS

WATER SUPPLY

- Completed plans for development of a 3000-gal/h Reverse Osmosis Water Purification Unit (ROWPU), with type classification projected for 1QFY85.
- Completed plans for development of a 1500-gal/h Reverse-Osmosis Water Purification Unit (ROWPU), with type classification projected for 1QFY86.
- Conducted a 200-hour high-temperature test on reverse-osmosis elements, and published a formal MERADCOM Report.
- Conducted a feasibility study to determine the advantages of a parallel-flow multi-element reverse-osmosis element configuration.
- Conducted a Best Technical Approach (BTA) study of various competitive water storage tanks including British, French, and Norwegian tanks.
- Reviewed the use of conventional geophysical methods for detection of groundwater by the field Army via a technical report by Colorado School of Mines.
- Conducted a joint groundwater detection symposium with Waterways Experiment Station which included representatives from HQDA, USAF, USMC, and technical experts from other US Government agencies.
- Completed installation of a pilot electroplating wastewater treatment unit at the Tobyhanna Army Depot for the evaluation of a new soluble sulifide toxic metal removal process.
- Accepted initial delivery of 600-gal/h ROWPU's for US Army, Air Force, and Marine Corps.
- Delivered RDJTF water support equipment to NTC for initial operational testing and subsequent training.
- Initiated delivery of RDJTF water support equipment for Operational Project Stocks to depot.
- Delivered 20,000-gal fabric collapsible water storage tanks, 600-gal/h ROWPU's, and prototype small mobile water chillers to XVIII Airborne Corps for the "Bright Star" exercise.

FUELS-HANDLING EQUIPMENT

- Completed engineering development testing of 200-gal/min Gas-Turbine Engine-Driven Refueling Pump Unit at Cold Regions Test Center, for the Arctic Fuel Dispensing Equipment System.
- Developed improved Arctic Fuel hose for use with the Arctic Fuel Dispensing Equipment System.
- Initiated developmental testing of prototpye 5,000-barrel collapsible fuel storage tanks for Bulk Fuel Tank Assembly at US Army Tropic Test Center, Panama.
- Completed fabrication and initiated developmental testing of prototype Petroleum Hoseline System.
- Completed fabrication and conducted developmental testing of prototype Pipeline Outfit, Petroleum.
- Conducted design refinement of Quick-Connect Pipe Coupling and started fabrication of advanced prototype coupling.
- Initiated fabrication and testing of critical components of the Automated Pipeline Construction Equipment System.
- Accepted initial delivery of 350-gal/min diesel-engine-driven pumps at depot.
- Accepted delivery of 4-in. Assault Hoseline at depot.
- Completed first-article preproduction of test of the multileg Tanker Mooring System.
- Completed test and evaluation of diesel engines for small dispensing pump.
- Delivered prototype high-profile-design collapsible tank to Tropic Test Center for evalution.
- Completed pilot plant determination of technique to manufacture continuous length hoseline.

SUPPLY DISTRIBUTION

- Projected operational requirements for ammo resupply in the 1990s.
- Defined design parameters for material-handling equipment used to handle theater war reserves and unit prepositioned ammunition.
- Initiated modernization pilot programs for 80-Ton and 100-Ton Locomotives.
- Initiated Procurement of prototype climate-controlled end-door boxcar for Trident II rocket motors.

- Completed evaluation/study of Small Tamping Machine.
- Completed design of robotic device for installing dunnage in cargo containers.
- Obtained regulatory approval of Prestaged Ammunition Loading System (PALS) dunnage systems.
- Awarded contract for design of Prestaged Ammunition Loading System (PALS) interfaces.

SUPPORT EQUIPMENT

- Provided support in the development/testing/evaluation of flatcar restraint systems for transporting the Abrams (M-1) tank.
- Obtained approval by DARCOM Safety to allow Clean Burning Diesel for use in earth-covered storage areas.
- Completed testing and standardized volumetric-type Halon Recharger for fire fighting systems.
- Standardized a commercial fire truck to replace the obsolete model 530-C fire truck.

