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DESCRIPTIVE SUMMARIES OF THE RESEARCH, DEVELOPMENT, TEST AND EV--ETC(U)
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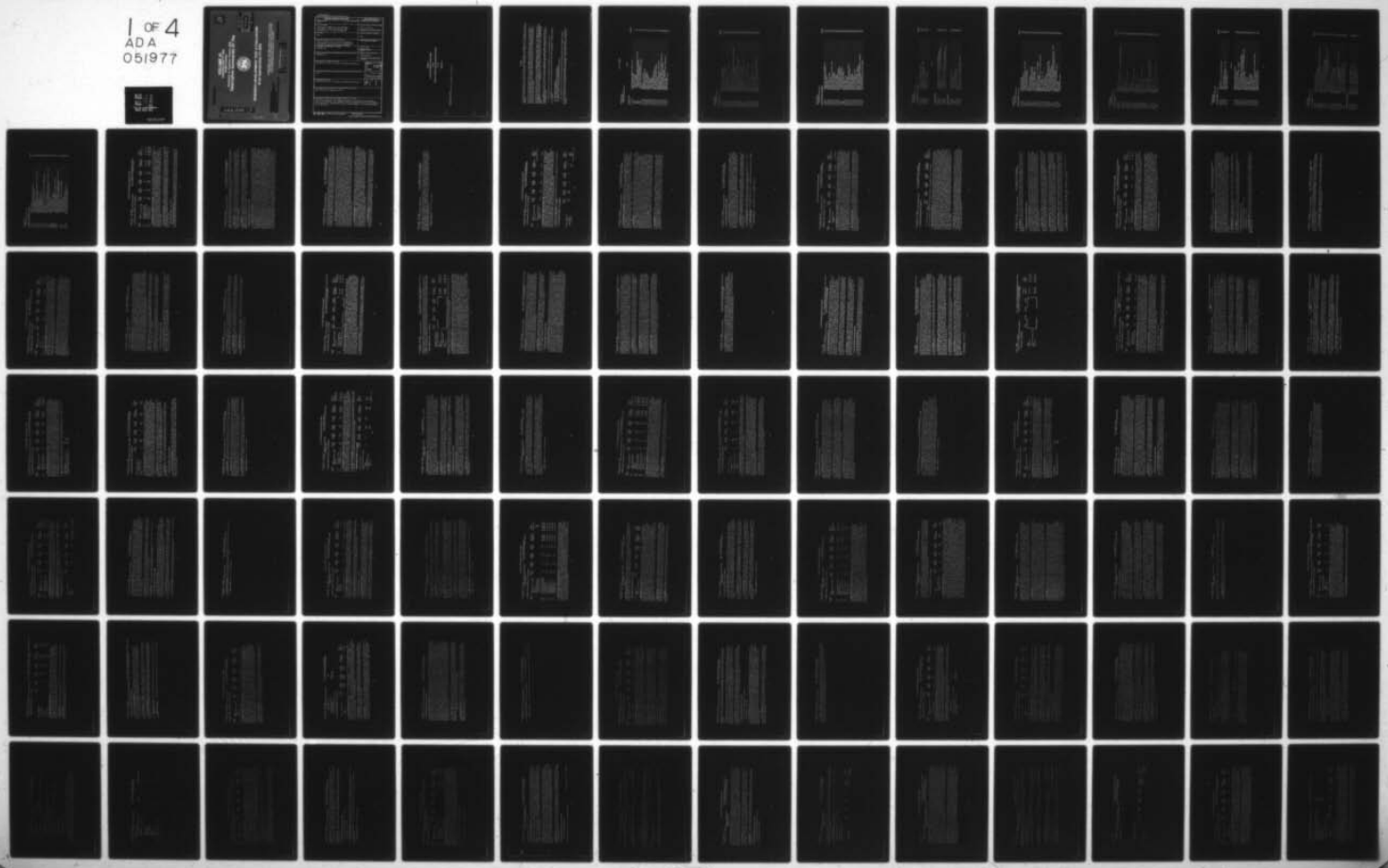

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VOLUME III

Supporting Data FY 1979
Budget Estimate

Submitted to Congress January 1978

Descriptive Summaries Of The



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RESEARCH DEVELOPMENT TEST & EVALUATION

Army Appropriation FY 1979

DEPARTMENT OF THE ARMY DEPUTY CHIEF OF STAFF
FOR RESEARCH DEVELOPMENT AND ACQUISITION
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REPORT DOCUMENTATION PAGE

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1. REPORT NUMBER: None	2. GOVT ACCESSION NO.
3. RECIPIENT'S CATALOG NUMBER	
4. TITLE *(and Subtitle)*: Descriptive Summaries of the Research, Development, Test & Evaluation, Army Appropriation - FY 1978, Volume III	5. TYPE OF REPORT & PERIOD COVERED: Final - FY 1979
	6. PERFORMING ORG. REPORT NUMBER: -
7. AUTHOR(s): None	8. CONTRACT OR GRANT NUMBER(s): None
9. PERFORMING ORGANIZATION NAME AND ADDRESS: Office, Deputy Chief of Staff for Research, Development, and Acquisition, DA (DAMA-PPR) Pentagon, Washington, DC 20310 (ODCSRDA)	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS: -
11. CONTROLLING OFFICE NAME AND ADDRESS: ODCSRDA, DA	12. REPORT DATE: January 1978
	13. NUMBER OF PAGES: 322
14. MONITORING AGENCY NAME & ADDRESS*(if different from Controlling Office)*: ODCSRDA, DA	15. SECURITY CLASS. *(of this report)*: UNCLASSIFIED
	15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT *(of this Report)*

Approved for public release; distribution unlimited.

17. DISTRIBUTION STATEMENT *(of the abstract entered in Block 20, if different from Report)*

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18. SUPPLEMENTARY NOTES

Sanitized version - deleting all classified material.

ACCESSION for	
NTIS	White Section [X]
DDC	Buff Section [ ]
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DISTRIBUTION/AVAILABILITY CODES	
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A	OK

19. KEY WORDS *(Continue on reverse side if necessary and identify by block number)*

RDTE Descriptive Summaries, FY 79

20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

Descriptive Summaries for program elements of the Research, Development, Test, and Evaluation, Army program, FY 1979, prepared to provide information for Congressional committees on each program element to be financed during FY 79 or FY 80.

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VOLUME III

DESCRIPTIVE SUMMARIES FOR PROGRAM ELEMENTS

OF THE

RESEARCH, DEVELOPMENT, TEST, AND EVALUATION, ARMY PROGRAM

FY 1979

JANUARY 1978

Department of the Army
Deputy Chief of Staff for Research, Development, and Acquisition

FOREWORD

These volumes have been prepared to provide information on the US Army Research, Development, Test, and Evaluation Program for Congressional Committees during the Fiscal Year 1979 hearings. This information is in addition to the testimony given by US Army witnesses.

These volumes contain a descriptive summary for each program element to be financed during FY 1979. Descriptive Summaries for projects within the program elements to be financed during FY 1979 for $5.0 million or more appear on buff colored pages immediately following the applicable program element. Where there are several items under development within a project, a separate summary has been provided for each item that exceeds $5.0 million during FY 1979. A Test and Evaluation Section is provided for all major weapon systems.

There are twenty-nine major weapon systems descriptive summaries appearing in Volumes II and III. Major weapon systems are identified by an asterisk in the Table of Contents. The formats and contents of these volumes are in accordance with guidelines and requirements of the Congressional Committees insofar as possible. Information previously provided in the SAC Data Book is consolidated into these volumes. The SAC Data Book information appears at the beginning of each program element descriptive summary.

A direct comparison of FY 1977, FY 1978, FY 1979, and FY 1980 data in this Program Element Listing with data shown in the Program Element Listing dated January 1977 will reveal significant differences. Many of the differences are attributable to the following factors:

a. Restructuring of the FY 1977 and FY 1978 programs for comparability to the FY 1979 program structure.

b. Reclassification to provide greater visibility and contribute to the effective management of the RDTE program such as the following:

(1) RDTE Headquarters Management
(2) Joint Tactical Command and Control Communications
(3) Aircraft Electronic Warfare Self Protection Systems
(4) Further extension of the Single Program Element Funding Concept.

c. An FY 1978 net reduction of $9.555 million resulting from the manpower/spaces reduction imposed by Congress.

The funding information used in these volumes corresponds to that contained in the President's Budget. Procurement data is shown where applicable for items in engineering or operational development. Military construction data is shown where applicable.

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FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.01.A
DoD Mission Area: #443 - Tactical Communications

Title: Communications Engineering Development
Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	5066	9659	6965	6827	Continuing	Not Applicable
D149	Army Support of Defense Communications System	818	4029	1300	1535	Continuing	Not Applicable
D481	Strategic Communications Development	42	299	1000	1000	Continuing	Not Applicable
D487	Tactical Multichannel	2682	3753	2240	2250	Continuing	Not Applicable
D488	Tactical Net Radio	1524	1578	2425	2042	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program provides engineering development for all Army Strategic and Tactical Communications equipments except Satellite Communications Ground Environment (PE 3.31.42.A), Joint Tactical Communications Program (TRI-TAC, PE 2.80.10.A), and Single Channel Ground and Airborne Radio Subsystems (SINCGARS-V, PE 6.37.46.A). The complexity of the modern battlefield has and is changing so that greater demands are placed upon both Strategic and Tactical communication. These demands include, greater reliability, reduced weight, reduced power consumption, lower life cycle costs, and increased mobility. Equipments currently in the field do not meet these demands. This program provides state-of-the-art developments for replacement equipments or product improvements of existing equipment whichever is judged the most cost effective to meet these demands.

C. BASIS FOR FY 1979 RDTE REQUEST: Completion of development to modify the AN/TTC-39 switch for 16 kilobits per second operation. Complete development of electromagnetic radiation hazard warning system. Support follow-on second Procurement of the Marine Corps Developed small unit transceiver (AN/PRC-68), support Development Tests/Operational Tests (DT/OT) III for the manpack single sideband high frequency combination radio used for the Special Forces and Ranger units (AN/PRC-70) and initiate DT/OT II for the transceiver multicoupler.

D. OTHER APPROPRIATION FUNDS: Not Applicable.

E. DETAILED BACKGROUND AND DESCRIPTION: The objective of this program is to develop communications equipment and systems that will be used by Army units within the Theater Army, Corps and division areas of operation. Specific tasks include National and International Communications Military Systems Standards, Communications Systems Design Facility, improvement of Ancillary multi-

channel radios/multiplexers, technical control facilities, automatic switching and telephone/teletypewriter terminal equipment. Communications systems and equipment for the Defense Communications System (DCS), which are assigned to the Army by the Defense Communications Agency (DCA) five year plan, are developed within this program.

F. RELATED ACTIVITIES: Program Element 6.27.01.A, Communications Electronics, and Program Element 6.37.07.A, Communications Development, provide the Exploratory and Advanced Developments that are continued in Engineering Development by this effort. This project also supports Program Element 6.37.46.A, Single Channel Ground and Airborne Radio System (SINCGARS). Duplication of effort is avoided through Service coordination and coordination with the Joint Tactical Communications Program (TRI-TAC) Office and Defense Communications Agency.

G. WORK PERFORMED BY: The Army developing organizations are the US Army Communications Research and Development Command; Project Manager, Army Tactical Communications System (ATACS); Project Manager, Single Channel Ground and Airborne Radio Subsystem (SINCGARS); and the US Army Communications Systems Agency, all located at Fort Monmouth, NJ. Contractors include: Canadian Commerical Corporation, Montreal Canada; Stelma, Inc., Stamford, CT; ITT Defense Communications Division, Nutly, NJ; GTE Sylvania, Needham, MA; Cincinnati Electronics Corporation, Cincinnati, OH; Collins Radio, Cedar Rapids, ID.

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: Completed development actions for the Technical Control Facility (AN/TSQ-84), Automatic Switch AN/TTC-38 and Forward Area Tactical Teletypewriter (FATT) program (Communications Terminal AN/UGC-74(V)4). The AN/TTC-38 was the first processor controlled, all electronic, automatic telephone central office to be fielded. It upgraded obsolete manual switches at major United States Army, Europe (USAREUR) headquarters. The AN/UGC-74 which is in production will be employed from battalion through corps units to replace obsolete electro mechanic teletypewriter equipments. Other tactical communications equipment improvements to improve mobility, reliability were also accomplished. Engineering development contracts were completed for frequency Band IV Tuning Head for the current multichannel radio, the AN/GRC-103 Radio Set; Pulse Form Restorers (TD-982 and TD-206); High Speed Serial Data Buffer (TD-1065); Time Division Digital Multiplexer (TD-1069); and Asynchronous Digital Combiner (TD-976). The components required to upgrade the AN/TSQ-84 with an automated record-keeping capability were developed. Developmental Test II was completed for TD-1065, TD-206, TD-1069, and the frequency band IV turning head for AN/GRC-103. Developmental/Operational testing was completed for the TD-9767, and the TD-206, and they were also type classified. Provided support to National and International Military Communications Systems Technical Standards efforts. Continued support for the Communications System Design Facility. Completed development of procurement data packages and type classified the TD-1065, the TD-1069, and the frequency Band IV tuning head for AN/GRC-103. Completed the development contract for components to upgrade AN/TSQ-84 and conducted the Developmental Testing/Operational Testing II (DT/OT II). Provided engineering support required through the first procurement for TD-976, TD-982, TD-206, AN/TSQ-85, multichannel equipments (AN/TRC-151/152), TD-1065 and TD-1069. In-house support was provided for USA Test and Evaluation Command in performing DT/OT II tests on AN/GRC-122(V)2 high power radio teletypewriter sets and the AN/PRC-70 manpack single sideband high frequency combination radio sets. Reliability tests were also conducted on advanced production engineering models of the AN/PRC-70 radio. Models of a high frequency single sideband radio set, AN/URC-92,

were supplied for operational evaluation aboard Army marinecraft. Contracts for engineering models of a multi-input transceiver coupler and small unit transceiver (AN/PRC-68) were awarded. Production contracts were awarded for Broadband Omnidirectional Antenna System, OE-254( )/GRC and Compact Very High Frequency (VHF) Vehicular Antenna, AS-2731( )/GRC. A production contract for the manpack single sideband high frequency combination radio (AN/PRC-70) was awarded. Developed a Washington, DC area high speed facsimile system. Contractual work was initiated to develop 16 kilobits per second modifications for the AN/TTC-39 switch.

2. FY 1978 Program: Provide engineering support through first procurement for the AN/GRC-103 frequency Band IV tuning head and its associated multichannel equipment, TD-1065, TD-1069, AN/TRC-151/152, AN/TSQ-85 and upgrading components for AN/TSQ-84. These are multichannel and technical control equipments to improve mobility, reliability and reduce maintainence costs for the active Army. Fabricate prototype models of the Time Division Digital Multiplexer (TD-1069) Assemblage. Continue technical support for National and International Communications Military Systems Standards Technical efforts and the Communications System Design Facility. The increased funds will be used to support the incremental funding for the transceiver multicoupler started in FY 1977. Additional SINCGARS-V supporting effort will include engineering development of a superior noise cancelling microphone for use in high ambient noise environments and a frequency independent antenna for point to point communications. Production support of the small unit transceiver (AN/PRC-68) and the AN/PRC-70 manpack single sideband high frequency Radio Set will continue and the first article test models of the AN/PRC-70 will be evaluated. Monitor production contracts for Broadband Omnidirectional Antenna System OE-265( )/GRC and Compact very high frequency Vehicular Antenna AS-2731( )/GRC. Project Management and type classification efforts of Strategic Communications and Army Support of Defense Communications System will continue. AN/TTC-39 switch modification will continue. The MD918 digital multiplexer will be used in-house to develop tropospheric scatter radio path data for communications engineering.

3. FY 1979 Planned Program: Continue engineering support of the Technical Control Facilities (AN/TSQ-85, and AN/TSQ-84A), Time Division Digital Multiplexer (TDDM) (TD-1069), and Transportable Radio multichannel Systems AN/TRC-151/152. Support Development Test III on the AN/TSQ-84A. Complete fabrication of TDDM assemblage and conduct Developmental Testing/Operational Testing II (DT/OT II). Continue technical support for National and Internation Communications Military Systems Standards technical efforts and the Communications System Design Facility. Support follow-on second procurement of the Marine Corps developed small unit transceiver (AN/PRC-68). AN/PRC-70 will begin Developmental Tests/Operational Tests III and the transceiver multicoupler's Developmental Tests/Operational Tests II will be initiated. Contract for support of type classifications and nomenclature for commercial equipment being fielded for Army use in long haul communications will continue. Completion of development effort started in FY 1977 for modification of AN/TTC-39 switch. Decrease in cost in FY 79 vs 1978 is due to completion of major part of AN/TTC-39 switch modification in FY 1978.

4. FY 1980 Planned Program. Continue technical support of Time Division Digital Multiplexer assemblage and the TD-1069 multiplexer through first production. Continue technical support for National and International Communications Systems Standards efforts and the Communication System Design Facility. Prepare for transfer of fiber optics system and millimeter wave radio developments from advanced development to engineering development. These two developments will improve mobility of

tactical communications by reducing set up time and by reducing the bulk and weight of interconnecting cables. These systems, because of their reduced size and weight will also reduce the number of required vehicles for training and the number of personnel required for installation. Continue with developments started in prior years and initiate engineering development of projects which began with advanced development under Program Element 6.37.07.A. Initiate engineering development contract for digital tropo radio system for Digital European Backbone system. Complete testing program for AN/TTC-39 switch modification. Continue type classification and project management efforts.

5. Program to Completion: This is a continuing program.

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.04.A
DoD Mission Area: #411 - Battlefield Surveillance

Title: Unattended Ground Sensors (UGS)
Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	7308	7094	8690	11080	13321	51000
	Quanities						(Not Feasible to List)
DL73	Remotely Monitored Battlefield Sensor System (REMBASS)	7308	7094	8690	11080	13321	51000

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The Army faces highly mobile and heavily mechanized forces who will make maximum use of terrain masking, bad weather, line-of-site restrictions and electronic countermeasures. The REMBASS program is expected to meet this challenge by the development of a passive all-weather Unattended Ground Sensor (UGS) system to complement the active sensor systems. The specific objective of this program is to conduct Engineering Development (ED) of unattended ground sensor equipment capable of operation anywhere in the world. This equipment will improve the Army's capability for early warning alert, ground surveillance, and threat acquisition during all conditions of weather and visibility. This program element consists of one active ED project - REMBASS. REMBASS consists of unattended ground sensors, including seismic, seismic acoustic, magnetic, strain cable, infrared, relay devices, read-out devices, and power sources which will provide the field commander with a passive unattended ground sensor system in 1982.

C. BASIS FOR FY 1979 RDTE REQUEST: Continuation of ED hardware fabrication contract awarded in FY 1977 for configuration end items which will comprise the basic REMBASS.

D. OTHER APPROPRIATION FUNDS: ($ in Thousands)

	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
Other Procurement Army						
PEWS: Funds	6000	6200	0	0	0	12200
Quanities	1551	2400	0	0	0	3951
REMBASS Funds					71600	71600
Quanities						(Not Feasible to List)

Program Element: #6.47.04.A
DoD Mission Area: #411 - Battlefield Surveillance

Title: Unattended Ground Sensors (UGS)
Budget Activity: #4 - Tactical Programs

E. DETAILED BACKGROUND AND DESCRIPTION: The objective of this project is to develop the techniques of target detection location, identification, and classification using passive remote sensors and produce Engineering Development (ED) system models suitable for extensive user tests. The element consists of one active project, REMBASS in FY 1979. Feasibility of the remote sensor concept was proven in Vietnam between 1968 and 1973. Selected configuration and item Advanced Development (AD) models were tested and transitioned into ED as REMBASS. These items will meet the basic requirements of the user with an expected Initial Operational Capability (IOC) of FY 1982. It employs a variety of sensor types including magnetic, seismic, seismic acoustic, imaging, strain cable and infra red.

F. RELATED ACTIVITIES: Related technological work was performed by the Defense Special Projects Group (DSPG). Prior to DSPG disestablishment in June 1972, the Army, in coordination with the other services, accepted the management of a large number of the ongoing DSPG research and development (R&D) projects. Appropriate projects have been integrated into on-going Army programs. Coordination between the services has been formalized with a Joint Service Memorandum of Agreement for Tactical Remote and Physical Secuity Sensor Systems Research, Development, Test and Evaluation. This joint agreement establishes a Joint Service Coordination Committee (JSCC) that reviews all planned and ongoing Research, Development, Test and Evaluation (RDTE) in the Tactical Remote and Physical Security Sensor area to insure appropriate interoperability between service systems and cooperative and coordinated RDTE efforts. In addition, the Navy, Marines, and Air Force participate with the Army in a system analysis group to identify the final UGS system configuration. There is extensive international interest in the UGS program. Information has been provided to NATO panels and other international forums. Many countries have or are preparing UGS requirements documents in line with the US program and have requested to be kept informed of the US development. Commander, European Command, has initiated a combined (United Kingdom, Germany, United States) program, AVID GUARDIAN, to study the application of sensors to the Central European environment. This program element is the Engineering Development (ED) effort corresponding to UGS work previously reported under 6.37.19.A, Surveillance, Target Acquisition and Night Observation (STANO) Systems, and program element 6.47.23.A, STANO Systems through FY 1975.

G. WORK PERFORMED BY: Responsibility for management of the REMBASS project is assigned to Project Manager (PM), REMBASS, US Army Electronics Research and Development Command (ERADCOM), Fort Monmouth, NJ. In-house work is performed by the US Army Electronics Research and Development Command (ERADCOM), Fort Monmouth, NJ; US Army Mobility Equipment Research and Development Center (MERADCOM), Fort Belvoir, VA; Human Engineering Laboratory (HEL), Aberdeen Proving Ground, MD; US Army Armament Research and Development Command (ARRADCOM), Dover, NJ. Contractors include: Chamberlain Manufacturing Corporation, Waterloo, IA; Mitre Corporation, McLean, VA; RCA Corporation, Camden, NJ, Analytics Incorporated, Philadelphia, PA.

Program Element: #6.47.04.A
DoD Mission Area: #411 - Battlefield Surveillance

Title: Unattended Ground Sensors (UGS)
Budget Activity: #4 - Tactical Programs

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: Validation In-Process Review (IPR) for basic components of the REMBASS to enter ED was approved by Department of the Army on 17 May 1976. Three design plan contracts were awarded: GTE Sylvania, RCA Corporation, and American Electronics Laboratory. A Special IPR was conducted on 10 May 1977 to finalize the coordinated developer/user configuration for basic REMBASS. Based on evaluation of the resulting design plans, an engineering development contract was awarded in June 1977 to RCA Corp. PEWS: Fabrication of ED hardware for the Platoon Early Warning System (PEWS) AN/TRS-2 was completed. PEWS will fulfill the small unit package requirement of the REMBASS. Development test II (DT II) and Operational Test II (OT II) were completed. A successful In-Process Review (IPR) was conducted on 1 June 1977 and PEWS has entered the production phase of development.

2. FY 1978 Program: Remotely Monitored Battlefield Sensor System (REMBASS). Continue Engineering Development contract for REMBASS hardware. A final design review will be held and approval given for fabrication of configuration end items. The cost of initiation of hardware fabrication is the basis for funding increase. Award production contract for platoon early warning system.

3. FY 1979 Planned Program: Complete fabrication of configuration end items; conduct Development Test II. The peak in hardware fabrication and the extensive DT II testing is the basis for funding increase.

4. FY 1980 Planned Program: Conduct REMBASS Operational Test II, complete hardware fabrication contract for REMBASS hardware and conduct DEVA IPR.

5. Program to Completion: Award production contract for REMBASS in FY 1981.

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element #6.47.06.A
Title: Radiological Defense Equipment
DoD Mission Area: #449 - CB Defense/Chemical Warfare
Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	676	773	1055	915	Continuing	Not Applicable
D517	Radiological Defense Equipment	676	773	1055	915	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Radiological measurement detection and alarm equipment is required on the tactical battlefield to: enable efficient use of radiological monitoring and survey assets; provide commanders with real time knowledge of radiation patterns on the ground; and provide commanders and medical personnel with the radiation history of individuals and units. This program provides for engineering development of a family of radiological detecting and measuring equipment and systems to enable troops and equipment to function effectively and safely on a nuclear battlefield. Equipment under development provides substantial improvement in radiation measurement, detection and recording over those systems currently fielded. New equipment will measure prompt as well as delayed radiation; neutron as well as gamma-ray levels; and will have a substantially improved dynamic measurement range. Equipment to be replaced typically has 1950 or early-1960 technology. All these new and improved capabilities are required to insure an operational capability in the tactical nuclear environments of a conventional-nuclear battlefield. Principal items of equipment under development include a vehicular radiac system, an aerial radiac system, tactical and individual dosimeters, and a fixed installation fallout monitor and alarm system.

C. BASIS FOR FY 1979 RDTE REQUEST: Funds requested provide for completing engineering development for the individual dosimeter (DT 236), an Interdependent Research and Development (IR-D) project with the United Kingdom; a fixed installation fallout monitor, an IR-D project with Canada; and engineering development for an x-ray probe for the alpha survey meter will continue. The development of the data annotation device to adapt the aerial radiac to the "Mohawk" Army aircraft will continue. Cost effective improvements to existing and developmental instruments such as Large Scale Integration (LSI) technology will be developed and appropriately applied.

Program Element: #6.47.06.A
DoD Mission Area: #449 - CB Defense/Chemical Warfare

Title: Radiological Defense Equipment
Budget Activity: #4 - Tactical Programs

D. OTHER APPROPRIATION FUNDS:($ in thousands)

		FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
Other Procurement, Army:	Funds	1803	320	5829	3909	Continuing	Not Applicable
	Quantities*						Not Applicable

* Numerous procurements of a variety of instruments and readers. Not meaningful to quote total numbers.

E. DETAILED BACKGROUND AND DESCRIPTION: Current dose-rate meters are relatively inaccurate, do not cover the dynamic range required, and do not measure prompt radiation. Currently there is no rapid aerial survey capability, nor is there an adequate fallout measurement and alarm system for fixed and semi-fixed installations. The objective of this program is to develop dosimetric devices having performance parameters required by todays nuclear weapons, tactics and doctrine. A family of radiological equipment will be developed to provide aerial, vehicular, dismounted, and fixed installation capabilities to measure both prompt and delayed (fallout or induced) radiation. Individual and tactical dosimeters to measure prompt and delayed neutron and gamma radiation are being developed on a low cost basis for individual issue. These individual and tactical dosimters will provide commanders with an immediate knowledge of the recent radiation history of their units and will provide a lifetime radiation history for the individual soldier. The vehicular radiac system will mount in armored fighting vehicles and can effectively monitor fallout radiation levels from within the vehicle. It provides an extremely fast on the ground radiation survey capability that does not exist today. The vehicular radiac may also be used in a dismounted role. The fixed installation fallout monitor provides a capability to remotely monitor radiation in as many as 10 separate locations at fixed or semi-fixed installations such as a depots or command posts. An x-ray probe for the alpha radiation detection is being developed that will enable standoff detection of plutonium. This capability is useful in the event of an accident involving the scatter of plutonium since it is much faster and safer than current methods. Current procedures require a "hands and knees" survey with the alpha detector within a few centimeters of the ground.

F. RELATED ACTIVITIES: This effort is related to exploratory development conducted in program element (PE) 6.27.03.A, Combat Surveillance/Target Acquisition and Identification; and to advanced development conducted in PE 6.36.04.A, Nuclear Munitions and Radiacs. A Navy alpha monitoring and survey meter has been adapted for Army use and the Air Force is participating in the tactical dosimeter program. An installation fallout monitor and alarm system, the AN-GDQ-3 is being developed jointly with the Canadian Department of Defense Production and the DT-236 individual dosimeter is being developed jointly with the United Kingdom Ministry of Defense. The vehicular radiac system was developed to be compatible with all armored fighting vehicles. Liaison with other services is maintained to preclude duplication.

Program Element: #6.47.06.A Title: Radiological Defense Equipment
DoD Mission Area: #449 - CB Defense/Chemical Warfare Budget Activity: #4 - Tactical Program

G. WORK PERFORMED BY: US Army Electronics Research and Development Command (ERDACOM), Fort Monmouth, NJ; the top five contractors are Rockwell, International, Corporation, Los Angeles, CA; Radio Corporation of America, Philadelphia, PA; Nuclear Corporation of America, Denville, NJ; Canadian Admiral Corporation, Toronto, Canada; seven other contractors/bidders are expected for a total of $129,000.

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: An aerial radiac has been developed and successfully tested for helicopter application that provides a capability for rapid ground radiological survey over large areas by aircraft. The vehicular radiac (AN-VDR-1) successfully completed the second phase of both developmental and operational testing. This instrument will provide a new capability to monitor radiation fields from within armored vehicles during closed hatch operations. Feasibility has been established to directly measure total cumulative neutron and gamma-ray dose for individual dosimeters. The technology involves silver activated photo luminescent glass for gamma radiation and silicon junction diodes for neutron dose and will give the commander and medical personnel an immediate indication of an individual soldiers' total radiation history. Materials have been developed for a small lightweight tactical dosimeter that measure and record extremely small electrical charges that are caused by low doses of either neutron or gamma radiation.

2. FY 1978 Program: First production of the aerial radiac begins. Producibility engineering packages for the vehicluar radiac will be prepared. The vehicular radiac and the tactical dosimeter will be type classified. Engineering development of the individual dosimeter continues and Developmental/Operational Test II (DT/OT II) begins. Engineering development of the fixed installation fallout monitor will be completed and development and operational testing will begin. New technology such as large scale integration that can substantially reduce production costs will be examined and appropriately applied.

3. FY 1979 Planned Program: Begin low rate initial production of the vehicular radiac. Begin competitive full scale procurement of the aerial radiac. Type classify the individual dosimeter, assimilate and coordinate United Kingdom procurement data and information. Complete development and testing the installation fallout alarm and monitor. Begin low rate initial production for the tactical dosimeter. Complete engineering development and begin testing of an x-ray probe for the alpha particle detection. Transition the cost effective improvements to the family of radiac equipment to the engineering development phase. FY79 funding is higher than for FY78 due to the changing nature of the various projects in the program and due to inflation.

4. FY 1980 Planned Program: Complete testing of the x-ray probe for the alpha meter and type classify. Initial Operational Capability for the aerial radiac will be achieved. Continue low rate initial production of the vehicular radiac. Complete preproduction activities for the individual dosimeter in accordance with appropriate US-UK arrangement. Begin low rate initial production of the tactical dosimeter. Initial activities will be conducted in coordination with Canada, for production of the fixed installation fallout monitor.

5. Program to Completion: This is a continuing program. Additional items will be considered for development when new requirements are validated and when new technology offers significant capability or cost advantages.

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.09.A
Title: Identification Friend or Foe (IFF) Equipment
DoD Mission Area: #444 - Tactical Combat Integration
Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	0	0	1000	1316	Continuing	Not Applicable
	Quantities						Not Applicable
D-530	Identification Friend or Foe (IFF) Equipment	0	0	1000	1316	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: In FY 1979 and 1980, effort will be devoted to the evolutionary development of the Army's Air Defense identification system, Air Traffic Control Radar Beacon System/Identification Friend or Foe (IFF)/ MARK XII/Systems (AIMS) to improve its effectiveness. This work is being performed as a coordinated part of a Tri-Service effort which the Air Force leads. The Tri-Service effort is being accomplished in conjunction with cooperative efforts with the United Kingdom. The work will stress the reduction of MARK XII vulnerabilities to exploitation and jamming, and improve the reliability (confidence) of identification.

C. BASIS FOR FY 1979 RDTE REQUEST: This program is a new start for the full scale development of improved Air Defense MARK XII Identification components and new Battlefield IFF systems. The Battlefield systems are now expected to remain in Advanced Development through 1980 to allow time for NATO cooperative development and interoperability studies. The Engineering Development efforts on the MARK XII components follow from FY 1977 and 1978 Advanced Development efforts in Program Element 6.37.06.A, Identification Friend or Foe (IFF) developments. In FY 1977, the vulnerabilities of MARK XII equipment were measured, while in FY 1978 circuitry solutions to these vulnerabilities will be determined in configurations that are form and fit compatible with the existing equipment. This course is expected to extend the useful life of MARK XII systems, in which investments in excess of $1 billion have been made, as well as allow for orderly transition to meet the long-term requirements of the NATO Future Identification System (FIS). The Required Operational Capability document necessary for authorization to begin full scale development is expected to be approved in FY 1978. Authorization of full scale development is essential to satisfy the Army's portion of the US/UK Memorandum of Understanding dealing with the upgrading of the MARK XII system.

D. OTHER APPROPRIATION FUNDS: Not applicable.

Program Element: #6.47.09.A
DoD Mission Area: #444 - Tactical Combat Integration

Title: Identification Friend or Foe (IFF) Equipment
Budget Activity: #4 - Tactical Programs

E. DETAILED BACKGROUND AND DESCRIPTION: The need for rapid, reliable, and secure Air Defense identification systems has become more important as the ranges at which targets can be effectively engaged extends beyond the ranges at which they can be positively identified. US military forces and some of our allies, to include some but not all of our NATO allies, have adopted the MARK XII system. The full advantage of this system is not realized unless all friendly forces are equipped. A Memorandum of Understanding is being negotiated with the United Kingdom to cooperatively develop improvements to the MARK XII system. The objective of this effort is to eliminate shortcomings of the MARK XII system so that it, or an improved system compatible with MARK XII, is accepted by all NATO allies. The Tri-Service program supporting this cooperative effort is managed by the Air Force. In support of this effort the Army is developing test standards, measuring the vulnerabilities of the MARK XII, and developing fixes. This effort will promote NATO interoperability, and extend the useful life of an investment in excess of $1 billion in Army MARK XII equipment. MARK XII equipment is used in numerous Identification Friend or Foe (IFF) equipments, e.g., AN/TPX-46 and APX-50 interrogators used with the Improved HAWK and Hercules missiles, Forward Area Alert Radar (FAAR), and AN/APX-100 airborne transponder.

F. RELATED ACTIVITIES: The Army is working with the Navy, and the Air Force to develop improvements to the MARK XII identification system that will enhance the operational capabilities and ensure that the system satisfies the requirements for continued use defined by NATO Panel VI (Defense Research Group).

G. WORK PERFORMED BY: In-house work is being performed by the US Army Electronics Research and Development Command, Fort Monmouth, NJ. Contractors that are expected to actively participate in the battlefield IFF development are Hazeltine Corporation, Greenlawn, NY; Teledyne Electronics, San Diego, CA; Texas Instruments, Dallas, TX; and RCA Corporation, Camden, NJ.

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: Not applicable.

2. FY 1978 Program: Not applicable.

3. FY 1979 Planned Program: Formulate procurement data for external contract for Evolutionary Improvement to MARK XII interrogators and transponders. This effort will be in conjunction with other Services in support of a joint developmental plan with the United Kingdom. FY 79 efforts will involve design of Product Improvement Kits to improve the receivers and signal processors for MARK XII interrogators.

Program Element: #6.47.09.A
DoD Mission Area: #444 - Tactical Combat Integration

Title: Identification Friend or Foe (IFF) Equipment
Budget Activity: #4 - Tactical Programs

4. FY 80 Planned Program: Procure, over a two year period, Engineering modules which can be integrated with Army interrogators AN/TPX-46 and AN/TPX-50, and transponders AN/APX-72 and AN/APX-100. Modules will enable operation to meet NATO long-term requirements, extend utility of large investment in MARK XII for HAWK, Hercules and Surface to Air Missile-Development (SAM-D), Forward Area Alert Radar.

5. Program to Completion: Complete development and testing of modules to improve performance of the MARK XII modules. In FY 1982, 1983 timeframe, begin Engineering Development of an identification system for the Forward Battle Zone. This system is expected to be the result of cooperative efforts with NATO allies.

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.10.A
Title: Night Vision Devices
DoD Mission Area: #411 - Battlefield Surveillance
Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	2342	2638	3812	5433	Continuing	Not Applicable
	Quantities						Not Applicable
DL70	Night Vision Devices	2342	2638	3812	5433	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The objective of this program is to perform Engineering Development and obtain Type Classification of Night Vision Devices which, while not specifically dedicated as part of a major weapon system, are needed by many elements of the field Army to perform military functions at night and during periods of limited visibility with an efficiency approaching that of daylight. Due to the relatively high cost of night vision devices, the number of systems that can be planned to be procured has been constrained to a number much less than that which is required. The program is directed so that life cycle costs are minimized by making maximum use of standard or common modules in the night sights of as many weapon systems as possible, and by making technology changes compatible with existing sights. Advances realized in Program Element, 6.37.10.A, Night Vision Advanced Development are utilized.

C. BASIS FOR FY 1979 RDTE REQUEST: The engineering development will be completed for an Infrared Aiming Light that is used in conjunction with second generation Night Vision Goggles for accurately firing the M-16 rifle at night. Complete test and evaluation of integration of a closed cycle cooler into the AN/TAS-6, Night Observation Device Long Range (NODLR) and support the initial production of the cooler. Introduction of this cooler into the field will allow for greater mission times for the NODLR. The NODLR makes use of Thermal Imaging Common Modules which are used in numerous US Army, Navy and Air Force Systems, and are expected to be used by the Federal Republic of Germany. Engineering Support will be provided to assist in the integration of Thermal Imaging Modules into the Advanced Attack Helicopter (AAH), and the Cobra Helicopter (AH-1S). Development will begin for high performance lightweight Aviation Night Vision Goggles that will enable nap-of-earth flight operations during starlight and overcast starlight conditions. Present goggles permit nap-of-the-earth flight at quarter moonlight or better. This dramatic increase in capability has been made possible by the exploitation of recent advances in 3rd generation image intensification technology.

Program Element: #6.47.10.A
DoD Mission Area: #411 - Battlefield Surveillance

Title: Night Vision Devices
Budget Activity: #4 - Tactical Programs

D. OTHER APPROPRIATION FUNDS: Not Applicable.

E. DETAILED BACKGROUND AND DESCRIPTION: The AN/TAS-6 Night Observation Device Long Range (NODLR) is equipped with an interim Joule-Thomson cooler that requires bottles of compressed gas to operate. The requirement to replace these bottles establishes logistical constraints on the operation of the equipment. The development of the closed cycle cooler will remove the logistical constraints and provide for continuous sight operation as stated in the Required Operational Capability (ROC). The NODLR which is interfaced with the AN/GVS-5, Laser Range Finder, will be employed to provide surveillance throughout the battalion area and place accurate fire on enemy locations. The individual soldier e.g., Ranger Battalions, will be unable to accurately aim his weapon while wearing Night Vision Goggles. Development of an Infrared Aiming Light will be completed in FY 79. This device will be mounted on and boresighted with the individual weapon, and will provide a pencil beam of radiation not visible to the naked eye but visible through goggles. The individual soldier will be able to place accurate fire on a target at night by observing the beam through his goggles. With the current Night Vision Goggles pilots cannot fly nap-of-the-earth at lower than 1/4 moonlight visibility. Development of a high performance Aviation Night Vision Goggle will provide a capability to fly nap-of-the-earth at less than starlight. The development of third generation tubes has made this possible.

F. RELATED ACTIVITIES: The US Navy and Air Force utilize the same Thermal Imaging Common Modules as the Army. The Army has configuration management responsibility for these thermal imaging systems, which are also expected to be utilized by the Federal Republic of Germany in their LEOPARD, MARDER, and LUCHS weapon systems. The efforts of the Services are closely coordinated and duplication avoided through Tri-Service agreements.