MARINE CRAFT

- Completed DT/OT IIA of Military Amphibious Reconnaissance System (MARS).
- Completed Initial Operational Capability (IOC) for the Ribbon Bridge Erection Boat.
- Required Operational Capability (ROC) approved for commercial Landing Craft Utility (LCU) and Logistic Support Vessel (LSV).
- Market survey/reports completed for commercial Landing Craft Utility (LCU) and Logistic Support Vessel (LSV).
- Completed program to modernize "B" Delong Piers to meet contingency requirements of Rapid Deployment Force (RDF).
- LACV-30 First Article accepted by the Army.
- Accomplished conditional Release for Issue of LACV-30.

TECHNICAL SUPPORT

MATERIAL TECHNOLOGY

- Established a Deterioration Prevention Action Office (DPAO) for the Material Deterioration and Control (MADPAC) program.
- Developed and provided guidelines for the evaluation/selection of materials for the LACV-30.
- Developed a high-solids chemical agent resistant polyurethane coating that conforms to the EPA solvent emmision regulations.
- Reformulated all camouflage formulations into lead- and chromate-free types.
- Developed new enamel and epoxy anticorrosive primers that are lead and chromate free.

- Developed high solids baking ammunition coating.
- Completed investigation of a Materials Compatibility Study with Fuel-Alcohol (Gasohol).
- Field tested corrosion-preventive compounds for Fielded Tactical Vehicles for use in tropical environments.
- Developed camouflage coatings that are completely mar-resistant by using vesiculated polymeric beads.
- Developed a waterbone epoxy anticorrosive primer as an alternative to present solvent base epoxy primers.
- Developed Manufacturing method for a unique high-strength (600 k lb/in.^{2}), high-modulus (57 k lb/in.^{2}) graphite fiber reinforcement for composite materials.

SCIENCE AND TECHNOLOGY BASE PROGRAM

The FY82 MERADCOM Science and Technology Base Program consists of the 6.1 (Basic and Applied Research), 6.2 (Exploratory Development), and 6.3A (Non-Systems Advanced Development) Program Elements distributed by funding category as follows:

Funding Category	FY82 (thousands)	% of Totals	
		Tech Base	RDTE Program
6.1	1142	5.0	2.7
6.2	9981	49.0	23.7
6.3A	9370	46.0	22.2
Total	20493	100%	48.6

*Total RDT&E Program (6.1 — 6.4) = 42,184

Effort in the Research Program is conducted via the Single Project funding (SPF) concept and in Exploratory Development via Single Program Element funding (SPEF) to provide the Command maximum flexibility in allocating resources. The advanced development consists of specific projects in each technical area. The magnitude of the MERADCOM Technology Base Program by Program Area is as follows:

MERADCOM FY82 RDTE FUNDS BY FUNDING CATEGORY AND PROGRAM AREAS
TECHNOLOGY BASE

PROGRAM AREA	(thousands) 6.1	6.2	6.3A	Tech Base Total	% of Total
Mobility/Countermobility Systems	357	2970	8753	12080	58.9
Energy Systems	317	4845	617	5779	28.1
Survivability Systems	468	1919	0	2387	11.7
Logistics Systems	0	247	0	247	1.2
TOTAL	1142	9981	9370	20493	100.0

Some principal FY82 SPEF accomplishments are as follows:

MOBILITY/ COUNTERMOBILITY	● Initiated study of fatigue indicator to indicate service life of bridge components.
	● Completed initial concept study on feasibility of Remotely Piloted Assault Raft. The results have been forwarded to USAES for statement of interest.
	● Initiated design study for ground-based scattermine remote detector.
	● Determined the "CLEWP" system as best candidate for Minefield widening and proofing.
	● Completed a Mine/Countermine Information Data Base.
ENERGY SYSTEMS	● Improved Fire-Resistant Fuel Formulation.
	● Determined that the quantity of water in fire-resistant fuel can be reduced by 40 percent without affecting the self-extinguishing properties.
	● Completed a gasohol evaluation program and issued a fully coordinated gasohol specification.
	● Coordinated a draft outline with TACOM, AVRADCOM, and TECOM to establish fully integrated Mobility Fuel and Engine RDTE Program within DARCOM.
	● Awarded contract to investigate thermally regenerative electro-chemical systems.
SURVIVABILITY	● Initiated new Tech Base Program Robotic Sensors and Artificial Intelligence.
	● Actively continued to pursue Counter Surveillance Coating efforts to defeat target acquisition and designation systems.
	● Continued to pursue new rapid excavation and overhead cover technologies for battlefield survivability. In coordination with USAES continued to assist 9th Infantry Division with equipment to generate new concepts and techniques for RDJTF survivability.
	● Evaluated methodologies for development of nonlead, nonchromate anticorrosive coatings and corrosion-resistant materials conforming to topic substances, regulations, MADPAC program, and environmental regulations that will prevent corrosion under all environmental conditions.
LOGISTICS	● Conducted feasibility analysis of robotic concepts for tank ammo resupply from armored resupply vehicle.
	● Conducted analysis of MHE concepts to safely outload ammo during transition to war.
	● Initiated investigation of methods to increase payloads on LACV-30 AMO/POL in RDJTF role.

TECHNOLOGY TRANSFER

Current passage of Public Law 96-480, Stevenson-Wydler Technology Innovation Act and newly revised Army Regulation 70-57, Military-Civilian Technology Transfer, has added impetus to the concept of "Active" Technology Transfer to the civilian sector and civilian agencies. MERADCOM has been involved in the DOD Technology Transfer program for many years. Our efforts in adapting existing R&D projects to meet civilian needs have been recognized by the Federal Laboratory Consortium for Technology Transfer and by many departments such as Department of Transportation, Department of Energy, and Department of Interior, to name a few. MERADCOM's expertise in the areas of Bridging, Countermine, Camouflage, Physical Security, Electric Power, Fuels and Lubricants, and others is of particular interest to the civilian sector. In FY82, MERADCOM had 8 reimbursable projects totalling more than $900,000. This work was in support of the Customs Department, U.S. Marine Corps, and Department of Energy. The following paragraphs describe some of the Technology Transfer activities which could be of benefit to the civilian sector.

Tagged Material Detector (TMD). The Counter Surveillance/Counter Intrusion Lab (CS/CI), as part of the Facility Intrusion Detection System (FIDS) program, has developed advanced development models of a Tagged Material Detector (TMD) to detect illegal removal of items from a secured area. The TMD models developed for FIDS are intended to provide coverage for a portal 5 ft by 8 ft. An RF transmitter illuminates the passageway approaching the portal. A tag, concealed in or on the item to be protected, re-radiates a coded signal which is picked up by a receiver antenna and is identified as an alarm by a signal processor. The tag used for the application is a passive tag requiring no power of its own. At the request of the Navy, the CS/CI Laboratory performed tests using the TMD in an exterior setting. Significant success was achieved in detecting tags placed in or on articles concealed within a vehicle—80 percent detection for vehicles moving 5 to 10 mi/h. Upon request by the Customs Department, this tag was tested under severe conditions. In order to prevent the illegal export of high technology, Customs is now engaged in project Exodus. This project requires detection of highly sophisticated electronics housed in shielded inclosures. To simulate this condition, the semi-passive tag was inserted on a printed circuit board and placed within a metallic box. This box was placed in various locations within a vehicle, which was driven past an illumination transmitter. In the severest trial position (recessed within the trunk of a vehicle) 100 percent detection was achieved, with the vehicle moving 10 mi/h and offset 20 ft from the illuminator.