G. WORK PERFORMED BY: In-house work is performed by the US Army Night Vision Laboratory, Fort Belvoir, VA; and the US Army Missile Research and Development Command, Redstone Arsenal, AL. Major contractors are: Varo Inc., Garland, Tx; International Telephone and Telegraph Corporation, Roanoke, VA; Texas Instruments Corporation, Dallas, TX; Martin-Marietta Corporation, Orlando, FL; and Varian Corporation, Palo Alto, CA.

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: This program has produced a variety of night vision equipment, both manportable items used by the individual soldier, and combat vehicle mounted devices. Recent accomplishments include type classification of the Individual Weapon Sight (AN/PVS-4), Crew Served Weapon Sight (AN/TVS-5), Driver's Viewer (AN/VVS-2), Handheld Thermal Viewer (AN/PAS-7), and AN/TAS-7, Night Observation Device Long Range (NODLR). In FY 1977, Development and Operational Tests II were conducted on the NODLR and the device was Type Classified Standard. Also in FY 1977 contracts for developmental models of the Infrared Aiming Light were awarded.

Program Element: #6.47.10.A
DoD Mission Area: #411 - Battlefield Surveillance

Title: Night Vision Devices
Budget Activity: #4 - Tactical Programs

2. FY 1978 Program: Initiate production of the integrated Night Observation Device Long Range (NODLR) closed cycle cooler, which will eliminate the logistical burden of refilling the bottles of compressed gas used to drive the currently developed open cycle cooler. Infrared Aiming Light will complete both Development Test II and Operational Test II, and an In-Process Review (IPR) will be held to determine if this should be Type Classified Standard.

3. FY 1979 Planned Program: Evaluation of integrated NODLR closed cycle cooler will be completed, and initial production supported. Engineering Development of the Infrared Aiming Light will be completed. Engineering Development of high performance Pilots Night Vision Goggles and support of providing the Advanced Attack Helicopter (AAH) and Cobra TOW helicopter with a thermal imaging capability will continue.

4. FY 1980 Planned Program: Increases in the program in FY 1980 over FY 1979 are due to the entrance of third Generation Image Intensification systems into Engineering Development. Development Test II and Operational Test II and continuation of Engineering Development for Pilots Night Vision Goggles.

5. Program to Completion: This is a continuing program.

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.11.A
DoD Mission Area: #448 - Aircraft Survivability

Title: Aircraft Electronic Warfare (EW) Self-Protection Systems
Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT					Continuing	Not Applicable
	Quantities						Not Applicable
DC52	Aircraft Survivability Equipment (ASE) Systems					Continuing	Not Applicable
D665	Aircraft EW Self-Protection (AEWSP) Systems					Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program element (PE) provides for the development, test and type classification for production and fielding of required ASE and AEWSP systems. The program combines the passive signature reduction, infrared (IR) suppressors and aircraft integration project, DC52 (formerly 6.42.09.A, DC52), with the complementary warning and active electronic self-protection countermeasures project, D665. Together, they address threat systems encompassing the IR, optical/laser and radar-directed air defense weapons. The program is time phased to be a logical follow-on to advanced developments from PE 6.37.11.A, AEWSP Equipment. Resultant production plans achieve the survivability needed to meet the attack, assault, and special electronic mission aircraft (SEMA) requirements. The program is adjusted continually to meet the changing nature of the threat and technology. This program responds to stated requirements of the Required Operational Capability (ROC) for Aircraft Survivability Equipment (ASE). ASE is needed for both current and developmental Army aircraft to accomplish their combat missions. ASE increases combat effectiveness by reducing or eliminating the ability of threat air defense systems to detect, hit, damage, or destroy Army aircraft.

C. BASIS FOR FY 1979 RDTE REQUEST: The principal efforts under this program will be to complete the ongoing contractual development, integration and testing for the AN/APR-39(V)2 radar warning receiver, the AN/ALQ-136 radar jammer, the AN/ALQ-156 missile warning detector, the AH-1S infrared suppressor, the OV-1 infrared suppressor, the RU-21 infrared suppressor and the

AN/ALQ-144(I) infrared jammer. A new start will be initiated for an advanced radar jammer, AN/ALQ-136(AI), to counter threat airborne interceptors. All necessary experimental work has been performed and the proposed system is ready for full scale development. The increase in this program reflects tha airborne interceptor countermeasure which has Under Secretary of Defense for Research and Engineering (USDRE) interest. This countermeasure will be used on special electronic mission aircraft (SEMA).

D. OTHER APPROPRIATION FUNDS: ($ in Thousands)

	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
AIRCRAFT PROCUREMENT, ARMY						
D665 Aircraft EW Self-Protection (AEWSP)						
Funds					Continuing	Not Applicable
Quantities					Continuing	Not Applicable
DC52 Aircraft Survivability Equipment (ASE)						
Funds					Continuing	Not Applicable
Quantities					Continuing	Not Applicable

Procurement total quantities include up to 14 different aircraft survivability equipment (ASE)/aircraft EW self-protection (AEWSP) systems, and funds are contained in eleven spearate aircraft modification lines.

E. DETAILED BACKGROUND AND DESCRIPTION: This program element (PE), like the advanced development PE, 6.37.11.A, AEWSP Equipment, combines two engineering development (ED) projects managed by the Army Project Manager for ASE (PM-ASE): DC52 (formerly 6.42.09/DC52) ASE Systems; and D665, AEWSP Systems. Both projects were initiated in 1971 after the Soviets introducted the SA-7 shoulder fired surface-to-air missile (SAM) in the Mideast. Project DC52 concentrates on passive signature reduction, infrared (IR) suppression, vulnerability reduction, ballistic hardening and aircraft integration. Project D665 develops the complementary warning and active jamming systems. In 1972 the SA-7 was used against Army helicopters in Vietnam. The aircraft were quickly equipped with the IR suppressors and low reflectance paint developed under this program and the advanced development program, 6.37.11.A. Flare dispensers were also adapted and successfully employed for larger helicopters. An IR jammer for use on fixed-wing aircraft demonstrated the required capabilities to defeat the SA-7 missile. Radar warning receivers (AN/APR-25/26) were used to detect enemy radar-directed weapons. Together, these efforts demonstratad the need for and the credibility of aircraft survivability equipment (ASE) and the countermeasures across the electromagnetic spectrum. Accordingly, requirements were established for present fleet and developmental aircraft to enable them to complete critical combat missions. Programs were established and funding provided to develop the required ASE and countermeasures for the present threat with changes and improvements identified for growth threats. The objectives of the individual DC52 and D665 projects are maintained in the combined program.

Program Element: #6.47.11.A
DoD Mission Area: #448 - Aircraft Survivability

Title: Aircraft Electronic Warfare (EW) Self-Protection Systems
Budget Activity: #4 - Tactical Programs

F. RELATED ACTIVITIES: This program is conducted in conjunction with PE 6.37.11.A, Aircraft Electronic Warfare Self-Protection (AEWSP) Equipment, also managed by the Army Project Manager (PM) for ASE and PE 6.32.15.A, Joint Survivability Investigations, of which the PM-ASE is the Senior Army Representative. In 1977, the Tri-Services signed a Memorandum of Agreement outlining responsibilities for Tri-Service development and production of the following items of equipment for helicopters and selected fixed-wing aircraft: (1) Army: Radar warning receivers, radar jammers, infrared (IR) jammers for small helicopters, pulse doppler missile warning detectors and laser warning receivers; (2) Navy: IR jammers for large helicopters, continuous wave (CW) radar jammers and ultraviolet missile warning detectors; and (3) Air Force: IR missile warning detectors for fixed-wing and selected large helicopters. International coordination is achieved through North Atlantic Treaty Organization (NATO), NATO Army Armaments Group (NAAG) and Quadripartite Working Groups.

G. WORK PERFORMED BY: US Army Aviation Research and Development Command (AVRADCOM), St. Louis, MO; US Army Electronics Research and Development Command (ERADCOM); Electronic Warfare Laboratory, Fort Monmouth, NJ; US Army Armament Research and Development Command (ARRADCOM), Dover, NJ. Contractors: Sanders Associates, Inc., Nashua, NH; ITT Corporation, Nutley, NJ; TRACOR, Inc., Austin, TX; Riverside Research Institute, New York, NY, Calspan Corporation, Buffalo, NY; Emerson Electric, St. Louis, MO; Grumman Aircraft Company, Bethpage, NY; Loral, Inc., Yonkers, NY; Garrett AiResearch, Torrance, CA.

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: In response to the SA-7 missile, introduced into Vietnam in 1972, infrared (IR) suppressors and low reflectance IR paint were produced from advanced development models and applied to attack, observation and utility helicopters. These IR signature reduction equipments were successful in reducing the effectiveness of the SA-7 virtually to zero and convincingly proved that Army aircraft could survive against sophisticated IR missiles. In 1976, improved IR suppressors were fielded to front line US tactical aircraft in Germany, Korea, and the United States. Advanced development was completed and engineering development was initiated for IR suppressors for growth threats for the following aircraft: OH-58 (FY 1975), OV-1 MOHAWK (FY 1975), AH-1 COBRA (FY 1977), and RU-21 GUARDRAIL (FY 1977). The AN/ALQ-144 IR jammer, applicable to current attack, utility and scout helicopters as well as the AH-64 and UH-60 BLACK HAWK, completed Development Test (DT)/Operational Test (OT) II in 1977, confirming requirements and effectiveness. The dual purpose M-130 chaff/flare dispenser successfully completed engineering development and demonstrated successful countermeasures capability against the prime ground based air defense threats as well as against airborne interceptors. The M-130 entered production in 1977. The AN/ALQ-156 missile warning detector entered engineering development in 1976 and is on schedule and within the funded FY 1977 program. The AN/APR-39(V)2 advanced radar warning receiver entered engineering development in 1977. Vulnerability reduction efforts to harden the tailboom of the AH-1S COBRA helicopter

were completed. The OH-58 vulnerability reduction (VR) programs for flight controls and transmission, initiated in FY 1976, made satisfactory progress. The flat plate canopies to reduce glare for the OH-58 and AH-1 helicopters satisfactorily completed engineering development and were approved for production. The overall aircraft survivability equipment (ASE) program in each of the technological areas accomplished planned work and is within the schedule and cost goals. Most of the above equipments are being adapted as appropriate by other Services in accordance with the Tri-Service Memorandum of Agreement. Production programs are being planned and programed by the Navy for Marine use of the AN/APR-39(V)1 and (V)2 radar warning receivers, the AN/ALQ-144 IR jammer, the AN/ALQ-156 missile warning detector, the AN/ALQ-136 radar jammer, the optical warning location detection system, and the laser warning receiver. Initial production requirements are established for the AN/APR-39 and AN/ALQ-144 beginning in 1979.

2. FY 1978 Program: The FY 1978 program will concentrate primarily on continuing the incremental funding of ongoing engineering development (ED) programs: the AH-1S hot metal plus plume infrared (IR) suppressor, the AN/ALQ-156 missile warning detector; the AN/ALQ-136 radar jammer; and the AN/APR-39 (V)2 radar warning receiver. ED will be completed for the RU-21 GUARDRAIL suppressor, OH-58 helicopter transmission and flight controls, and endurance testing will be completed for the OV-1D MOHAWK IR suppressor.

3. FY 1979 Planned Program: The FY 1979 program will complete ED for the AH-1S COBRA hot metal plus plume suppressor; the AN/APR-39(V)2 advanced radar warning receiver for special electronic mission aircraft (SEMA), AH-64 and UH-60 BLACK HAWK helicopters; the AN/ALQ-136 radar jammer for attack helicopters; the AN/ALQ-156 missile warning detector for the CH-47 helicopter (used with the M-130 flare dispenser) and SEMA. ED will begin for advanced radar jammer to counter airborne interceptor threats and for which all necessary experimental work has been performed. The proposed system is ready for full scale development. This airborne interceptor countermeasure has Under Secretary of Defense for Research and Engineering (USDRE) interest. The increase in funding reflects the airborne interceptor jammer for use on SEMA. These aircraft survivability and countermeasure systems are required for attack and observation helicopters and SEMA to perform their critical combat missions effectively.

4. FY 1980 Planned Program: ED efforts for FY 1980 will continue to provide target measurements and analysis in support of hardware development. ED will continue for the advanced airborne interceptor radar jammer. ED for the laser warning receiver will be initiated. Vulnerability reduction and ballistic hardening will be completed for the present fleet. ED will be initiated for the optical warning, location and detection (OWL/D) system. All necessary experimental work will have been completed for both OWL/D and laser warning receivers and both proposed systems will be ready for full scale development. The FY 1980 aircraft survivability programs respond to stated user requirements for attack helicopter and SEMA.

Program Element: #6.47.11.A
DoD Mission Area: #448 - Aircraft Survivability

Title: Aircraft Electronic Warfare (EW) Self-Protection System
Budget Activity: #4 - Tactical Programs

5. Program to Completion: This is a continuing program. Developments will continue to be transferred from advanced development Program Element 6.37.11.A, Aircraft EW Self-Protection Equipment. The development of countermeasures against threat weapons requires constant review and updating. All aircraft survivability programs, advanced development and engineering development, respond to stated user requirements and threat documentation. The requirements and threats are reviewed on a continuing basis by the Aircraft Survivability Equipment (ASE) Permanent Steering Group (PSG). The ASE PSG provides a forum for joint user and developer review of all aspects of aircraft survivability with broad representation from the US Army Training and Doctrine Command (TRADOC) and US Army Materiel Development and Readiness Command (DARCOM).

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D665 — Title: Aircraft Electronic Warfare (EW) Self-Protection Systems
Program Element: #6.47.11.A — Title: Aircraft EW Self-Protection Systems
DoD Mission Area: #448 - Aircraft Survivability — Budget Activity: #4 - Tactical Programs

A. DETAILED BACKGROUND AND DESCRIPTION: The objective of this project is the engineering development (ED) of airborne Aircraft Electronic Warfare Self-Protection (AEWSP) Systems to negate or degrade the use of threat electromagnetic anti-aircraft weapons using infrared, radar, or optical guidance. AEWSP systems are developed after feasibility has been demonstrated under Project #D653 AEWSP Equipment. This project interfaces with Project #DC52 Aircraft Survivability Equipment (ASE) Systems which is in this Program Element, 6.47.11.A. The approach in this project is to continue the development of selected electronic active response, threat detection and complementing ground support equipments. Emphasis is placed on equipment integration for a particular aircraft as part of its survivability suit and associated system reliability, availability, maintainability, configuration and automated data management, personnel development, logistic support and facilities requirements.

B. RELATED ACTIVITIES: Related AEWSP developments are conducted by Air Force and Navy. Coordination is effected by reviews conducted by the Office of the Under Secretary of Defense for Research and Engineering (USDRE), subgroups and working panels of the Technical Cooperation Program by the Joint Tri-Service Electronic Warfare Panel, and by the Joint Technical Coordinating Group on Aircraft Survivability (JTCG/AS). Formal requirements documents submitted by each Service are reviewed also by other Services.

C. WORK PERFORMED BY: US Army Aviation Research and Development Command (AVRADCOM), St. Louis, Missouri; US Army Electronics Research and Development Command (ERADCOM), Electronic Warfare Laboratory, Fort Monmouth, New Jersey; US Army Armament Research and Development Command (ARRADCOM), Dover, New Jersey. Contractors: Sanders Associates, Inc., Nashua, New Hampshire; ITT Corporation, Nutley, New Jersey; TRACOR, Inc., Austin, Texas; Calspan Corporation, Buffalo, New York; Loral, Inc., Yonkers, New York; American Electronics Laboratory, Lansdale, Pennsylvania; Bell Helicopter International, Fort Worth, Texas.

D. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: The AN/ALQ-147 infrared (IR) jammer for OV/RV-1 aircraft was initiated in 1973 with Development Test (DT)/Operational Test (OT) II completed in 1975. AN/ALQ-147 production contract was awarded in 1975, with initial fielding 3d quarter FY 1977. The AN/ALR-46, a USAF fixed-wing radar warning receiver, was tested and adapted for Army use in 1974, with DT III completed in 1976, and was fielded in 2d quarter FY 1977. The AN/APR-39(V)1 radar warning receiver

was tested and qualified on Army helicopters beginning 1975. The AN/ALQ-144 IR jammer entered ED in 1975 with a contract awarded FY 1976 for ED associated with integration of the AN/ALQ-144 into attack, utility and observation helicopters; M-130 chaff/flare dispenser for all Army aircraft entered ED in FY 1975, with a contract for design and development with technial data sufficient for competitive procurement. The ED contract for the AN/ALQ-136 radar jammer was awarded December 1976. The AN/ALQ-136 is a lightweight radar jammer designed primarily for helicopter application to counter threat radars associated with the ZSU-23-4 air defense gun and SA-8 missile. ED was initiated on AN/ALQ-156 missile warning detector system, a lightweight pulse doppler radar that detects the approach of a missile and automatically dispenses an IR flare decoy. A full scale engineering development contract was awarded in January 1977 for the AN/APR-39(V)2, a replacement processor for threat recognition and discrimination permitting successful operation in an electronic environment more complex than that for which the AN/APR39(V)1 is designed.

2. FY 1978 Program: The FY 1978 program for this project represents second year funding of three ongoing incrementally funded programs: the AN/APR-39(V)2 radar warning receiver, AN/ALQ-136 radar jammer and AN/ALQ-156 missile warning detector. There are no new starts in FY 1978.

3. FY 1979 Planned Program: Development Test II testing for FY 1978 contracts will be completed in FY 1979, with US Army Electronics Research and Development Command (ERADCOM) in-house support continuing for all on-going tasks. Development acceptance (DEVA) in-process review (IPR) will be conducted for the AN/ALQ-136 radar jammer and the AN/ALQ-156 missile warning detector, and special IPR on the AN/APR-39(V)2. Engineering development (ED) will be initiated for the advanced radar jammer to counter airborne interceptor threats. All necessary experimental work will have been completed and the AN/ALQ-136 (Airborne Interceptor) radar jammer system will be ready for full scale development. The increased funding level permits initiating this countermeasure development which has Under Secretary of Defense for Research and Engineering (USDRE) interest due to its requirement for use on special electronic mission aircraft (SEMA).

4. FY 1980 Planned Program: Continue development efforts on the advanced airborne interceptor radar jammer. ED of the optical warning, location and detection (OWL/D) system and the laser warning receiver will be initiated. All necessary experimental work will have been completed and proposed systems will be ready for full scale development.

5. Program to Completion: This is a continuing project. Developments will continue to be transferred from Program Element #6.37.11.A, Aircraft EW Self-Protection Equipment, in response to stated user requirements and threat documentation. Requirements and threats are reviewed continually by the Aircraft Survivability Equipment (ASE) Permanent Steering Group (PSG). The ASE PSG members are drawn from the US Army Training Doctrine Command (TRADOC) and the US Army Materiel Development and Readiness Command (DARCOM) providing broad user and developer participation in all aspects of the aircraft survivability program which is key to increased mission effectiveness of Army aircraft, particularly attack helicopters and special electronic mission aircraft (SEMA).

6. Major Milestones: Not applicable.

Project: #D665
Program Element: #6.47.11.A
DoD Mission Area: #448 - Aircraft Survivability

Title: Aircraft Electronic Warfare (EW) Self-Protection Systems
Title: Aircraft EW Self-Protection Systems
Budget Activity: #4 - Tactical Programs

7. Resources ($ in thousands):

	FY 1977	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Cost
RDTE,A						
Funds					Continuing	Not Applicable
Quantities						Not Applicable
Aircraft Procurement, Army						
Funds					Continuing	Not Applicable
Quantities					Continuing	Not Applicable

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.12.A

Title: Joint Advanced Tactical Command, Control and Communications Program

DoD Mission Area: #444 - Tactical Combat Integration

Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	5501	1300	1500	1000	Continuing	Not Applicable
	Quantities						Not Applicable
D321	Tactical Air Control Systems/Tactical Air Defense Systems Program	5501	1300	1500	1000	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program supports Army participation in the joint Service Tactical Air Control Systems/Tactical Air Defense Systems (TACS/TADS) Program. This program was established in response to an urgent and continuing requirement for interoperability among the Service's tactical automated command and control systems. TACS/TADS is a Secretary of Defense directed program designed to continue the interoperability efforts initiated under the Southeast Asia Joint Interface Program and the West Pacific North (WestPacNorth) Compatibility Program in 1967 and 1968. The TACS/TADS Test Bed, located on the West Coast with the systems interface and control center at San Diego, CA, provides a controlled environment test capability for the participating systems. The program objective is the achievement and demonstration of compatibility, interoperability, and operational effectiveness of participating systems achieved through the use of common standards.