Internal Combustion Engine Lubricant and Stabilizer Additive-Diesel Fuel Military Specifications. The Energy and Water Resources Laboratory has prepared a draft military specification for multiviscosity engine oils intended for use in high-performance engines. The specification contains an endurance test using an engine 6V53T, representative of engines used in combat/tactical equipment. Problems were encountered in obtaining satisfactory test results reproducibility among different laboratories. Efforts to control both engine components and test techniques more precisely are in progress and success is indicated. Multiviscosity engine oils for high-performance diesel engines will eliminate seasonal oil drains and will result in savings of valuable resources of manpower and money. Energy and Water Resources Laboratory also prepared a draft military specification for a stabilizer additive for diesel fuels. This additive formulation would be used in diesel fuels which are intended for intermediate or long-term storage. Diesel fuels conforming to current military and civilian specifications are not stabilized and detericrate in long-term storage through fuel oxidation reactions or microbial growth. Several typical applications for the stabilizer additive are for vehicles and equipment exposed to re-build operations at Depot facilities, vehicles and equipment to be stored partially or fully fueled at Depot facilities, pre-positioned materiel, or bulk procurements. The product will reduce and/or eliminate the potential for fuel system corrosion and/or malfunctioning.

Electric Power—Versatile Data Acquisition Compression System (VDAS). The Electrical Power Laboratory has developed an economical Versatile Data Acquisition and Compression System (VDAS) for the acquisition of electric vehicle performance data. The VDAS records temperature, voltage, current, and power extremes versus time and forms histograms which map average electrical and mechanical power, average velocity, and time based on vehicle mechanical power and velocity intervals. This system has been successfully applied to electric vehicles under a program funded by the Department of Energy. A complete system has been delivered to Sandia Laboratories and is under test in their electrical vehicle program. In addition, a system is under evaluation on a military engine generator set to establish actual performance and usage characteristics during operation. The VDAS is a unit which can be used to define actual operational use and load characteristics of engine generators, electric vehicles, and fork-lift trucks. Use of this device would allow the proper sizing of engines or electric generation equipment for the actual requirement.

LONG-RANGE TECHNICAL GOALS AND OBJECTIVES

Limited resources has forced concept-based materiel development to the forefront of the Army's acquisition strategy. Previously, technologies were pursued on the basis that an application would be found sooner or later. Emphasis is now placed on the application of advanced technology to solve specific problems. The key to this approach is a complete understanding to the tactical units. TRADOC has laid the groundwork for concept-based development by publishing "Airland Battle and Corps 86" and "Airland Battle 2000." The operational concepts stress maneuver, rapid response, and increased standoff. For combat support systems, emphasis is placed on less manpower extensive materiel and improved, more efficient methods of accomplishing support functions. With emergence of concept-based development, the challenge to the Science and Technology Base Program is in the earlier definition of system concepts, quantification of their military worth, and demonstration of their technical feasibility. Increased activity in planning and analysis will be required to accomplish this goal. The first step involves the identification of Army operational deficiencies or limitations within each field of endeavor. This includes a detailed cataloging of the Army's current capabilities in the MERADCOM Equipment Digest and a comparison of these capabilities to those envisioned in future scenarios were documented in the MERADCOM Research and Development Plan. The second step includes the identification of the technology needed to achieve the necessary operational capability and its application to specific system concepts and the successful demonstration of their operational worth. The net result is a Science and Technology Base Program that is product-oriented and focused on resolving deficiencies.

ACTIVITY INDICATORS

During FY82, MERADCOM originated a total of 211 formal reports, technical articles, and presentations. Out of the total number of 180 reports and technical articles published, 52 were prepared by MERADCOM personnel and 128 were published by contractors. Three patent applications were filed and five patents were issued during this year. Three MERADCOM personnel received the prestigious Department of Army R&D Achievement Award. A summary of MERADCOM's activity indicators is presented in the following table:

FY82 ACTIVITY INDICATORS

In-House Formal Reports Published	27
Formal Reports Published by Contractors	109
Technical Articles Published	25
Formal Reports Published by Dedicated Contractors	19
Technical Presentations	31
Patents Issued in FY82	5
Patent Applications Filed in FY82	3
Patent Applications Pending From Previous FYs	10
AWARDS	
DA R&D Achievement Award	3
Special Act or Service Award	87

AWARDS

The Incentive Awards and Annual Commanders' Award Programs continue to improve and grow. These programs are the means by which the Command recognizes significant individual achievements and contributions in the areas of technological and scientific advances, cost reduction, energy conservation,value engineering, management, equal opportunity, leadership, and outstanding job performance in support of Command goals and objectives.

The Army R&D Achievement Award was approved for Mr. Fred Lafferman, Mr. Stanley Koutek, and Ms. Virginia Estes of the Material Technology Laboratory. They were cited for their outstanding accomplishments leading to formulation of a new chemical-agent-resistant coating for Army tactical materiel. The successful demonstration of the technical and operational feasibility of the coating for Army applications provides the capability for rapid chemical agent decontamination, plus, it provides for retention of camouflage anti-detection capabilities, removal of lead and lead chromates to meet OSHA requirements, and reduction of volatile organic compounds to meet clean Air Act requirements. The team was awarded the Commander's Award for Scientific Achievement in FY81 for this project.

Ms. Virginia Estes

Mr. Fred L. Lafferman

Mr. Stanley Koutek

The MERADCOM Annual Commanders' Award is a local program established by the Command to complement the Army R&D Achievement Awards Program by recognizing outstanding contributions in scientific, technical, administrative, and leadership achievement. This year marks the 25th Anniversary of the awards.

Two Gelini Medals, which are named in honor of Colonel Walter C. Gelini, former Commander, were presented this year for technical and administrative support. Previously one medal had been awarded for both areas.

The Gelini Medal for Technical Support was awarded to Aubrey Thomas, Jr. Helen K. Jordan was awarded the Gelini Medal for Administrative Support.

The team of Carl J. Heise and Michael A. Mando received the Commander's Award for Scientific Achievement. The Commanders' Award for Technological Achievement went to R. Donald Sherwood. The Commanders' Award for Leadership was awarded to Maurice E. LePera.

First row (l to r): Maurice E. LePore, Mrs. Helen K. Jordon and Aubrey Thomas, Jr. Second row: Carl J. Heise, R. Donald Sherwood and Michael A. Mando. Third row: (l to r) Maj. Gen. Henry Doctor, Jr., Chief of Staff, U.S. Army Material Development and Readiness Command, Mrs. Walter C. Gelini of Vienna, and Col. Theodore Vander Els, MERADCOM Commanding Officer.

In addition to the major Command Awards, the following categories of Incentive Awards were presented during FY82.

Quality Increase — 8
Sustained Superior Performance Awards — 17
Exceptional Performance Ratings:
  Merit Pay — 15
  GPAS — 67
Special Act or Service Awards
  Merit Pay — 3
  GPAS — 84
Certificates of Achievement — 6
CFC Certificate of Achievement — 1
Patent Applications — 8
Patent Issued — 7
Certificates of Appreciation — Sick Leave — 41

FACILITIES/CAPABILITIES

MERADCOM's facilities/capabilities consist of unique facilities and special instrumentation to perform the research, development, and testing of materiel in the assigned mission areas of the Command. The capabilities to perform the mission consist of facilities for materials research, testing stations, product assurance, structural analysis, computer center, technical documentation, and service support. All of these areas are considered essential, and some unique, to provide facilities/capabilities which are vital to modern *scientific and engineering assessments and evaluations.*

FUELS AND LUBRICANTS

Two separate laboratory facilities support the Fuels and Lubricants program. One is located at MERADCOM; the other is located at Southwest Research Institute in San Antonio, Texas. The laboratory at MERADCOM is equipped to conduct tests such as those contained in the Federal Test Method Standard for Lubricants, Liquid Fuels, and Related Products and The American Society for Testing and Materials (ASTM) Standards. The laboratory at Southwest Research Institute is a government-owned, contractor-operated facility equipped to conduct research and development programs on fuels and lubricants which range from laboratory chemical characterization of materials to full-scale engine tests to determine fuel, lubricant, and engine performance and compatibility.