C. BASIS FOR FY 1979 RDTE REQUEST: Requested funds provide for completion of the Tactical Air Control System/Tactical Air Defense System (TACS/TADS) interface standards and maintain interoperability among the participating command and control systems. The interface standards reflect all previous Department of Defense interoperability efforts, including Southeast Asia interface of automated systems, five years of TACS/TADS testing, and the results of the Operational Effectiveness Demonstration by the Commander-in-Chief, Atlantic. These standards, when completed, will become the baseline for the Joint Interoperability of Tactical Command and Control Systems (JINTACCS) Program. Continuity of the TACS/TADS program will assure that Service command and control systems retain joint operational capability in the field.

D. OTHER APPROPRIATION FUNDS: Not Applicable.

E. DETAILED BACKGROUND AND DESCRIPTION: A requirement exists for the Services' automated tactical command and control systems to interoperate in joint military operations. The urgency and validity of this requirement was demonstrated in Southeast Asia in 1968 by the interfacing of Service systems, utilizing "black box" (translation device) techniques and manual inputs, and

successfully controlling long range air operations. Accordingly, the Tactical Air Control System/Tactical Air Defense Systems (TACS/TADS) program was established in 1969, with the Chief of Naval Operations as Executive Agent, to achieve, test, and demonstrate interoperability among participating systems by utilizing joint standardization techniques. A test bed was established on the West Coast with the interface, Control Center, and Navy test system at San Diego, CA, the Air Force and Marine test systems at Camp Pendleton, VA, and the Army test system at Fort MacArthur, CA. The following Service systems were participants: the Army Air Defense Command and Control System, AN/TSQ-73; the Navy Tactical Data System (NTDS); the Airborne Tactical Data System (ATDS); the Air Force Tactical Control and Reporting Center, AN/TSQ-91; and the Marine Air Command and Control System (MACCS). In-place testing was conducted from 1973 until 1976. In 1977, the test systems moved to the East Coast to participate in an Operational Effectiveness Demonstration (OED) conducted by the Commander-in-Chief, Atlantic as part of the field exercise "SOLID SHIELD". The West Coast test bed is currently being reactivated with the Service systems interfacing into San Diego by Commercial Long Line Communications.

F. RELATED ACTIVITIES: Related activities are the development of the Army Air Defense Command and Control System, AN/TSQ-73 (Missile Minder) (Program Element 6.43.02.A) and all developments of future tactical command and control systems. This program is directly related to Program Element 6.47.79.A, Joint Interoperability of Tactical Command and Control Systems (JINTACCS). Efforts in this program element also have application to efforts in Program Element 6.37.23.A D101, Integration of Army Tactical Data Systems.

G. WORK PERFORMED BY: Army Staff responsibility for Tactical Air Control Systems/Tactical Air Defense Systems (TACS/TADS) is provided by the Deputy Chief of Staff for Research, Development, and Acquisition. Management of TACS/TADS is provided by the Center for Systems Engineering and Integration, US Army Communications Research and Development Command (CORADCOM), Fort Monmouth, NJ. Direct support for TACS/TADS and Army personnel for the TACS/TADS Joint Interface Test Force and TACS/TADS Test Unit are provided by the Project Manager, Air Defense Command and Control Systems, Redstone Arsenal, AL. Contractors supporting Army TACS/TADS efforts are Data Systems Division, Litton Systems, Incorporated, Van Nuys, CA; and Command, Control, Communications Corporation, Lomita, CA.

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: Tactical Air Control Systems/Tactical Air Defense Systems (TACS/TADS) efforts included initial preparation of the Interface Management Plan, Technical Interface Concept, Technical Interface Design Plan, and the Joint Interface Test Proposal. Documentation developed was used to run scenarios and simulations to refine tests for the TACS/TADS test bed. Documentation completed in FY 1972 included the Interface Management Plan, the Technical Interface Concepts, the Army Implementation Plan, the Interface Design Plan, the Simulation and Data Reduction Plan and the Joint Interface Test Proposal. The Test Plan, the Communications Plan, and revision of the Army Implementation Plan were completed. An Army Air Defense Command and Control AN/TSQ-73 Battalion System was delivered to the test site at Fort MacArthur, CA, in October 1973. Formal testing was initiated in January 1974. TACS/TADS participated in requalification

testing of the Navy systems and the Air Force systems. Formal tests were completed during FY 1976. Tactical Air Control Systems/ Tactical Air Defense Systems (TACS/TADS) participated in the West Coast procedural exercise, finalized software programs and documentation, completed refurbishment of the TACS/TADS AN/TSQ-73 Missile Minder, and participated in the Commander-in-Chief, Atlantic Operational Effectiveness Demonstration (OED) during FY 1977. Currently, the TACS/TADS test bed is being re-established for configuration management and testing.

2. FY 1978 Program: The Tactical Air Control Systems/Tactical Air Defense Systems (TACS/TADS) FY 1978 schedule will provide for the evaluation of the test program and CINCLANT Operational Effectiveness Demonstration (OED) and initiate Post OED Configuration Management. Joint Service tests will be performed as required. Documentation is being finalized and the Technical Interface Design Plan will be submitted to the Joint Chiefs of Staff (JCS) as the baseline standard for maintaining interoperability of TACS/TADS systems.

3. FY 1979 Planned Program: The program schedule for FY 1979 provides for continued incorporation of the Operational Effectiveness Demonstration (OED) originated improvements, configuration management of the interface standards, and joint Service system tests as required. Tactical Air Control Systems/Tactical Air Defense Systems (TACS/TADS) personnel and facilities provide the only capability currently available to accomplish these tasks. Accomplishment of the FY 1979 program as scheduled will assure interoperability of Service systems in joint military operations during this period.

4. FY 1980 Planned Program: Funding for Tactical Air Control Systems/Tactical Air Defense Systems (TACS/TADS) will continue at about the same level as present as the program continues to maintain the test bed and provide configuration management. New systems will be qualified and new requirements will be tested.

5. Program to Completion: This is a continuing program.

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.14.A Title: Tactical Electric Power Sources
DoD Mission Area: #442 - Logistics/General Combat Support Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	2368	150	3027	7966	Continuing	Not Applicable
	Quantities						Not Applicable
194	Engine Driven Generators	2368	150	0	3621	Continuing	Not Applicable
196	Silent Power Generating Sources	0	0	3027	4345	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Army requires new and advanced tactical electric power generation and associated power conditioning and control equipment to meet general purpose, special purpose, or precision power applications that cannot be satisfied by existing items. Current engine-driven generators, particularly in the power range of 5.0 Kilowatt (KW) to 10 KW, have low power efficiency, are noisy, emit heat (infrared) signatures, are heavy and bulky, require excessive maintenance, and are not fuel efficient. This program will provide the Army with advanced state-of-the-art tactical power generation equipment to achieve major benefits with respect to mobility, noise and heat signature reduction, increased power efficiency, reduction in fuel consumption, commonality of components, standardization to reduce number of different types of generators, and provide multifuel and/or non-fossil fuel capabilities. Mobile tactical generators are vital to the operation of critical weapons, and command and control systems. If advanced power generation equipment is not developed on a timely basis, the Army will be forced to use less reliable generators which will degrade effectiveness of supported combat systems.

C. BASIS FOR FY 1979 RDTE REQUEST: Funding is required to begin engineering development of a 1.5 Kilowatt (KW) methanol fuel cell member of a family of silent power generation equipment. Key milestones for the 1.5 KW fuel cell are:

Major Milestones	Date
Complete test model design/fabrication	4th Qtr 80
Complete development and operational tests	1st Qtr 82
Development acceptance in-process-review	3rd Qtr 82

Program Element: #6.47.14.A Title: Tactical Electric Power Sources

DoD Mission Area: #442 - Logistics/General Combat Support Budget Activity: #4 - Tactical Programs

D. OTHER APPROPRIATION FUNDS: ($ in Thousands)

	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
Other Procurement, Army						
Item: Generator Set, GTED, 10 KW, 60 Hz						
Funds: ($ in thousands)	0	8600	0	9500	51000	69100
Quantities	0	229	0	233	1165	1627

E. DETAILED BACKGROUND AND DESCRIPTION: This program supports development of power generation and related equipment to satisfy the Army's requirements for efficient tactical mobile electric power. Items of power generation equipment developed under this program are considered as individual systems within the Army and have general purpose application. The program provides the major development thrust toward achieving Department of Defense goals for maximum standardization of power generation equipment with attendant benefits of commonality of components, reduced logistics support requirements, and lower life cycle costs. The program encompasses the development, within the prescribed Department of Defense family of generators, of engine-driven generators (gasoline, diesel, gas turbine, and other advanced combustion engine sets), fuel cell silent power, and power conditioning devices. Objectives of the program are to develop generator sets which are lighter weight for increased mobility, lower in life cycle costs, more fuel economical, quieter, longer in life and higher in reliability.

F. RELATED ACTIVITIES: The Army maintains continuing coordination with the other services through the Department of Defense Project Manager for Mobile Electric Power, structured with Army as the lead Service; and with other agencies such as the Department of Energy. Related basic research is conducted in Program Element 6.11.02.A, Project AH47, Electronic Devices Research, and Project AH51, Combat Support. Exploratory development is conducted in Program Element 6.27.33.A, Mobility Equipment Technology. Advanced development is conducted in Program Element 6.37.02.A, Electric Power Sources.

G. WORK PERFORMED BY: In-house effort and contract monitoring is performed by US Army Mobility Equipment Research and Development Command, Fort Belvoir, VA. Contractors will be selected in FY 1979, with total contract amount estimated to be $2.5 million.

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: As part of prior Army power generation programs, standard Department of Defense families of diesel engine-driven and gasoline engine-driven generators ranging from 0.5 Kilowatt (KW) to 200 KW were developed. Engineer design tests, configuration planning, and drawings were completed for a 10 KW, 60 Hertz (Hz) gas turbine engine-driven generator. Test models of the 10 KW, 60 Hz generator have been fabricated and a combined Development Test II/Operational Test II (DT II/OT II) was initiated.

Program Element: #6.47.14.A Title: Tactical Electric Power Sources
DoD Mission Area: #442 - Logistics/General Combat Support Budget Activity: #4 - Tactical Programs

2. FY 1978 Program: Complete Development Test II/Operational Test II (DT II/OT II) of the 10 Kilowatt (KW), 60 Hertz (Hz) turbine generator, conduct development acceptance decision review, and prepare a technical data package for procurement.

3. FY 1979 Planned Program: Contractual efforts will be initiated for the design and fabrication of engineering development (ED) test prototypes of a 1.5 KW methanol fuel cell member of the Silent Lightweight Electrical Energy Plant (SLEEP) family. Efforts on the 1.5 KW fuel cell represent a new engineering development (ED) start in FY 1979. All necessary experimental work will have been performed and the proposed item will be ready for full scale development. The 1.5 KW fuel cell is the initial member of a required family of silent generators which is vital to achieve quiet and lightweight power source capabilities for operating critical combat systems in the forward areas where mobility and reduced threat of detection is essential. Increase in funds from FY 1978 to FY 1979 is required to initiate ED of the 1.5 KW fuel cell SLEEP family member.

4. FY 1980 Planned Program: Fabrication of ED test prototypes of the 1.5 KW methanol fuel cell will be completed. ED will be initiated on: an advanced 15 KW turbine generator set utilizing ceramics components; a silencing enclosure system for a 10 KW, 60 Hz turbine generator; and a 15 KW member of a family of general purpose power conditioners.

5. Program to Completion: This is a continuing program.

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.16.A
Title: Mapping and Geodesy
DoD Mission Area: #446 - Navigation Positioning And Related Systems
Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands):

Project Number	Title	Fy 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	2593	2853	840	925	Continuing	Not Applicable
	QUANTITIES						Not Applicable
D578	Field Army Surveying Equipment	2133	1333	700	625	Continuing	Not Applicable
D579	Field Army Mapping System	460	1520	140	300	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program addresses the engineering development and testing of materiel for rapid acquisition, processing and dissemination of topographic map and position location data in the field Army in direct support of tactical deployment of forces and weapon system operation. This program provides the necessary follow-on engineering development of the systems and equipments originating in program element 6.37.12.A, including the Position and Azimuth Determining System, and Field Army Topographic Support System. It addresses present deficiencies in the Army's ability to provide topographic data and field artillery fire control positioning in a timely manner consistent with rapid and effective combat operations.

C. BASIS FOR FY 1979 RDTE REQUEST: Complete actions necessary to type classify the Position and Azimuth Determining System (PADS) in first quarter. Complete PADS environmental testing in fourth quarter. Continue procurement and testing of Topographic Support System Modules. Work is directed toward FY 81 type classification of these modules.

D. OTHER APPROPRIATION FUNDS: ($ in Thousands)

	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
Other Procurement Army						
Position and Azimuth Determining System						
Funds	0	0	12300	12900	70100	95300
Quantities	0	0	9	57	286	352
Topographic Support System						
Funds			18200		80000	98200
Quantities						♀ Equivalent Systems

Program Element: #6.47.16.A
DoD Mission Area: #446 - Navigation Positioning And Related Systems

Title: Mapping and Geodesy
Budget Activity: #4 - Tactical Programs

E. DETAILED BACKGROUND AND DESCRIPTION: The objectives of this program are the engineering development and testing of materiel for field Army survey and Map compilation, revision, reproduction and distribution. These developments will be used in direct support of the tactical deployment of forces and the operation of weapon systems. The systems in this program include: (1) the Position and Azimuth Determining System (PADS), a palletized inertial survey platform for jeep or helicopter operations which will provide real-time positions, elevations, and azimuths for mobile artillery and missile systems and reduce the number of personnel in a survey team from six to two; (2) the Topographic Support System (TSS) which will modernize the field Army topographic battalions, which presently use World War II vintage equipment, so that they will be effective in a highly mobile tactical environment; and (3) the Advanced Analytical Photogrammetric Positioning System (AAPPS) which will provide the field Army with the capability of determining accurate coordinates of friendly and target positions using photogrammetric techniques and advanced sensor imagery.

F. RELATED ACTIVITIES: The Army works directly with Air Force, Navy and Marine Corps and under the coordination of the Defense Mapping Agency (DMA) and the Under Secretary for Defense Research and Engineering in the functional area of Mapping, Geodesy and position location. Specific related program elements are as follows: DMA Program Element 6.37.01.B, Mapping, Charting and Geodesy Investigations and Prototype Development; DMA Program Element 6.47.01.B, Mapping, Charting and Geodesy Engineering Development and Test; Army Program Element 6.27.07.A, Mapping and Geodesy, and Army Program Element 6.37.12.A, Mapping Geodesy.

G. WORK PERFORMED BY: The US Army Engineer Topographic Laboratories (USAETL), Fort Belvoir, VA, are responsible for all work under this program element. The contractors are: Motorola, Inc., Scottsdale, AZ; Lear Siegler, Inc., Santa Monica, CA; Bausch and Lomb, Rochester, NY; Litton Systems, Inc., Woodland Hills, CA; and Decilog, Long Island, NY.

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: In FY 1971, development of the Long Range Position Determining System was initiated. In FY 1972, the Lightweight Gyro Azimuth surveying instrument was tested and type classified for troop use. In FY 1974, testing of the Long Range Position Determining System indicated errors in the system computer program. The system was returned to the contractor for corrective action. Development of the Topographic Support System (TSS) was initiated. In FY.1975, corrective actions on the Long Range Position Determining System were completed. System performance was found to be marginal and a decision was made to terminate development. Development of the Position and Azimuth Determining System (PADS) was initiated. Fabrication of the PADS was completed and Development Tests (DT) II/Operational Tests (OT) II was started in FY 1977.

2. FY 1978 Program: Modification of the Position and Azimuth Determining System to eliminate reliability problems discovered during testing will be completed. DT/OT II will be resumed and completed. A study of Topographic Support System input and throughput processing will be completed. Technical data packages, listing components and showing their layout, will be prepared for the system modules.

Program Element: #6.47.16.A
Title: Mapping and Geodesy
DoD Mission Area: #446 - Navigation Positioning And Related Systems
Budget Activity: #4 - Tactical Programs

3. FY 1979 Planned Program: The Position and Azimuth Determining System will be type classified. Environmental testing of the system will be completed. Topographic Support System modules will be assembled based upon the previously prepared data packages. Work will begin on three System components which will require some development. These components include an advanced orthophoto production capability; an interactive graphic system, which is a computer controlled system for revising cartographic data; and an advanced survey instrument. Funding requirements decrease because the Position and Azimuth System Development is nearing completion.

4. FY 1980 Planned Program: Assembly, integration, and testing of off-the-shelf components of the Topographic Support System will be completed. Contract development will be continued for the three developmental components listed in paragraph 3. Engineering development of the Advanced Analytical Photogrammetric Positioning System will begin and an incrementally funded contract for design and fabrication of Development Tests (DT)/Operational Tests (OT) II models will be awarded. All necessary experimental work will have been performed and the proposed system will be ready for full scale development by that time. Funding requirements will increase slightly over FY 1979 because of the new start and the contracts for the Topographic Support System development items.

5. Program to Completion: This is a continuing program.

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.17.A Title: General Combat Support
DoD Mission Area: #442 - Logistics/General Combat Support Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	2782	3468	6186	10912	Continuing	Not Applicable
DH01	Combat Engineer Equipment	450	422	0	2600	Continuing	Not Applicable
DH14	Container Distribution Equipment	2	0	1031	1600	Continuing	Not Applicable
DL17	Camouflage	223	745	85	660	Continuing	Not Applicable
DL39	General Support Equipment	967	938	2450	1550	Continuing	Not Applicable
DL41	Fuels Handling Equipment Systems	140	271	1172	2295	Continuing	Not Applicable
D429	Tactical Rigid-Wall Shelters	369	419	725	900	Continuing	Not Applicable
D461	Marine Oriented Logistics Equipment	0	0	0	500	Continuing	Not Applicable
D832	Combat Medical Materiel	631	673	723	807	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The Army requires new and advanced logistical support equipment to meet the requirements of ship-to-shore and over-the-beach resupply operations, as well as the requirements of deployed forces in support of various military contingencies. In the event that port facilities are unavailable, commercial container ships must be assisted by military equipment capable of off-loading and transporting containerized supplies. This program also provides the Army with materiel that will increase the Army's tactical mobility and reduce the burden of logistic resupply through: a new family of prefabricated tactical shelters to replace the myriad of vans and shelters now protecting sophisticated electronic equipment, new water purification equipment that can provide potable water more efficiently than can existing equipment, new equipment for handling fuel more effectively from the tanker to the ultimate user in the forward area, new and more efficient, environmental control equipment (heating/air-conditioning), and enhanced survivability via new camouflage techniques to defeat enemy surveillance threat. New and improved field casualty treatment systems vital for maintaining combat strength are also developed and tested under this program.

C. BASIS FOR FY 1979 RDTE REQUEST: Funds are necessary to perform engineering development (ED) and testing of new and improved equipment for handling containerized cargo, purification of sea or brackish (saline) water, space heaters with greater safety characteristics, fuels handling, tactical shelters, and field medical support in a combat environment.