FUELS HANDLING

A test facility located at Gunston Cove on the southern edge of Fort Belvoir is available for test and evaluation of aviation fuel filtration equipment. The facility is equipped with the necessary calibration test equipment to conduct specification quality assurance tests of standard DOD fuel filter/coalescer elements and equipment to qualify suppliers manufactured items. Additionally, tests equipment exists to test elements used to remove trace amounts of oil from separator elements used on Army water-craft to clean bilge water for discharge meeting US Environmental Protection Agency (EPA) requirements.

WATER RESOURCES

Research, development, and testing of water resources and equipment are conducted in a building located at MERADCOM. The building contains full-scale process test equipment and chemical and bacteriological laboratories with a full range of analytical instrumentation to support these programs. Exterior test pads, pumps, and water storage tanks adjacent to the building are available for outdoor testing of large water purification and sewage treatment systems.

ELECTRICAL POWER

New Energy Sources. Variable-temperature cryogenic research systems and microprocessor systems development facilities are among the extensive instrumentation and appartus available for research, development, and testing of new energy sources and components. The low-temperature research facilities provide a controlled temperature environment for experiments on electrical properties of materials in the 4° K to 400° K range. The microprocessor facility provides for software development and hardware debugging for representative microprocessor families.

Pulse-Power Test Facility. A multi-megawatt flywheel facility is being installed to permit testing of high-speed, high-power, low-duty alternators and gear box assemblies. This facility, coupled with a flywheel burst containment area and conventional dynamometer stations, provides a full range of capability for developing and evaluating pulse-power supplies and components for forseeable directed energy systems.

FUEL CONDITIONING CATALYST RESEARCH

A research capability has been developed to evaluate advanced fuel conditioning catalysts. This system includes a miniaturized fuel reactor to evaluate the efficiency of catalysts for the conversion of methanol or logistic fuels to a hydrogen-rich feed stock for fuel cells. The fuel reactor is equipped with temperature monitors and sampling ports connected to microprocessor-controlled analytical equipment which are used to characterize the reactions occurring on the catalyst materials.

TEST INSTRUMENTATION

An automatic data gathering microprocessor and processing instrumentation was installed for use in testing heaters, air conditioners, and electrical power end items and components. The instrumentation is controlled with a flexible test program providing data measurements for up to 10 test items.

MATERIALS RESEARCH AND TESTING

The Material Technology Laboratory conducts a broad program of research, development, engineering test and evaluation, prototype fabrication, and specification reviews in the field of organics, metals, plastics, ceramics, coatings, rubber, radiation, adhesives, coated fabrics, paper chemistry, preservatives, fuels, optical and spectral properties, as well as packaging and transportability. Facilities which make these efforts possible include:

- Radioactive Materials Analysis.
- Optical and Luminosity Measurements.
- Physical and Mechanical Metallurgy.
- Nondestructive Test.
- Plastics and Ceramics.
- Rubber and Coated Fabrics.
- Electrochemistry and Corrosion.
- POL Analysis.
- Paper Technology.
- Classical and Instrumental Chemical Analysis.
- Organic and Chemical Coating.
- Packaging Development and Engineering.

MARINE AND BRIDGE

Facilities include a variety of test sites, test equipment, and sophisticated strain-gage instrumentation. These facilities are utilized in test and evaluation to determine the structural integrity and load-carrying capabilities of newly developed prototypes, existing and modified bridges and bridging systems, armored-vehicle launchers, bridge-erection boats, and landing craft and ancillary equipment. Signals from strain-activated sensors such as strain gages, load cells, torque and pressure transducers, and accelerometers are recorded on dynamic or static strain data acquisition systems and are converted to practical engineering data.

Within close proximity of the main shipping channel of the Potomac River, MERADCOM has a naturally protected basin which is primarily used for testing and demonstration of small craft and bridging equipment. The water in this basin is deep enough (12 ft) to accomodate boats such as the LCU, LCM-8, RBEB, Small Tug, and Harbor Service Boat. Also available is a concrete ramp for trailer-launched boats, limited fueling capabilities, potable water replenishment, docking facilities, and a dock-mounted hoist (5-ton capacity).

PRODUCT ASSURANCE AND TESTING

The Product Assurance and Testing Directorate conducts a comprehensive program of testing, evaluation, and qualification of components, equipment, and systems in the investigative, development, pre-production, and product improvement phases. Facilities include the MERADCOM Testing Area, Electrical and Mechanical Testing, and Environmental and Field Testing.

MERADCOM Testing Area. The 820-acre MERADCOM Testing Area is used extensively to test heavy construction equipment, materials-handling equipment, sensors, detectors, camouflage equipment, and barrier creation and reduction techniques. Facilities include concrete and gravel test tracks for vehicle testing; a fording basin; pothole course; side slopes for vehicle grade tests; sound measurement facility; forklift truck facility; and a number of test ranges that simulate the variety of terrain features required for effective barrier and camouflage system development.

Electrical and Mechanical Testing. Electrical and Mechanical Testing facilities include Electomagnetic Interference (EMI) testing; Simulated Field Sound Chamber; Test Area used for endurance testing of power generating equipment, Dynamometer, multipurpose test cells used to evaluate various items of equipment; Exhaust Emissions-measuring equipment; Shock and Vibration testing equipment and a Data Acquisition System for Multipurpose acquisition of reliability data.

Environmental and Field Testing. Environmental and Field Testing facilities include Performance Test Chambers to conduct cooling capability, endurance testing and durability/reliability test on air conditioners; Heater Test facility which provided a means of testing equipment in various climatic conditions.

COMPUTER CENTER

The Computer Center supports MERADCOM scientists and engineers in the areas of analysis, programming, computer simulations and models, specialized experimental design, and software development. During FY82, the Computer Center replaced the Control Data Corp (CDC) 6600 computer with a CDC Cyber 170-730. This replacement resulted in a reduction of power consumption estimated to be approximately 40 percent, over 50 percent reduction in floor space, and maintaining the same computing power. Another major component of the system (extended core storage) was replaced with a unit requiring 70 percent less power and 80 percent less floor space. A communications processor (CDC model 2550) was installed to enhance the telecommunication processing capabilities and relieve the central processor (Cyber 170-730) of certain communication tasks.

SERVICES AND SUPPORT

R&D Model Fabrication. Comprehensive metalworking, processing, and woodworking facilities are available for the fabrication and modification of RDTE items developed by MERADCOM and its tenants. Metalworking capabilities include the fabrication of specialized precision instruments, high-vacuum apparatus, and other laboratory equipment. Machining, welding, sheet-metal work, heat treatment, and a foundry are utilized in processing work. Woodworking includes the production of mock-ups and models from wood, plastic, and canvas.

R&D Pictorial Support. Audio-visual facilities provide the still photography, graphic arts, motion pictures, video tapes, photo instrumentation, technical repoorts, and reproductions required to support RDTE programs conducted by MERADCOM and its tenant agencies.

Technical Library. Provides a variety of library service including acquisition, organization, and maintenance of a collection of library materials composed of books, journals, documents, and microfilm; direct-terminal on-line retrieval of information from Lockheed/Dialog Defense RDTE data bases; and interlibrary load services to the MERADCOM community.