Program Element: #6.47.17.A Title: General Combat Support
DoD Mission Area: #442 - Logistics/General Combat Support Budget Activity: #4 - Tactical Programs

D. OTHER APPROPRIATION FUNDS:($ in thousands)

	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
Other Procurement, Army						
Ribbon Bridge Erection Boat						
Funds	0	13000	0	10200	30500	53700
Quantities	0	200	0	130	531	861
Water Purification Unit 600 Gal/Hr						
Funds	0	1800	0	0	0	2400
Quantities	0	30	0	0	0	62

E. DETAILED BACKGROUND AND DESCRIPTION: This program supports the engineering development (ED) of various items of equipment to meet the Army's needs in countersurveillance, logistics, mobility, counter mobility, survivability and medical care. New or improved logistics resupply equipment are required to provide Army with capability to move increasing volumes of containerized cargo and fuel vital to support Army forces engaged in a combat mission.

F. RELATED ACTIVITIES: Close coordination is maintained with other Services through the Joint Service Civil Engineering Research and Development Coordinating Group, the Joint Committee on Tactical Shelters, the Joint Medical Research Committee, the Joint Container Steering Group, and the Project Manager for Army Container Oriented Distribution System. The projects of this element contain items and systems that have progressed to engineering development from related advanced development Program Elements 6.37.26.A, Combat Support Equipment, and 6.37.32.A, Combat Medical Materiel. Related exploratory development program elements include 6.27.23.A, Clothing, Equipment and Packaging Technology; 6.27.33.A, Mobility Equipment Technology; and 6.27.78.A, Combat Medical Materiel. In FY 1980 the trilateral United States, United Kingdom and Federal Republic of Germany (US-UK-FRG) Bridging for 1985 and beyond program will enter engineering development. A trilateral steering committee directs this NATO standardization/interoperability effort.

G. WORK PERFORMED BY: In-house work is performed at the US Army Mobility Equipment Research and Development Command, Fort Belvoir, VA; US Army Natick Research and Development Command, Natick, MA; and the Army Medical Bioengineering Research and Development Laboratory, Fort Detrick, MD. Contracts include ROTORK, United Kingdom; Brunswick Corporation, Marion, VA; Parson Company, Stockton, CA; Energy Transformation Corporation, Boyertown, PA; American Science and Engineering, Incorporated, Boston, MA; and seven additional proposed contracts estimated to cost $2,500,000.

Program Element: #6.47.17.A Title: General Combat Support
DoD Mission Area: #442 - Logistics/General Combat Support Budget Activity: #4 - Tactical Programs

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: Completed testing of fuel identification kit, multipurpose shipping container for canines, field dental light-tray, leg splint and case, medium girder bridge reinforcing kit, and combat evacuation bag-medical. Items developed and adopted as standard under this element include: mobile floating assault bridge-ferry; ribbon bridge; cargo pallet for the ribbon bridge transporter; heavy and medium duty landing mat; 25,000 barrel hasty fuel storage reservoir; forward area refueling equipment; fuel tanker mooring system; woodland, desert, and snow blend camouflage screening systems; water quality analysis sets; and field dental compressor-dehydrator and operating and treatment unit. Stopped testing of 600 gallons per hour (GPH) reverse osmosis water purification unit (ROWPU) in order to redesign a more dependable unit. Conducted review of 1500 GPH ROWPU and determined need for 3000 (fresh)/2000 (sea) GPH ROWPU to replace 1500 and 3000 GPH ROWPUs.

2. FY 1978 Program: Ribbon bridge erection boat, modular cabinets for field dental sets, and fuel identification kit will be type classified. Technical data package for snow camouflage screen will be prepared. Redesign and testing of 600 GPH ROWPU will be completed. Models of 250,000 British Thermal Unit per Hour (BTUH) multi-fuel heater will be purchased and tested. Design of helicopter multipoint fueling system will be initiated. Marine Corps family of small shelters for potential Army use will be evaluated. Engineering development (ED) of the two-for-one expandable rigid wall shelter will continue. Operationally test field optometry set. A prototype Selective Blood Screening Device will be fabricated and tested. ED and testing of field dental chair with self-contained, electrically-powered operating unit will be completed.

3. FY 1979 Planned Program: Test prototypes of cargo container identification system, 3000/2000 GPH ROWPU, and helicopter multipoint fueling system will be purchased. Testing and type classification of the 600 GPH ROWPU and field dental chair with operating unit will be completed. ED and testing of 250,000 BTUH multi-fuel heater will continue. ED will be initiated on the camouflage screen support system for 155mm self-propelled howitzer, inflatable decoys for HAWK missile system, three-for-one expandable rigid wall shelter, field medical human body diagnostic examination and recording system, and sterile water production unit. The design and fabrication of test models of improved fuel system supply point and a low temperature fueling system will be initiated. Review of the Marine Corps family of small shelters and operational testing of the Army developed two-for-one expandable rigid wall shelter will be completed. ED and testing of high efficiency air filter hood for compounding pyrogen-free solutions will be completed. Increased funding in FY 1979 compared to FY 1978 is required for procurement of ED test models of various items of materiel.

Program Element: #6.47.17.A
Title: General Combat Support
DoD Mission Area: #442 - Logistics/General Combat Support
Budget Activity: #4 - Tactical Programs

4. FY 1980 Planned Program: Engineering development (ED) of selected design for Bridging for 1985 and beyond will be initiated. US will design/fabricate the bridge girder; FRG will design/fabricate the wheeled transporter; UK will design/fabricate floating components. US-FRG-UK will share costs and work equally. Testing of container identification system, howitzer camouflage screen support system, HAWK missile decoys, 250,000 British Thermal Unit per Hour (BTUH) multi-fuel heater, 3000/2000 GPH ROWPU, improved fuel system supply point, low temperature and multipoint helicopter fueling system, and the selective blood screening will be conducted. ED of a flatrack cargo container, container inserts, diesel fuel decontaminator, 10,000 gallon fabric fuel tank, 15,000 BTUH multi-fuel heater, shape disrupters for camouflage, fuel metering system, rapidly deployable sectionalized barge, non-expandable rigid wall shelter, modification and upgrading of Marine Corps shelter for Army use, prototype chemical, biological, radiation (CBR) devices such as the patient decontamination set and other devices for use in special climatic or operational environments for field evacuation of combat casualties will be initiated. ED of three-for-one- expandable rigid wall shelter, field medical diagnostic examination and recording system, field X-ray unit, and field medical laboratory equipment will continue. ED of two-for-one expandable rigid wall shelter will be completed.

5. Program to Completion: This is a continuing program.

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.18.A
DoD Mission Area: #447 - Physical Security

Title: Physical Security
Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	675	2813	5400	4341	Continuing	Not Applicable
	Quantities						(Not Feasible to List)
DL82	Physical Security	675	2813	5400	4341	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Objective is to conduct engineering development (ED) of a Tri-Service family of physical security sensors, exterior lighting, barriers, and ancillary equipment that will operate worldwide, enabling military commanders to tailor physical security systems to protect assets, installations, bases, facilities, personnel and the rear area of deployed forces. Physical security equipment is required to better protect critical areas including arms rooms and storage facilities. Significant manpower savings are practical when adequate detection systems are installed. Department of Defense uses more than 16,000 personnel daily just to guard nuclear facilities. Development is directed toward satisfying requirements for a Facility Intrusion Detection System (FIDS) and for a Fixed Installation Exterior Perimeter Sensor System (FIEPSS). All developments are aimed at satisfying Tri-Service requirements.

C. BASIS FOR FY 1979 RDTE REQUEST: Accomplish Army testing and evaluation of Development Test II/Operational Test II (DTII/OTII) Models of the Interim FIDS Sensors, the Sensor Self Test Subsystem, an Audio Surveillance Device, and the Control, Communication, and Display Subsystem (CCDS). Individual components as well as an integrated system will be evaluated. Development Test II will be initiated at the Electronics Proving Ground, Fort Huachuca, AZ and Operational Test II will be initiated at the Airborne, Communications, and Electronics Board, Fort Bragg, NC. Initiate Engineering Development of the Advanced FIDS video surveillance devices, personnel identification elements, remote alarm displays and secure locks, safes, and containers. Initiate Engineering Development of the DoD lighting and barrier subsystems.

Major Milestones	Date
Initiate ED of Advanced FIDS Components	2QFY79
Initiate DTII/OTII of Interim FIDS	3QFY79

Program Element: #6.47.18.A
DoD Mission Area: #447 - Physical Security

Title: Physical Security
Budget Activity: #4 - Tactical Programs

D. OTHER APPROPRIATION FUNDS: Not Applicable.

E. DETAILED BACKGROUND AND DESCRIPTION: Objective is to conduct all design, development, test, and evaluation required to field a complete, integrated physical security system to protect materiel, bases, facilities, installation, and personnel against theft, sabotage, and espionage. Developments will be directed towards satisfying the Army's Materiel Need (MN) for a Facility Intrusion Detection System (FIDS) and will fulfill the internal physical security requirements of all Department of Defense (DOD) elements. Approach is to develop, under a number of tasks, (1) sensors, including penetration, motion, item removal, duress, and contraband; (2) electronic data links, data link security supervisory components, and centralized data processing components; (3) alarm display, readout, and monitoring components; (4) physical or psychological deterrent devices; (5) devices to protect cargo in depots or in transit by truck, rail, or ship; (6) standardized secure weapons containers and locks and safes; and (7) interfaces necessary to integrate exterior sensors developed by the Air Force and potentially shipboard security equipment components adopted by the Navy. Developments will also be directed towards satisfying the lighting and barriers requirements for all DOD elements.

F. RELATED ACTIVITIES: This program follows from Advanced Development Program Element 6.37.05.A, Physical Security. Related are the Army's type classified Joint-Services Interior Intrusion Detection System (J-SIIDS), the Army's Remotely Monitored Battlefield Sensor System (REMBASS) tactical Sensor Program, and the Air Force's Base and Installation Security System (BISS) exterior physical security program. Close coordination with REMBASS and BISS is being accomplished to assure utilization of related technologies and developments and to prevent duplication of effort. Coordination is accomplished by membership on joint working groups and by attendance at interservice meetings. The DOD Physical Security Equipment Action Group monitors and coordinates the development and acquisition of physical security equipment by all Services. The Department of Army single point of contact is the Project Officer for Physical Security Equipment (POPSE) who coordinates and monitors the development, acquisition, integrated logistic support, and installation of physical security systems.

G. WORK PERFORMED BY: The US Army Mobility Equipment Research and Development Command (MERADCOM), Fort Belvoir, VA is assigned responsibility for the Army's Physical Security RDTE. Other Government agencies involved are the US Army Test and Evaluation Command, Aberdeen, MD, and the US Army Natick Research and Development Command (NARADCOM), Natick, MA for development of locks and secure containers. Major contracts and LaBarge Electronics Division, Tulsa, OK; GTE Sylvania, Mountainview, CA, and Aritech Inc., Boston, MA.

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: Development of the Joint-Services Interior Intrusion Detection System (J-SIIDS) was initiated in December 1971 under the auspices of the Defense Special Projects Group (DSPG). In April 1972 responsibility was transferred from DSPG to Department of the Army. J-SIIDS components were type classified standard in May 1973 for use in arms rooms. Installation of the J-SIIDS was initiated in August 1976 and is continuing at the present time. Engineering Development (ED) of J-SIIDS add-on components designed to provide additional capabilities and more application flexibility was initiated in

June 1973. A Special In-Process Review was conducted in July 1976 to type classify the add-on components and to certify the J-SIIDS for use in areas other than arms rooms. During FY77 final preparations were made to conduct Development Test II/ Operational Test II of the remaining J-SIIDS components, i.e.; Data Transmission System Type II (a highly secure data link), Large Area Motion Sensor (a microwave sensor) and intrinsically Safe components (suitable for use in explosive atmospheres). Full scale development of the Facility Intrusion Detection System (FIDS) was authorized at Concept Feasibility In-Process Review (IPR) conducted during June 1974. Contracts for Engineering Development Models of FIDS sensors and Control Communication and Display Subsystem (CC&DS) were awarded during July 1974. FIDS components were received in December 1975 and an in-house evaluation was conducted. Contracts were awarded in June 1976 for Development Test II/Operational Test II (DT/OT II) test models of the Passive Infrared Motion Sensor (PIMS) and CC&DS. During FY77 a FIDS CC&DS, J-SIIDS sensors, FIDS sensors, a sensor self test subsystem, and a surveillance device were integrated into a system. In addition military and commercial exterior sensors were integrated into the system to demonstrate the adaptability and flexibility of the CC&DS to meet all services requirements.

2. FY 1978 Program: The FIDS CC&DS DTII/OTII models will be delivered for Army laboratory evaluation. DTII/OTII models of FIDS sensors, i.e., Ultrasonic Motion Sensor (UMS), Passive Ultrasonic Sensor (PUS), Vibration Sensor (VS), Passive Infrared Motion Sensor (PIMS), Large Area Motion Sensor (LAMS) and Capacitance Proximity Sensor (CPS) will be procured. Initial planning for DTII/OTII integrated FIDS systems will be accomplished with the Army's Test and Evaluation, and Training and Doctrine Commands (TECOM and TRADOC). DTII/OTII of the J-SIIDS Data Transmission System Type II, Large Area Motion Sensor (LAMS) and Intrinsically Safe components will be started at Fort Huachuca, AZ and Fort Bragg, NC.

3. FY 1979 Planned Program: DTII/OTII of the complete Interim FIDS consisting of intrusion sensors, a sensor self test subsystem, a control communication and display subsystem, and an audio surveillance device for protected areas will begin at Fort Huachuca, AZ, (DT) and Fort Bragg, NC (OT). Full scale development will begin for other FIDS components including: surveillance devices for protected areas, personnel identification elements, remote displays, control, communication and display subsystems, high security locks, and weapons containers. Compatibility of visible and non-visible lighting systems with surveillance systems will be determined and the capability of currently available interior/exterior barriers for physical security applications will be determined. Goal of this effort is to integrate and optimize existing sensor, barrier, and lighting systems. For all new starts, all necessary experimental work will have been performed and the proposed items will be ready for full scale development. The increase in funding is required for the new tasks in barriers and lighting assigned by DOD DIR 3224.3.

4. FY 1980 Planned Program: DTII/OTII of the Interim FIDS will be completed, and Type Classification will be accomplished. Development of advanced FIDS components begun in FY79 will continue and DTII/OTII models will be procured. Development of lighting and barrier subsystem components begun in FY79 will continue and DTII/OTII models will be procured.

Program Element: #6.47.18.A
DoD Mission Area: #447 - Physical Security

Title: Physical Security
Budget Activity: #4 - Tactical Programs

5. Program to Completion: This is a continuing program. Production Quantities of Facility Intrusion Detection System (FIDS) components Type Classified in FY80 will be procured and fielded. Components of the FIDS and Lighting and Barriers Subsystems for which full scale development was initiated during FY79 will be type classified, procured, and fielded. Components to provide additional FIDS capabilities will be transitioned into full scale development in the out-years as Advanced Development under Program Element 6.37.05.A is completed. Additional lighting and barrier components will also be transitioned into full scale development as Advanced Development is completed. Coordinated efforts with the other Services will be directed towards integrating components/subsystems/systems developed under this Program Element into a completely integrated interior/exterior physical security system for DOD.

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.23.A
Title: Special Purpose Detectors
DoD Mission Area: #411 - Battlefield Surveillance
Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	3284	1637	2327	475	Continuing	Not Applicable
	QUANTITIES						Not Applicable
DL71	Low Energy Laser Devices	2765	0	0	0	Continuing	Not Applicable
DL79	Information-Identification-Position Devices	519	1637	2327	475	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program is directed toward providing the commander with accurate and timely intelligence from aerial reconnaissance and surveillance sensors by providing equipment to rapidly process and reproduce reconnaissance and surveillance imagery and to automate image interpretation tasks. This program is also directed toward providing surveillance and target acquisition devices with an improved capability to locate and engage targets using both conventional and terminal homing munitions during all conditions of weather and visibility.

C. BASIS FOR FY 1979 RDTE REQUEST: The requested funds will permit continuation of engineering development of the Mobile Army Ground Imagery Interpretation Center (MAGIIC), and continuation of a program to provide the Tactical Imagery Processing Set (TIPS). (Previously identified as Tactical Imagery Processing Laboratory).

D. OTHER APPROPRIATION FUNDS: ($ in thousands)

Other Procurement Army	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
MAGIIC						
Funds		25500	0	36200	To Be Determined	To Be Determined
Quantity		5	0	9	To Be Determined	To Be Determined

Program Element: #6.47.23.A
DoD Mission Area: #411 - Battlefield Surveillance

Title: Special Purpose Detectors
Budget Activity: #4 - Tactical Programs

E. DETAILED BACKGROUND AND DESCRIPTION: The present system (ES-38 Photo darkroom) to process reconnaissance and surveillance imagery from cameras, radars, infrared (IR) scanners, laser line scanners and image intensifies is inadequate. The Tactical Imagery Processing Set (TIPS) is being developed by the Army to interface with the Mobile Army Ground Imagery Interpretation Center (MAGIIC). TIPS will perform all functions pertaining to production of imagery (including processing, titling, printing and storage) obtained by Army and Air Force systems down to the Corps level. MAGIIC is being developed for the Army by the Air Force under its Tactical Information Processing and Interpretation (TIPI) Program. The MAGIIC consists of automated light tables with associated optics, mensuration system, map and overlay display unit and a computer interface system for message input/output. The Army plans to buy the appropriate elements of the Air Force developed TIPI system with some sensor modifications to meet its MAGIIC requirements.

F. RELATED ACTIVITIES: The US Navy and US Air Force utilize the same general technologies. Service and Department of Defense programs are closely coordinated through joint meetings and conferences, and multi-service use of the same devices and facilities. This program element is a follow-on to 6.37.19.A, Special Purpose Detectors. Procurement of the MAGIIC is performed by the USAF at Hanscom Air Force Base (AFB) as part of the TIPI procurement.

G. WORK PERFORMED BY: In-house is performed by the US Army Electronics Research and Development Command, Fort Monmouth, NJ. Contractors include: Texas Instruments, Dallas, TX, General Electric, Bedford, MA.

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: Both Tactical Imagery Processing Set (TIPS) and Mobile Army Ground Imagery Interpretation Center (MAGIIC) were started in FY 77. For TIPS, the specifications and contract were written and the first of the Development Plan (DP) was completed. The Army has a Memorandum of Agreement with the USAF regarding the procurement, testing, training and logistical support for the MAGIIC. The Army will "buy-in" on the USAF contract beginning in FY78. MAGIIC R&D funds cover the necessary work for writing the Development Plan, defining Army requirements for incorporation in USAF documents and procuring the Maintenance Allocation Chart (MAC) through the USAF System Integration contract.

2. FY 1978 Program: Initiate a contract for two engineering development (ED) models for TIPS. Each ED model will consist of a processing, printing, administrative, and storage shelter. Work will also continue on system integration efforts in support of MAGIIC production, e.g. evaluating change proposals and interfaces with other tactical intelligence command and control systems currently under development.

3. FY 1979 Planned Program: Continue work on fabricating two engineering development models of TIPS. Continue MAGIIC system integration efforts. Increase in funds over FY78 is due to peaking of ED for TIPS in FY79.

Program Element: #6.47.23.A
DoD Mission Area: #411 - Battlefield Surveillance

Title: Special Purpose Detectors
Budget Activity: #4 - Tactical Programs

4. FY 1980 Planned Program: Complete fabrication of two Tactical Imagery Processing Sets (TIPS) engineering development models and begin acceptance testing. Continue MAGIIC system integration effort.

5. Program to Completion: This is a continuing program.

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.24.A
DoD Mission Area: #449 - Chemical Biological Defense/ Chemical Warfare

Title: Biological Defense Material
Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	3647	3686	3287	2678	Continuing	Not Applicable
	Quantities						
	XM19 Alarm						50
	XM2 Sampler						45
DF45	Biological Defense Materiel	3647	3686	3287	2678	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program element (PE) provides for the engineering development (ED) of protective materiel and equipment to warn of the presence of and to protect against a biological attack. Specifically, there is a military need for a rapid biological detection and warning system to provide US forces with early warning of an approaching biological attack. Improvement of the biological detection and alarm capability is essential towards maintenance of a totally integrated biological defense posture.

C. BASIS FOR FY 1979 RDTE REQUEST: The prototype qualification test on the Biological Detection and Warning System will be conducted. Inspection and test equipment will be evaluated and documented. All development data will be examined to finalize the hardware design for fabrication of the test items for use in developmental and operational tests.

D. OTHER APPROPRIATION FUNDS: Not applicable.

E. DETAILED BACKGROUND AND DESCRIPTION: The objective of this PE is to develop and type classify a first generation biological agent automatic point detection and warning system for Army field use. The scope of this project includes the development of the XM19 Alarm and the XM2 Sampler (components of the Biological Detection and Warning System) for use as applicable to division and brigade organizations. The XM19 Alarm automatically detects biological agent aerosols by the chemiluminescent reaction. The XM2 Sampler collects samples of the aerosols for subsequent identification by designated medical laboratories.

F. RELATED ACTIVITIES: Many items of equipment suitable for chemical defense are also suitable for biological defense (e.g., protective shelters). Such items are developed in PE 6.47.25.A, Chemical Defense Materiel, and not duplicated here. The Army is responsible for its own chemical defense items and for those that meet joint requirements of the Army and other Services.

Program Element: #6.47.24.A Title: Biological Defense Material
DoD Mission Area: #449 - Chemical Biological Defense/ Chemical Warfare Budget Activity: #4 - Tactical Program

Work is coordinated through a joint coordinating group composed of representatives of all Services. Coordination and cooperation is also maintained with the United Kingdom, Canada, and Australia through the Quadripartite and the Technical Cooperation Program organization and with North Atlantic Treaty Organization (NATO).

G. WORKED PERFORMED BY: In-house efforts at the US Army Chemical Systems Laboratory, Edgewood, MD. Contracts with Bendix Corporation, Baltimore, MD; Geomet Corporation, Pomona, CA; Southern Research Institute, Birmingham, AL; Environmental Research Institute, St. Paul, MN; Midwest Research Institute, Kansas City, MO; and Stanford Research Institute, Menlow Park, CA.

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: The multi-year prime contract program for the Biological Detection and Warning System (BDWS) XM19 Alarm and XM2 Sampler was started. Conceptual designs were prepared and full mock-ups fabricated. The configurations emphasize ease of operation and maintenance at the organizational level and a high degree of commonality of major components and subassemblies. A novel wet collector design for use in the XM2 was developed in-house and experimentally tested. Its performance led to a major redesign of the XM2 and resulted in lower unit costs, increased projected reliability, and reduced logistics burden. Conceptual models of the XM19 and XM2 are currently being fabricated and will be utilized in the execution of engineering design testing. Contract and in-house efforts continued in techniques and methodologies offering improvements for sample concentration and aerosol testing of the system.

2. FY 1978 Program: Efforts will focus on conducting those activities which will culminate in an engineering development prototype system. Necessary prototype test items will be fabricated and the engineering design tests, both contractor and in-house, will be conducted. The draft technical data package will also be prepared.

3. FY 1979 Planned Program: Engineering design testing will be completed. The data obtained will be used to determine areas for further design improvements on both the XM19 Chemical Alarm and the XM2 Sampler. These design efforts will be reflected in the test hardware which will be fabricated during this year for use in prototype qualification test by the contractor. Inspection and test equipment will be evaluated and documented. All development data will be examined to finalize the hardware design for fabrication of the test items for use in Development Test (DT) II/Operational Test (OT) II to begin in FY80. Test plans for prototype qualification testing by the contractor will be finalized. Funding requirements are less in FY79 than in FY78 because fewer prototype alarms will be purchased.

4. FY 1980 Planned Program: DT/OT II of Biological Detection and Warning System will be conducted in 1QFY80. The Biological Detector Kit is scheduled to enter engineering development in FY80.

5. Program to Completion: This is a continuing program.

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.25.A
Title: Chemical Defense Materiel
DoD Mission Area: #449 - Chemical Biological Defense/ Chemical Warfare
Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	2931	4714	6128	10682	Continuing	Not Applicable
	Quantities						
	Mask, XM21						2850
	Liquid Agent Detector						1200
	Simulator, Projectile, Airburst, Liquid (SPAL)						800
DF97	Chemical Defense Materiel	0	0	0	3092	Continuing	Not Applicable
D017	CB Collective Protection	0	0	90	0	Continuing	Not Applicable
D018	Collective Protection for Vehicles & Vans	70	0	0	0	Continuing	Not Applicable
D019	Individual Chemical Protection	1352	4256	4038	520	Continuing	Not Applicable
D020	Chemical Detection and Warning System	0	0	1600	5100	Continuing	Not Applicable
D022	Chemical Detection and Sampling Device	1139	97	0	1370	Continuing	Not Applicable
D138	Training System for Chemical Defense	370	361	400	600	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The objective is to develop improved rapid detection and warning systems, and protective materiel and equipment, to warn of the presence of and to protect US forces in a chemical warfare environment. The new mask provides improved respiratory protection with minimum burden to the user and maximum compatibility with individual clothing and equipment. The requirement for improved chemical detection, warning and identification materiel and equipment addresses the need to reduce the burden on the soldier while increasing his chances of survival in a chemical warfare environment. There exists a need for collective protection for certain headquarters and communications functions and certain armored vehicle crews in order to accomplish their assigned missions in an active chemical environment and to relieve the stresses and restrictions inherent in wearing individual protective clothing and equipment. The above improvements are essential to maintain a totally integrated chemical defense posture.

Program Element: #6.47.25.A
DoD Mission Area: #449 - Chemical Biological Defense/ Chemical Warfare

Title: Chemical Defense Materiel
Budget Activity: #4 - Tactical Programs

C. BASIS FOR FY 1979 RDTE REQUEST: Developmental Test/Operational Test II will be conducted on the new protective mask. The Technical Data Package for the new mask will be completed for use in a competitive production contract. The mask will be type classified in FY79. Work on the application of Modular Collective Protection Equipment to Improved HAWK and PATRIOT will continue. Engineering development of the Passive Remote Detector will be initiated.

D. OTHER APPROPRIATION FUNDS: ($ in thousands)

Other Procurement, Army	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
Funds				2800	102000	104800
Quantities (XM29 Mask)				22000	740000	762000

E. DETAILED BACKGROUND AND DESCRIPTION: The objective of this program element (PE) is to conduct engineering development on defensive materiel and equipment to protect individuals from chemical agents by providing: protection from the respiratory system and body surface; manual and automatic detection and warning devices that respond to toxic agents in all forms on all surfaces; means to decontaminate skin, clothing, equipment, terrain, food and water; and the development of collective protection shelters. Development of the new mask is in response to a Service requirement for improved respiratory protection with emphasis on improved operational capabilities and reduced logistical burden, suitability for wear under a wide range of operational conditions, and improved storage characteristics. Type classification of the mask will occur following successful completion of engineering development. Development of new/improved decontamination materiels and equipment, detection warning and identification equipment, and individual/collective protection is in response to a requirement to reduce the burden to the soldier while increasing his chances of survival in a chemical warfare environment. The above improvements are part of a broad program to correct deficiencies which could jeopardize the survivability of US forces in an active chemical or biological (CB) environment.

F. RELATED ACTIVITIES: The approval of the Memorandum of Understanding with Canada for protective mask canisters is pending. Similarly, conversion of the Army-approved Required Operational Capability (ROC) for the New Protective Mask to a Joint Service Operational Requirement for multi-Service application is pending. PE 6.27.06.A, "CB Defense and General Investigations", supports the entire Department of Defense (DOD) chemical and biological (CB) defense technology base and addresses in-depth exploratory activities in the development of a broad spectrum of CB defensive equipment concepts and is not duplicated in this program.

G. WORK PERFORMED BY: In-house effort by US Army Chemical Systems Laboratory, Edgewood, MD. Prime Contractors are Sierra Engineering Company, Sierra Madre, CA; Bendix Corporation, Baltimore, MD; D. H. Litter, New York, NY; and Calspen Corporation, Buffalo, NY.

Program Element: #6.47.25.A
DoD Mission Area: #449 - Chemical Biological Defense/ Chemical Warfare

Title: Chemical Defense Materiel
Budget Activity: #4 - Tactical Programs

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: The new protective mask completed the advanced development phase and entered engineering development September 1977. Extensive laboratory and field testing comprising Development Test I (DT I) have been performed. The conclusion of the test was that the new protective mask is superior when compared to the current M17A1 protective mask. Spectacle development has continued with the objective of providing a combat spectacle which can be utilized with the mask. Product qualification of the XM9 Chemical Agent Detector Paper was conducted and Phase II of the operational and development tests was initiated. The XM256 Chemical Agent Detector Kit development tests were conducted and the item was type classified.

2. FY 1978 Program: Test items for the engineering design test of the new protective mask will be made. The Prototype Systems Technical Review will be conducted. Research and Development Acceptance Review (RDAR) will be made. Work on applications of Modular Collective Protection Equipment to Improved HAWK and PATRIOT will continue. The XM9 Chemical Agent Detector Paper will be type classified in FY 1978.

3. FY 1979 Planned Program: The New Protective Mask will be type classified. Work on the application of Modular Collective Protection Equipment to Improved HAWK and PATRIOT will continue. Engineering development of the Passive Remote Detector will be initiated. Funding requirements in FY 1979 are greater than FY 1978 because of the added expense of conducting carcenogenicity tests on the BI dye in the Liquid Agent Detector and environmental testing on the M256 Chemical Detector Kit.

4. FY 1980 Planned Program: Post type classification activities (completion of test, report writing) on the new protective mask will be accomplished. Personnel Decontamination System and the Chemical Agent Detector will be type classified. Engineering development will be initiated on a large scale decontamination system, Automatic Liquid Agent Detector and a Field Protection System.

5. Program to Completion: This is a continuing program.

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.27.A
Title: Command and Control
DoD Mission Area: #446 - Navigation, Positioning and Related Systems
Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	6346	8571	7227	12366	Continuing	Not Applicable
	QUANTITY						BLC - 10 TDS - 7
DC98	Position Location Reporting System (PLRS)	2263	6532	1000	3000	Continuing	Not Applicable
D183	Tactical Display System (TDS)	0	0	2911	6649	2007	12567
D184	Tactical Computer System (TCS)	0	0	0	1675	Continuing	Not Applicable
D284	Battery Level Computer (BLC)	4083	2039	2316	1042	0	11580
A570	Mortar Fire Control Calculator (MFCC)	0	0	1000	0	0	1000

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Automated command and control equipments are being developed to provide the capability for processing the large volumes of data needed by commanders to make timely and accurate decisions on the highly mobile modern battlefield. This volume of data innundates present manual methods. The Position Location Reporting System is a Division level system that will assist in command and control, and provide a high probability for first round artillery hits as the Army accurately locates its position. The Tactical Display System is needed to interact with a data base and present rapidly changing situations in detail quickly. Automatic display of accurate up-to-date-information speeds operation over current manual methods. The display is a one meter square panel which presents tactical information graphically on a map background of the commanders area of interest. The Tactical Computer System is a high speed, general purpose, minicomputer being standarized for use in many systems. The system is militarized and modular construction. The TCS is intended for Army field use at all echelons in a variety of highly mobile tactical applications. The Battery Level Computer is needed to improve the mission effectiveness of artillery fires, increase survivability, and provide a capability for battery autonomous operations for field artillery batteries. The Mortar Fire control Calculator will improve the accuracy and responsiveness of mortar fires by replacing manual computation of firing data.

Program Element: #6.47.27.A
DoD Mission Area: #446 - Navigation, Positioning and Related Systems

Title: Command and Control
Budget Activity: #4 - Tactical Programs

C. BASIS FOR FY 1979 RDTE REQUEST: Continuation of the Position Location Reporting System (PLRS) in its present configuration is doubtful. The Army is looking toward a multifunction command and control/navigation device and the course of action will be developed in 1978. The Tactical Display System (TDS) will begin engineering development (ED). ED contract award is scheduled and will result in prototypes to be tested during this phase. Battery Level Computer (BLC): correct deficiencies from Development Test (DT) Operational Test (OT) II, refurbish prototypes and develop diagnostic software for the Automatic Test Equipment (ATE). Mortar Fire Control Calculator (MFCC): Award ED contract.

D. OTHER APPROPRIATION FUNDS: ($ in thousands)

Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
Other Procurement, Army						
Battery Level Computer	0	0	3800	24300	87800	115900
Quantity	0	0	33	210	717	960

E. DETAILED BACKGROUND AND DESCRIPTION: The PLRS consists of a central master unit to which 350 to 400 users will automatically report their location and identification. The objective of the TDS program is to develop a more effective means of displaying tactical situations in support of the Division Artillery, Battalion Fire Direction centers and in providing automated assistance to the Operation's and Intelligence sections of tactical operations centers in Divisions. A specific objective is to replace the Digital Plotter Map and Electronic Tactical Display, correcting known inadequacies. These inadequacies are lack of map background, lack of mobility and flexibility, lack of ability to interact with a data base, and consequent limitations on effective planning. Advanced development (AD) of this program was initiated in January 1975 as a joint program with the Federal Republic of Germany. The objective of the Tactical Computer System (TCS) program is to develop and qualify a general purpose data system device that the Army will be able to apply to a variety of applications. The TCS is a minicomputer of modular construction that can be configured and programed for many different applications. AD prototypes for testing were delivered in 1977. The Tactical Operations System (TOS) is the initial major use of the TCS and initial testing of engineering prototypes will be performed by the TOS program. Logistics and support packages will be developed to support TCS with TOS. Unique TCS applications to other programs such as Emergency Action Message (EA) will be conducted in 1980. The BLC program was initiated in FY 1976 to provide an improved technical fire control computational capability for field artillery firing batteries. The BLC will improve mission effectiveness in the target area, increase battlefield survivability, and provide for independent or autonomous battery operations. It will perform ballistic computations for individual weapons, storage and application of nonstandard ballistic data, moving target prediction, and provide for interface with the Tactical Fire Direction System (TACFIRE) and two-way digital data communications with the TACFIRE Digital Message Device used by forward observers. The BLC will be employed in all field artillery

batteries including Reserve components. It will replace the obsolescent Field Artillery Digital Automatic Computer (FADAC) and the TACFIRE Battery Display Unit in cannon batteries and, in rocket and missile batteries, replace the Field Artillery Digital Automatic Computer (FADAC) and Tactical Fire Direction System (TACFIRE) Variable Format Message Entry Device. The system will consist of a computer unit located at battery headquarters and a gun display unit for each battery weapon. The Mortar Fire Control Calculator (MFCC) is needed to improve the accuracy and responsiveness of mortar fires by replacement of the present manual/graphical methods of computing firing data which are highly subject to error. The MFCC will be a small hand-carry unit which can be powered either by internal batteries or external sources. It will provide for input of meteorological data and interface with the Digital Message Device used by mortar and artillery forward observers.

F. RELATED ACTIVITIES: The US Marine Corps is funding approximately 40% of the Position Location Reporting System (PLRS) system under Program Element (PE) No. 6.47.65.M (Other Marine Corps Development (Engineering)). Advanced development (AD) of the Tactical Display System (TDS) was begun as a joint program with 50% of the funds provided by Federal Republic of Germany and 50% under PE 6.37.23.A (Integration of Army Tactical Data Systems). The Tactical Computer System (TCS) AD was funded previously under PE 6.37.23.A. Engineering development (ED) for the TCS will be undertaken by the Tactical Operations System (TOS) development testing (DT) in 1979 under PE 6.47.49.A (Tactical Operations System (TOS)). The Program Manager's Office, Army Tactical Data Systems, provides management for the TCS and TDS and insures no duplication of effort through liaison with foreign countries and other Services. The Battery Level Computer (BLC) has application in the TACFIRE program (PE 2.37.26.A) in that it is planned to replace the TACFIRE Battery Display Unit with the BLC. The Army and Marine Corps have signed a Memorandum of Agreement to develop a single battery computer unit which meets the requirements of both Services. Exploratory Development of the MFCC was accomplished under PE 6.26.03.A (Armament Technology) with both Army and Marine Corps funding support.

G. WORK PERFORMED BY: The Army in-house developing organization developing the Position Location Reporting System (PLRS), The Tactical Display System (TDS), the Tactical Computer System (TCS) and the Battery Level Computer (BLC) is the Project Manager, Army Tactical Data Systems (PM, ARTADS), US Army Communications Research and Development Command, Fort Monmouth, NJ. PLRS contractors performing tasks are: Hughes Aircraft Company, Fullerton, CA, and Telcom Systems, Incorporated, Arlington, VA. BLC: Technical support is furnished by the US Army Computer Systems Command, Fort Belvoir, VA, US Army Armament Research and Development Command, Dover, NJ, and the US Army Communications Research and Development Command, Fort Monmouth, NJ. System testing is to be performed by the US Army Test and Evaluation Command, Aberdeen Proving Ground, MD, and the US Army Training and Doctrine Command (TRADOC), Fort Monroe, VA. TRADOC will perform cost and operational effectiveness analyses for the system. The Engineering Development contractor is The Norden Division of United Technologies, Incorporated, Norwalk, CT. TDS: competitive prototyping contracts for the TDS were awarded to Control Data Corporation, Minneapolis, MN, and Litton Data Systems, Van Nuys, CA. TCS: the Singer Company, Libra scope Division, Glendale, CA, is the contractor for the Tactical Computer System (TCS). MFCC: The MFCC developer is the US Army Armament Research and Development Command (ARRADCOM), Dover, NJ. System testing will be performed by the US Army Test and Evaluation Command and the US Army Training and Doctrine Command (TRADOC). TRADOC will perform cost effectiveness analyses for the system. A competitive solicitation for engineering development (ED) is anticipated with Litton Industries, as well as other corporations, bidding.

Program Element: #6.47.27.A
DoD Mission Area: #446 - Navigation, Positioning and Related Systems

Title: Command and Control
Budget Activity: #4 - Tactical Programs

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: The technical and operational feasibility of the Position Location Reporting System (PLRS) program was demonstrated by the Marine Corps. Following the formalization of the Joint Service Operational Requirement, a contract was awarded to Hughes on 16 August 1976 for an engineering development PLRS system consisting of 2 master units and 64 user units. Competitive prototyping contracts were awarded in July 1976 for development of advanced development (AD) models of the Tactical Display System (TDS). The Battery Level Computer (BLC) contract for engineering development (ED) was awarded on 28 September 1976 based on results of evaluation of responses to a competitive solicitation. Design Reviews were held during 1977 to permit both the user and developer to closely monitor the contractor's progress in hardware and software development. For the Mortar Fire Control Calculator (MFCC), Exploratory Development was accomplished and the process to definitize user requirements for the system was initiated during the period 1974-1977.

2. FY 1978 Program: The Army, in coordination with the Marine Corps, is developing a new course of action for the PLRS efforts. TDS: Continue AD with delivery of prototypes for testing in May 1978. Testing is planned for the June through August time frame. Results will be evaluated and preparations made for Engineering Development Specifications and a validation review in early FY 1979. The BLC contractor will complete fabrication of prototypes and the Government will conduct its Preliminary Qualification Test and Operational Test II. For the MFCC, a Validation In-Process Review (IPR) will be conducted to ensure readiness to enter Engineering Development and development of the procurement package will be initiated.

3. FY 1979 Planned Program: The PLRS planned program is undetermined, see FY 1978 Program discussion above. The funds are required to complete the engineering development contract and effect delivery of the PLRS system. TDS: ED Phase should start in 1979 with Award of contracts scheduled for March 1979. ED Prototypes will be procured and tested with other systems such as Tactical Operations System for use with those systems. Planned activities for the BLC include correction of test deficiencies, refurbishment of prototypes, conduct of the Development Validation IPR, initiation of low rate production, and establishment of the Automatic Test Equipment (ATE) diagnostic capability. Funding is necessary to develop the ATE diagnostic software for maintenance support of the BLC. All necessary experimental work will have been performed and the MFCC will be ready for full scale development. All technology and the majority of components required for the MFCC will be readily available from multiple sources. Planned activities for this period include release to industry of the Request for Proposal and award of the ED contract.