1982 MERADCOM Command Group and Senior Staff

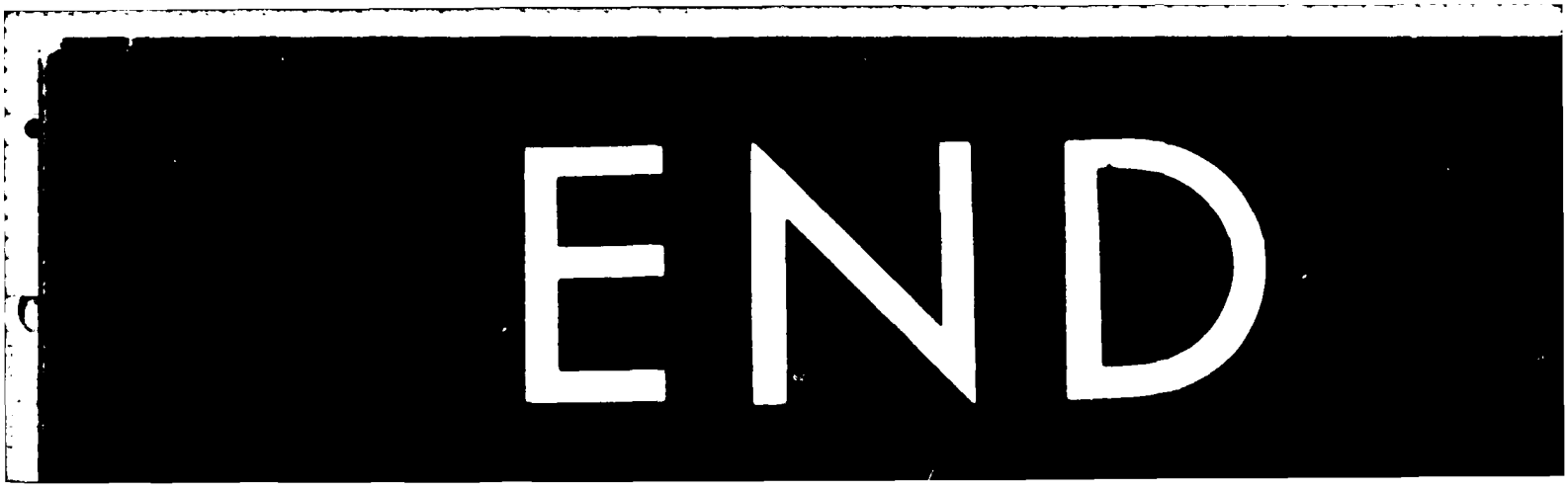
Seated, L to R: SGM D.A. Parker, Sgt Major; P. Bolan, ATD/R&D; T.W. Lovelace, Technical Director; COL T. Vander Els, Commander; COL A.K. Reiser, Deputy Commander; M. Zusman, ATD/Engrg & Acq; W.L. Keyes, Asst ATD/E&A; LTC H.J. Chura, Executive Officer

2nd Row: Dr. K.H. Steinbach, SA/Sci & Tech; S.A. Kilpatrick, C,CS/CI Lab; K.K. Harris, C, Mar & Bridge Lab; D.D. Fuehn, C, Elec Pwr Lab; J.A. Christians, C, E&WR Lab; P.D. Hopler, C, MACE Lab; E.J. York, C, Mat Tech Lab; Dr. T.M. Small, Actg C, CM Lab; COL R.K. Cornell, Prod Mgr, PSE; S.L. Vannucci, SA/Res Mgt

3rd Row: M.C. Kelley, Comptroller; W.G. Putnam, D, ILS&E; LTC M.R. Keiser, D, Prgms & Anal; J.J. Friery, Jr., Counsel; J.C. Kilby, Dep CPO; E.D. Hardin, D, Prod Assur; S.P. McCutchen, D, Mgt Info Sys; M. Friedland, D, Svcs & Spt; A.T. Sylvester II, SA/Materiel Asmt

4th Row: R.W. Young, EO Ofcr; L.D. Herman, C, FD&TO; L.L. Askew, Security Ofcr; J. Dixon, Safety Ofcr; H.K. Grimle, SADBUS; MAJ N.G. Comstock, Org Eff Ofcr; E.M. Morrissey, PAO

Not Shown: Dr. K.J. Oscar, Asst ATD/R&D; W.H. Booth III, D, Proc & Prod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