4. FY 1980 Planned Program: The funds in the Position Location Reporting System (PLRS) planned program is required to initiate development of a multifunction capability. TDS: Program will with testing and necessary hardware and software modifications and preparation for Development Test (DT) II and Operational Test (OT) II. Tactical Computer System (TCS): Requirements for completion of DT II and development of logistic and technical support packages for unique TCS applications to such programs as Emergency Action Message, Army Terrain Information System, Record Traffic System, and other potential

users will be completed. Planned activities for the Battery Level Computer (BLC) include conduct of production acceptance testing and initiation of full production. Planned activities for the MFCC include conduct of DT/OT II and initiation of low rate production.

5. Program to Completion: The Position Location Reporting System (PLRS) program is being restructured and a new course of action is being developed. The TDS and TCS: Programs are scheduled for completion in FY 1981. Full scale production and delivery through FY 1983 will complete the BLC and MFCC projects.

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.28.A Title: Family of Military Engineer Construction Equipment (FAMECE)
DoD Mission Area: #442 - Logistics/General Combat Support Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	6691	4672	2275	1000	100	39669
DH08	Family of Military Engineer Construction Equipment (FAMECE)	6431	4672	1875	1000	100	32279
D500	Universal Engineer Tractor (UET)	260	0	400	0	0	7390

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The Army must have earthmoving/construction equipment right up front to fight and win the next battles. Existing military equipment and comparable commercial equipment will not do the job. This program provides the Army with a family of wheeled and tracked earthmovers (FAMECE and UET) uniquely designed to do the job and provide increased mobility, simplicity of operation, reduced maintenance, and common ability of parts. FAMECE consists of a common power section and eight work sections. The complete vehicles thus have the capability of a scraper, dozer, compactor (two types), water distributor, grader, dumper and front loader. The sectionalized concept permits helicopter lift by a medium lift helicopter and satifies the requirement for airborne/airmobile wheeled engineer equipment in addition to providing effective divisional engineer combat support. UET, as a full-tracked, high-speed earthmover, provides an increased engineer capability to support armored/mechanized combat forces in mobility, countermobility and survivability missions. FAMECE and UET, as wheeled and tracked earthmoving vehicles, complement each other in mission performance and enable the combat engineer units to support the committed forces in a cost and operationally effective manner not possible today.

C. BASIS FOR FY 1979 RDTE REQUEST: Funds are required to complete the environment and air drop tests of FAMECE and type classify the equipment Standard (1st Quarter, FY 1979) and to prepare and initiate post production testing of UET.

Program Element: #6.47.28.A
Title: Family of Military Engineer Construction Equipment (FAMECE)
DoD Mission Area: #442 - Logistics/General Combat Support
Budget Activity: #4 - Tactical Programs

D. OTHER APPROPRIATION FUNDS: ($ in thousands)

	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
Other Procurement, Army Funds (FAMECE)	0	0	24000	44600	203600	272200
Quantity (FAMECE)	0	0	376	674	2828	3878
Funds (UET)	0	0	21200	38400	222000	285900
Quantity (UET)	0	0	75	155	840	1070

E. DETAILED BACKGROUND AND DESCRIPTION: This program consists of the development of the Family of Military Engineer Construction Equipment (FAMECE) and the Universal Engineer Tractor (UET). FAMECE is airmobile and air-droppable and designed to perform construction tasks required of combat engineer units to include dozing, scraping, loading, grading, compacting, excavating, hauling and spreading. It will utilize a standard wheeled power section which, when combined with comparable wheeled construction sections, will meet combat support construction requirements. The UET is an armored, multi-purpose, tracked combat engineer earthmover capable of performing pioneer tasks such as dozing, scraping, rough grading, and off-road prime moving in support of combat operations.

F. RELATED ACTIVITIES: There is no effort by other Services to develop like equipment. The Army maintains coordination with the US Marine Corps and Navy concerning this project.

G. WORK PERFORMED BY: In-house work is performed by elements of the US Army Mobility Equipment Research and Development Command, Fort Belvoir, Virginia. Contractors are Clark Equipment Company, Benton Harbor, Michigan, for FAMECE; and Pacific Car and Foundry, Renton, Washington, for UET.

Program Element: #6.47.28.A Title: Family of Military Engineer Construction Equipment (FAMECE)
DoD Mission Area: #442 - Logistics/General Combat Support Budget Activity: #4 - Tactical Programs

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: The FAMECE program was validated and competed between two major contractors (Lockheed and Clark Equipment Company). After successful Development Test I/Operational Test I (DT I/OT I), the Full Scale Development Contract was awarded to Clark Equipment Company. Final prototype sections have been designed and Development Test II (DT II) has been initiated. The UET successfully completed its user test and development check test and was type classified standard by the Development Acceptance In-Process Review. (Type classification approved by Headquarters, Department of the Army.)

2. FY 1978 Program: All FAMECE sections will be tested during DT II and Operational Test II (OT II). The Development Acceptance In-Process Review (DEVA-IPR) will approve the development and recommend type classification standard. Headquarters, Department of the Army will review the type classification recommendation and approve it.

3. FY 1979 Planned Program: Producibility Engineering Planning (PEP), Initial Provision Documentation, Integrated Technical Documentation and Training (ITDT), and preparation for post production testing of both FAMECE and UET will be conducted. Production contracts will be awarded for both items. Decrease in funding from FY 1978 level results from program nearing completion.

4. FY 1980 Planned Program: Final items for Initial Provisioning, PEP, and ITDT will be completed. Post production testing will be completed.

5. Program to Completion: Only housekeeping chores such as final documentation wrap-up remain. Items are fielded and in the system.

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.29.A
DoD Mission Area: #411 - Battlefield Surveillance

Title: Countermortar Radar (AN/TPQ-36)
Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	6742	4226	4381	2050	1050	44314
	QUANTITIES						5
DL81	Countermortar Radar	6742	4226	4381	2050	1050	44314

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The countermortar radar, AN/TPQ-36, will automatically detect and locate hostile mortars, artillery, and rockets at short and mid ranges over a wide sector with sufficient accuracy and timeliness to permit effective counterfire. It is being developed for the US Army and Marine Corps to replace the inadequate AN/MPQ-4 radar in order to provide an effective and responsive capability to front line units against the heavy mortar/artillery threat. Experience in Vietnam with the AN/MPQ-4 radar clearly indicated its shortcomings and the need for improvements represented by the AN/TPQ-36 countermortar radar. Threat estimates indicate that, in future conflicts, US forces will be significantly outmanned and outgunned. Soviet/Warsaw Pact forces place great emphasis upon the use of indirect fire weapons. The accurate and timely location of these numerically superior weapons is vital to ground warfare. The AN/TPQ-36 is being developed for the US Army and Marine Corps to replace the obsolescent, manually operated AN/MPQ-4 radar. The AN/TPQ-36 will automatically detect and locate hostile mortars, artillery, and rockets at short and mid ranges with sufficient accuracy and timeliness to permit effective field artillery counterfire. The AN/TPQ-36 will automatically interface with the Tactical Fire Direction System (TACFIRE) to further reduce response times and increase effectiveness.

C. BASIS FOR FY 1979 RDTE REQUEST: To provide for completion of special tools and test equipment design (hardware and software) for field and depot use, extension of prime contractor engineering services (field test crews, depot support of engineering development models and Reliability, Availability and Maintainability (RAM) analysis), software upgrading, producibility, planning documentation, and completion of institutional training device development.

Program Element: #6.47.29.A
DoD Mission Area: #411 - Battlefield Surveillance

Title: Countermortar Radar (AN/TPQ-36)
Budget Activity: #4 - Tactical Programs

Major Milestones	Date
Army Systems Acquisition Review Council (ASARC) III	November 1977
Development Test (DT) III	October 1978
Initial Operational Capability (IOC)	

D. OTHER APPROPRIATION FUNDS: ($ in Thousands)

Other Procurement, Army	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
Funds	0	53300	49900	74500	0	177700
Quantities		20	31	48	0	99

E. DETAILED BACKGROUND AND DESCRIPTION: The countermortar radar, designated the AN/TPQ-36, is designed to automatically locate hostile mortar launch sites to a range of with an accuracy of and a probability of location of Artillery and rockets can also be located to this range with a small reduction in accuracy and probability of location. The AN/TPQ-36 radar will replace the AN/MPQ-4 radar which has been the Army mortar locating radar since 1958. The AN/MPQ-4 is limited by reduced sector coverage, manual operation, large human interface, and reliability and maintainability problems. The AN/TPQ-36 incorporates the latest advances in planar array antennas and computer technology, and will provide highly mobile, automatic first round locations over a wide degree selectable sector.

F. RELATED ACTIVITIES: Development of the countermortar radar, AN/TPQ-36, was previously funded in Program Element/Project 6.47.23.A, DL72 Radars. Transfer to Program Element/Project 6.47.29.A, DL81 (Countermortar Radar) was made in FY 1973 to separate funding of the Countermortar Radar from other radars found in the previous program element. The Counterbattery Radar, AN/TPQ-37, is being developed under 6.47.31.A, DL83.

G. WORK PERFORMED BY: The in-house developing organization for this program is the Project Manager, FIREFINDER (Counterbattery and Countermortar Radars), US Army Electronics Research and Development Command, Fort Monmouth, NJ. A contract for five engineering development models of the radar was awarded to Hughes Aircraft Company, Fullerton, CA, in October 1973. Institutional training devices for the US Army Field Artillery School are being developed for Project Manager, FIREFINDER by Project Manager for Training Devices, Orlando, FL. A contract for training devices was awarded to Hughes Aircraft Company in August 1976.

Program Element: #6.47.29.A
DoD Mission Area: #411 - Battlefield Surveillance

Title: Countermortar Radar (AN/TPQ-36)
Budget Activity: #4 - Tactical Programs

H. PRIOR ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: Engineering Development of the countermortar radar was initiated in FY 1972. Several administrative milestones were accomplished leading to expected award of a contract for Engineering Development of the radar in late FY 1972. This award was delayed until October 1973 due to protests of the procurement selection proceedings by International Telephone and Telegraph (ITT)-Gilfillian, RCA, and General Electric. Extensive litigation concerning the protests was conducted, and no work on the radars could be undertaken in FY 1973. The General Accounting Office resolved the protests in favor of the Army in October 1973. A contract for five engineering development (ED) models was then awarded to Hughes Aircraft Company, Fullerton, California. Extensive design-to-cost engineering efforts were conducted in FY 1974/75 to achieve the most cost effective radar design. In FY 1975, fabrication of the five models was initiated. The first model was delivered to Yuma Proving Ground in July 1975 where it completed Prototype Qualification Testing. During FY 1976 fabrication of the remaining four models was completed using experience gained from the first model. To date, four models have been live fire tested at Yuma Proving Ground with all critical test requirements successfully completed. The Army completed a comparative evaluation with the United States Marine Corps Hostile Weapons LocatingRadar (HWLS) and the AN/TPQ-36 countermortar radar in July 1976. The United States Marine Corps has since terminated the HWLS development and plans to procure 22 AN/TPQ-36 radars. All ED models are being modified with enhanced capabilities to satisfy Marine Corps and Army requirements. Development Test (DT) II was completed in March 1976 and Operational Test (OT) II was completed at Fort Carson, Colorado in June 1976. Commonality planning with the AN/TPQ-37 radar was initiated in FY 1977. Life cycle cost savings are expected to approach $50 million as a result of the common operations shelter being used by both systems.

2. FY 1978 Program: Full scale production is expected to begin 2d Qtr FY 1978 following an Army Systems Acquisition Review Council decision. FY 1978 RDTE funding will be used to complete system hardware development, commonality re-engineering of the system, continue institutional training device development, begin special tool and test equipment design (hardware/software) for field and depot use, provide contractor engineering services, complete producibility planning and pay Award Fees. Operation and Maintenance, Army, (OMA) funding has been provided for preparation and shipment
with trained crews. Contractor support will also be provided

3. FY 1979 Planned Program: Continue full scale production. RDTE funding will be used to complete special tools and test equipment design; complete training device development; maintain continuing upgrade of system software/producibility planning documentation and provision of contractor engineering support. Continue OMA support of fielded development models. The minimal increase in funding over FY 1978 is due to the emphasis placed on developing the training devices, tools, and test equipment to properly support the fielded systems.

Program Element: #6.47.29.A
DoD Mission Area: #411 - Battlefield Surveillance

Title: Countermortar Radar (AN/TPQ-36)
Budget Activity: #4 - Tactical Programs

4. FY 1980 Planned Program: Continue full scale production. Support software upgrading, engineering services and field support, primarily for Project Handoff activities (fielding).

5. Program to Completion: Project Handoff (fielding) activities, both contractor and in-house, will be completed in FY 1981.

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.30.A
DoD Mission Area: #411 - Battlefield Surveillance

Title: Remotely Piloted Vehicles (RPVs)
Budget Activity: #6 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	0	0	22003	32455	Continuing	Not Applicable
	Quantities						4
D040	Remotely Piloted Vehicle	0	0	22003	32455	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program provides for Engineering Development of a Remotely Piloted Vehicle (RPV) system to fill the requirement for unmanned aerial target acquisition, target identification and location, laser designation for laser seeking weapons such as the helicopter launched missile (HELLFIRE) and the cannon launched guided projectile (COPPERHEAD), artillery adjustment and battlefield reconnaissance. Extends the eyes of Brigade and Division elements to the range of their direct support artillery weapons, where during combat, ground based systems cannot see and manned observation aircraft cannot operate with acceptable attrition rates. This system will multiply the effectiveness of field artillery and assist the commander to optimally employ his forces by providing artillery adjustment and laser designation on targets at the full range of the field artillery.

C. BASIS FOR FY 1979 RDTE REQUEST: Funds requested provide for the first year of a three year Engineering Development program for a daylight, clear weather, target acquisition, designation and reconnaissance RPV system. Separate contracts will be awarded for the anti-jam data link, the sensor system, and the RPV system integrator. A joint development effort will provide a nearly common data link for the Stand-Off Target Acquisition System (SOTAS) and the RPV. Individual data link and sensor contractors will be selected based upon the results of competitive design studies conducted in late FY 1978. In-house support will include monitoring contractors performance using design reviews and controlling the cost, technical work, and schedule. Off-the-shelf commercial components or commercial standards will be used in lieu of military specifications wherever possible.

D. OTHER APPROPRIATION FUNDS: Not Applicable.

E. DETAILED BACKGROUND AND DESCRIPTION: This program will accomplish the Engineering Development (ED) of the RPV systems for employment by the Army. This is a new program element beginning in FY 1979. The system parameters will be defined based upon the results of the AQUILA RPV System Technology Demonstrator testing completed under PE 6.47.25A, Remotely Piloted Vehicles/Drones, in FY 1978. Requests for Proposals (RFP) for the data link, sensors and system integrator will be issued to industry in FY 1978. Contractors will be selected to design and fabricate a system starting in FY 1979 in order to commence production in FY 1982. The 1st generation RPV effort will provide a target acquisition, artillery adjustment, laser designation and

reconnaissance capability. It will be a clear weather, day system with an anti-jam data link. Modular payloads currently in development will add a night and adverse weather capability approximately two years after the clear weather system becomes operational.

F. RELATED ACTIVITIES: This Remotely Piloted Vehicle (RPV) was funded during exploratory development and advanced development FY 1975 - 1978 under Program Element (PE) 6.27.32.A and PE 6.37.25.A, Remotely Piloted Vehicles. Development of different interchangeable payloads such as a night and adverse weather sensors and jammers will continue under these two PEs. The Air Force RPV programs consisting of PE 6.37.39.F, Advanced RPVs, and PE 6.47.46.F, Expendable Drones, are being monitored to utilize applicable technology, as appropriate. The Marine Corps is closely following the Army program. The Army, Navy, and Air Force RPV program managers meet quarterly to preclude duplication of effort between the services.

G. WORK PERFORMED BY: US Army Aviation Research and Development Command, St Louis, MO; US Army Electronics Research and Development Command, Fort Monmouth, NJ; US Army Missile Research and Development Command, Huntsville, AL; Research and Technology Laboratories, Aero Mechanics Lab, Moffett Field, CA; Applied Technology Lab, Fort Eustis, VA; and the US Army Mobility Equipment Research and Development Command, Fort Belvoir, VA. Contractors will be selected in FY 1979.

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: Not Applicable.

2. FY 1978 Program: Not Applicable.

3. FY 1979 Planned Program: This is a new engineering development program starting in FY 1979, following a successful advanced development program accomplished under PE 6.37.25.A from FY 1975 through FY 1978. All experimental work required before moving into engineering development (ED) will be completed in the AQUILA RPV program and parallel technology efforts. An anti-jam data link will be flight tested in FY 1978 in both a manned aircraft and the RPV. By the beginning of FY 1979 all necessary experimental work will have been performed for a daylight, clear weather, target acquisition, laser designation and reconnaissance system. The proposed system will be ready for full scale development. The ED contract will be awarded in 1st quarter FY 1979. Development will be started and fabrication initiated in FY 1979 which will be the first year of a three year ED contract. In-house support will consist of monitoring the contractor's work using design reviews to control the costs and technical progress of the program.

4. FY 1980 Planned Program: Continue the Engineering Development program initiated in FY 1979. Design and assembly of the equipment will be completed during this period. System and logistics testing will be conducted. Development flight testing and captive flight testing of the sensor will be started with completion in the early part of FY 1981. Army instructor training will be started in this time period.

Program Element: #6.47.30.A
DoD Mission Area: #411 - Battlefield Surveillance

Title: Remotely Piloted Vehicles (RPVs)
Budget Activity: #4 - Tactical Programs

5. Program to Completion: The contractor portion of the program will continue through FY 1981 with completion of fabrication and testing by the contractor. Developer and user testing will commence in FY 1982 for a six month period. As other sensors and payloads such as Forward Looking Infrared (FLIR) devices and jammers, and multi-control data links advance through the technology base, the appropriate items will enter engineering development and will be added to the basic system in order to provide a day/night/adverse weather capability and other mission capabilities such as electronic-warfare.

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.31.A
DoD Mission Area: #411 - Battlefield Surveillance

Title: Counterbattery Radar (AN/TPQ-37)
Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	11375	11339	6849	2483	0	73770
	Quantities						2
DL83	Counterbattery Radar	11375	11339	6849	2483	0	73770

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Threat estimates indicate that, in future conflicts, US forces will be significantly outmanned and outgunned. Soviet/Warsaw Pact forces place great emphasis upon the use of indirect fire weapons. The accurate and timely location of numerically superior long range artillery and rockets is vital to ground warfare, and experience in Vietnam vividly documented the inability of US forces to locate these indirect fire weapons. The AN/TPQ-37 has been expedited to fill the critical void in our capabilities to locate long range artillery and rockets at normal deployment ranges. Through an automatic interface with the Tactical Fire Direction System (TACFIRE), response times will be greatly reduced, and field artillery counterfire effectiveness significantly enhanced.

C. BASIS FOR FY 1979 RDTE REQUEST: The funding in FY 1979 will complete development of the training device, complete the survivability program, complete producibility engineering and planning (PEP), provide acceptance testing, technical support, and complete system built-in test equipment (BITE) development.

Major Milestones	Date
Initial limited procurement system transported to Fort Sill, Oklahoma	October 1978
Initial live fire acceptance testing	December 1978
Initial fielding	

Program Element: #6.47.31.A
DoD Mission Area: #411 - Battlefield Surveillance

Title: Counterbattery Radar (AN/TPQ-37)
Budget Activity: #4 - Tactical Programs

D. OTHER APPROPRIATION FUNDS: ($ in Thousands)

Other Procurement, Army	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
Funds	51800	22500	40200	63000	72100 *	249600 *
Quantities	10	5	11	15	17 *	58 *

* Additional 28 systems to be funded beyond FY 1983.

E. DETAILED BACKGROUND AND DESCRIPTION: The counterbattery radar, designated the AN/TPQ-37, will automatically locate hostile artillery and long-range rocket launch sites out to ranges of for tube artillery and for large rockets. The US Army has no effective means to locate hostile artillery with sufficient accuracy and speed. The AN/TPQ-37 incorporates the latest advances in phased array antenna and computer technology and will provide first round detection and location of weapons over a wide sector coverage. Detailed system characteristics are depicted in the Test and Evaluation Data Section of this descriptive summary.

F. RELATED ACTIVITIES: Development of the counterbattery radar, AN/TPQ-37, was previously funded in Program Element/Project 6.37.19.A., DK72, Radars. Transfer to Program Element/Project 6.37.29.A., DK83, Counterbattery Radar, was made in FY 1973 to separate funding of the counterbattery radar from other radars found in the previous program element. Transfer to Program Element/Project 6.47.31.A., DL83, Counterbattery Radar, was made in FY 1977. The countermortar radar, AN/TPQ-36, is funded under Program Element/Project 6.47.29.A., DL81, Countermortar Radar.

G. WORK PERFORMED BY: The in-house developing organization for this program is the Project Manager, FIREFINDER (Counterbattery and Countermortar Radars), US Army Electronics Research and Development Command, Fort Monmouth, NJ. Contractual work is being performed by Hughes Aircraft Company, Fullerton, CA.

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: Studies and computer simulations of the proposed counterbattery radar system to determine the technical feasibility of developing such a radar were conducted prior to FY 1972. The desired capabilities of the proposed radar were evaluated against the state-of-the-art, resulting in a firm conclusion that the radar could be designed and built. The advanced development program included a two contractor, competitive phase to shorten the total development cycle and reduce the technical risk. Contracts were awarded to Hughes Aircraft Company and Sperry Rand Corporation in June 1972, for each to build a model of the radar system. Both contractors completed engineering design planning in mid FY 1973, and fabrication

of components was started. Fabrication of both systems was completed in FY 1975. The radars were subjected to live fire acceptance testing at Fort Sill, Oklahoma, followed by competitive developmental testing. Weapons were located automatically at ranges to The radar demonstrated the capability to transmit information digitally to the Tactical Fire Direction System, marking the first time two operational systems had transferred such digital information. Competitive developmental and operational testing was concluded in FY 1976, followed by an environmental evaluation. Source selection was concluded in May 1976, with Hughes Aircraft Company being chosen as the prime contractor. As a result of a May 1976 decision briefing to the Principal Deputy Director of Defense Research and Engineering, guidance was given to emphasize commonality of components between the countermortar radar, AN/TPQ-36, and the counterbattery radar, AN/TPQ-37, particularly the shelterized components. On 27 October 1976, an Army Systems Acquisition Review Council (ASARC) rendered a decision to proceed into production. Concurrent with the start of production there was continuing developmental effort to effect a common shelter design including a changeover to 400 Hz power, producibility engineering and planning (PEP), initiation of training device development and other engineering changes to improve Reliability, Availability, and Maintainability (RAM).

2. FY 1978 Program: Conclude development effort on most areas started in FY 1977 to include system hardware development. Continue producibility engineering and planning to facilitate transition into full scale production and continue training device development. Complete efforts on the common shelter, and continue development of the training devices which are required before the system is fielded. Initiate development of Special Test Equipment for the General Support capability in the field. Accomplish nuclear hardening development. Initiate acceptance testing support for acceptance testing of the systems procured for delivery in FY 1979. Prepare for government configuration control.

3. FY 1979 Planned Program: Conduct production acceptance testing on first ten limited procurement systems. Start development and operational testing. Conclude training device, built-in test equipment, and survivability enhancement developments. Continue producibility planning and documentation, configuration control, technical and engineering services support efforts. The FY 1979 effort is essential to properly support fielding of the hardware systems. Decrease in funding is due to completion of hardware system development during FY 1978, and subsequent reduction of RDTE efforts.

4. FY 1980 Planned Program: The development effort should be terminated with the completion of FY 1980. Contractor support will be required to support and successfully complete the final development and operational testing phase conducted on the initial ten limited procurement systems for the full scale production decision.

5. Program to Completion: Not Applicable.

Program Element: #6.47.31.A
DoD Mission Area: #411 - Battlefield Surveillance

Title: Counterbattery Radar (AN/TPQ-37)
Budget Activity: #4 - Tactical Programs

I. Test and Evaluation Data:

1. Development Test and Evaluation:

a. Development Contractor: Hughes Aircraft Company Ground Systems Division, Fullerton, California.

b. Summary Description: Development Test (DT) I - During DT I the system was operated by typical Army crews. More than 1400 rounds in both single and multiple weapon problems were fired during the test. Test shots were designed to stress radar performance at minimum and maximum ranges, at the search sector edges, and with high crossing and elevation rates. The radar was located at five different sites requiring crews to frequently emplace and displace the systems. Weather during DT I was hot with several periods of heavy rainfall; however, no testing was conducted during the rain. Performance characteristics demonstrated during DT I are listed below. US Army Test and Evaluation Command is responsible for conduct of the developmental testing of this system.

c. Schedule:

DT I	16 Jun 75 - 19 Sep 75
DT II	Waived due to Low Rate Initial production decision in October 1976
DT III	Sep 78 - Sep 80

d. Similarity of Equipment: The central data function of the tested AN/TPQ-37 was configured in an S280 shelter mounted on a 2 1/2 ton truck. To take advantage of commonality in design with the AN/TPQ-36 system, this function in the production version will be reconfigured into an S250 shelter. The new shelter will be identical for both systems. This change will require that some hardware be moved to the antenna trailer assembly. There are several other design changes which will be made to facilitate the production process. One example is the redesign of the antenna sub-array modules. These changes should not detrimentally affect the performance demonstrated to date in either Development Test (DT) or Operational Test (OT). An automatic height correction capability will be incorporated in the production equipment.

e. Items not tested: Built-in-Test-Equipment (BITE). Because the BITE was not finished, it was difficult to determine the system's operability under all conditions.

f. Deficiencies: Safety hazards were found associated with the rotation and elevation of the antenna. These hazards have since been corrected.

g. Reliability, Availability, and Maintainability (RAM): The radar demonstrated an instantaneous Mean Time Between Failures (MTBF) of 28 hours at the completion of DT I. All maintenance was performed by contractor personnel. BITE software was not complete so accurate maintainability evaluation could not be made. A maintenance assessment was conducted during August 1976. This assessment demonstrated a Mean Time to Repair (MTTR) of about 10 minutes against a requirement of 30 minutes at organizational level.

2. Operational Test and Evaluation:

a. Operational test and evaluation (OT) accomplished to date: OT I was conducted by the US Army Operational Test and Evaluation Agency (OTEA) at Fort Sill, Oklahoma, during an eight-week period in the 2d Quarter FY 1976. This was a combined test in which OT type data was collected and evaluated in conjunction with DT data taken in the 4th Quarter, FY 1975 and the 1st Quarter, FY 1976. The test included typical military crews performing enemy artillery detection and friendly registration missions using two competing prototype radars. Electronic countermeasures, vulnerability, and reliability were also evaluated to a limited extent. Four different threat matrices were used, the largest of which employed 24 firing positions firing simulated preparatory fires. During the entire OT I, 8,500 rounds were fired and the system was required to move 30 times. The final subtest involved a 72 hour field training exercise. The weather during OT I was colder than during DT I.

b. Operational Test and Evaluation to be accomplished prior to major production contract award: A low rate initial production decision (LRIP) was made in October 1976, thereby, eliminating the requirement for OT II. OT III is scheduled to be conducted by OTEA at Ft. Sill, Oklahoma during the period 22 Oct 79-30 Jan 80. Operational interface with TACFIRE and the AN/TPQ-36 will be included in this test. The radars will observe the same artillery and mortar threat fires both independently and concurrently. Data gathered during the test will be compared to that collected in previous testing.

Program Element: #6.47.31.A
DoD Mission Area: #411 - Battlefield Surveillance

Title: Counterbattery Radar (AN/TPQ-37)
Budget Activity: #4 - Tactical Programs

c. Schedule:

Operational Test (OT) I	13 Oct 75 - 14 Dec 75
OT III	22 Oct 79 - 30 Jan 80

d. Statement of results: The results were achieved against a mixture of calibers and ranges represented by the threat.

Mean Probability of Location =
Mean Accuracy of Location =
Radar Located batteries under jamming conditions, Probability of Location =

e. Similarity between tested and production items: Same as le above.

f. Subsystems not tested: Same as lf above.

g. Agency responsible for OT: US Army Operational Test and Evaluation Agency (OTEA).

h. Location of Tests:

OT I - Fort Sill, Oklahoma
OT III - Fort Lewis, Washington

i. Operators - Military Crews
Maintenance Personnel - Contractors

j. Major deficiencies and remedial action: There were no major deficiencies found during OT I.

k. Reliability, availability, and maintainability (RAM): Using a hardware oriented methodology, the radar demonstrated a Mean Time Between Failures (MTBF) of 63 hours at the completion of Operational Test (OT) I. Using methodology designed to capture operational considerations, the mean time between failures was 11.5 hours. This methodology includes failures of government furnished equipment (e.g., generators) and those failures caused by crew errors and does not address partial mission failures. No assessment of maintainability was made during OT I.

Program Element: #6.47.31.A
DoD Mission Area: #411 - Battlefield Surveillance

Title: Counterbattery Radar (AN/TPQ-37)
Budget Activity: #4 - Tactical Programs

3. System Characteristics:

Operational/Technical Characteristics	Objective	Demonstrated Performance
Single Weapon Probability of 1st Round Location	[redacted]	[redacted]
Range		
105mm Howitzer		
155mm Howitzer		
175mm Howitzer		
4.5 Inch Rocket		
Honest John Rocket		
Accuracy		
Artillery		
Registration		
Simultaneous Firings		

* Limited by range safety constraints.

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.40.A
Title: Tactical Surveillance System
DoD Mission Area: #444 - Tactical Combat Integration
Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	0	0			Continuing	Not Applicable
D662	Tactical Surveillance System	0	0			Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program element (PE) supports the Army's Tactical Exploitation of National Capabilities (TENCAP) program (Part A) engineering development (ED) work which is directed toward developing a tactical support system to collect, process, and disseminate intelligence/information which locates enemy units, activity and targets representing a general tactical threat. Such intelligence/information is essential to the tactical commander to enable him to fight and win while outnumbered in a highly intensive but short duration conflict. The tactical commander must have the capability to locate, identify, engage and attrite superior enemy forces at maximum range to insure that a manageable combat power ratio exists in the main battle area. The tactical commander must also have the capability to seize the initiative from the enemy by blunting his strength and exploiting his weaknesses. Since the enemy has the advantages of great numerical superiority and the choice of time, location and natureof an attack, friendly forces must rely heavily on superior intelligence systems to counter these advantages. In the TENCAP Program, advanced techniques are applied to exploit information collected from a variety of sensors, which, in general, is not otherwise obtainable, and provide that information to the tactical command and control environment in a sufficiently timely and useful form to greatly assist the commander in defeating the enemy.

C. BASIS FOR FY 1979 RDTE REQUEST: Begin engineering development work on hardware/software interfaces between existing sensor systems and Army tactical exploitation systems.

D. OTHER APPROPRIATION FUNDS: Not applicable.

E. DETAILED BACKGROUND ANDDESCRIPTION: Data orfginating from a variety of and tactical surveillance sensors must be transmitted to central collection points where the data can be processed and analyzed. The resulting tactical intelligence must be rapidly disseminated and fuzed into the command and control environment in such a timely and useful form so as to materially influence the land battle. Techniques and equipment which provide for this rapid collection, transmission and manipulation of intelligence data is being developed under this program.

F. RELATED ACTIVITIES: Technological developments designed to shorten the time required to collect and disseminate information are related to this development. These areas include automated search procedures, data link technologies, and tactical identification and positioning. The use of satellite communications is being considered. The initial efforts to provide the technical basis for the equipment and techniques were addressed under Program Element (PE) 6.37.30.A, D560, Tactical Surveillance Systems. This work is closely monitored by the appropriate office at the | level.

G. WORK PERFORMED BY: RCA Corp., Camden, NJ; TRW, Los Angeles, CA; Aerospace Corp., El Segundo, CA; Electromagnetic Systems Laboratories, Sunnyvale, CA; US Army Electronics Research and Development Command (ERADCOM), Fort Monmouth, NJ; Aeronutronics Ford, Palo Alto, CA.

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: Not applicable.

2. FY 1978 Program: Not applicable.

3. FY 1979 Planned Program: Begin engineering development (ED) of the hardware required to interface with a major collection system; and the associated hardware that provides for the capability to transmit and process the acquired data.

4. FY 1980 Planned Program: Continue ED of the hardware which was begun in FY 1979. Begin ED of an advanced data exploitation system.

5. Program to Completion: This is a continuing program.

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.45.A
Title: Tactical Electronic Warfare Systems
DoD Mission Area: #445 - Electronic Warfare Counter Command, Control and Communications (C^3)
Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT					Continuing	Not Applicable
	Quantities						Not Applicable
D906	Tactical Electronic Support Measures Systems					Continuing	Not Applicable
D909	Tactical Electronic Surveillance Systems					Continuing	Not Applicable
D926	Tactical Electronic Systems					Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The objective of this program is to provide for full scale development/ engineering development of tactical electronic support measures (ESM) equipment and systems, electronic warfare and intelligence command and control systems, and tactical electronic surveillance systems for use by division, corps, and echelon above corps commanders. Army commanders, at all echelons, depend upon tactical intelligence, combat information and effective electronic counter-measures to win the land battle. The enemy may be expected to have weapons generally as effective as our own, and it may be anticipated that he will have them in greater numbers, at least in the early stages of conflict. Detection, positive identification and location of the enemy's main thrust must be made early, while leading elements are still in the covering force area, so that the force can be met with massed armor and anti-tank weapons. The equipment and systems in this program provide the Army with this capability. Specifically, ESM systems for different tactical echelons and different information needs and tactical electronic surveillance systems are developed and tested prior to initiation of production.

C. BASIS FOR FY 1979 RDTE REQUEST: Continue the fabrication of
Continue development of the

Continue
the full scale development of tactical electronic surveillance systems.

Program Element: #6.47.45.A
DoD Mission Area: #445 - Electronic Warfare Counter Command, Control and Communications (C^3)

Title: Tactical Electronic Warfare Systems
Budget Activity: #4 - Tactical Programs

D. OTHER APPROPRIATION FUNDS: Not Applicable.

E. DETAILED BACKGROUND AND DESCRIPTION: The objective of this program is to provide for full scale development/engineering development of tactical electronic support measures (ESM) equipment, tactical electronic surveillance systems and tactical electronic warfare and intelligence command and control systems. This program includes the development of equipment and systems to detect, collect and locate enemy infrared and electro-optical communications and non-communications emitters, provide for control and analysis of Army Division and Corps tactical electronic countermeasures (ECM) systems, ESM systems and other intelligence sensor systems and electronic and other order of battlefield information. Equipment development includes ground vehicular and airborne mounted systems. All items in this program are Non-Signal Intelligence Intelligence-Related Activities (IRA); Non-IRA items were transferred to the new Program Element 6.47.50.A Tactical ECM Systems and SIGINT items were transferred to National Security Agency in FY 1979.

F. RELATED ACTIVITIES: Related developments are conducted by the Air Force, Navy and the National Security Agency (NSA). Coordination is effected between the Services and NSA to minimize duplication of effort and insure the interchange of technical data. Coordination is effected by reviews conducted by the Office of the Under Secretary for Defense Research and Engineering through the exchange of technical reports, attendance at scientific meetings and conferences, and joint participation on subgroups and working panels of the Technical Cooperation Program and by the Joint Tri-Service Electronic Warfare Panel. In addition, each Service's formal requirements documents are reviewed and commented upon by the other Services. Following Program Elements apply: 2.56.74.N Electronics Countermeasures Response, 6.42.55.N Electronic Support Measures Equipment, 6.37.97.N Surface Electro-Optic System, 6.47.10.F Reconnaissance Electronic Warfare Equipment, 6.37.43.F Electro-Optic Warfare, and 3.10.11.G, Cryptologic Activities.

G. WORK PERFORMED BY: Major contractors are: United Technology Laboratory, Dallas, TX; Bunker-Ramo, Westlake Village, CA; Cincinnati Electronics, Cincinnati, OH; Northrop Electronics, Rolling Meadows, IL. In-house development and contract monitoring is conducted by the Army's Electronic Warfare Laboratory, Fort Monmouth, NJ; and the US Army Signals Warfare Laboratory, Arlington Hall Station, Arlington, VA.

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments:

and development test type II conducted and a limited procurement contract awarded. Engineering Development

(QUICK LOOK II) was completed, Development Test (DT) II and Operational Test (OT) II was completed, the system was type classified and a limited procurement contract was awarded. QUICK LOOK I product improvement was type classified and deployed. Development

was initiated. Competitive design contracts for were awarded.

2. FY 1978 Program: Development of the will be completed and Development Test (DT) II and Operational Test (OT) II will be conducted and the system will be type classified. Specifications will be prepared

Contract award

3. FY 1979 Planned Program: Ongoing efforts will continue. Fabrication of will continue with procurement of Government furnished equipment for delivery to the prime contractor. Development will continue with the preparation for and conduct of software system demonstration and a determination made as to the modifications required on sensor subsystems to conduct the required interfaces. The decrease in funds from FY 78 to FY 79 is due to the transfer of Signal Intelligence related programs,

and also the transfer of jamming systems to Program Element 6.47.50.A, Tactical ECM Systems.

4. FY 1980 Planned Program: Fabrication will continue.

5. Program to Completion: This is a continuing program. Developments under this project will normally have been transferred from advanced development, Program Element 6.37.45.A, Tactical Electronic Warfare Equipment.

FY 1979 RITE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D909
Program Element: #6.47.45.A
DoD Mission Area: #445 - Electronic Warfare/Counter Command, Control and Communications (C^3)

Title: Tactical Electronic Surveillance System
Title: Tactical Electronic Warfare Systems
Budget Activity: #4 - Tactical Programs

A. DETAILED BACKGROUND AND DESCRIPTION: This program supports the Army's Tactical Exploitation of National Capabilities (TENCAP) program (Part B) engineering development (ED) work which is directed toward developing a tactical support system to collect, process, and disseminate electronic intelligence/information which locates and identifies enemy units, activity, and targets representing a general tactical threat. Data originating from a variety of and tactical electronic surveillance sensors must be transmitted to central collection points where the data can be processed and analyzed. The resulting tactical intelligence must then be rapidly disseminated and fuzed into the command and control environment in such a timely and useful form so as to materially influence the land battle. Techniques and equipment which provide for this rapid collection, transmission and manipulation of intelligence data are being developed under this PE.

B. RELATED ACTIVITIES: Technological developments designed to shorten the time required to collect and disseminate information are related to this development. These areas include automated search procedures, data link technologies, and tactical identification and posttioning. The use of satellite communications is being considered. The initial efforts to provide the technical basis for the equipment and techniques are addressed under PE 6.37.45.A, D907, Tactical Electronic Surveillance Systems. This work is coordinated with the appropriate offices at the level.

C. WORK PERFORMED BY: Aerospace Corporation, El Segundo, CA; Electromagnetic Systems Laboratories, Sunnyvale, CA; US Army Electronics Research and Development Command (ERADCOM), Adelphi, MD; US Army Communications Research and Development Command, Fort Monmouth, NJ.

D. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: Not applicable.

2. FY 1978 Program: Not applicable.

Project: #D909
Program Element: #6.47.45.A
DoD Mission Area: #445 - Electronic Warfare/Counter Command, Control and Communications (C^3)

Title: Tactical Electronic Surveillance System
Title: Tactical Electronic Warfare Equipment
Budget Activity: #4 - Tactical Programs

3. FY 1979 Planned Program: Initiate engineering development (ED) of systems to interface with two collection programs previously addressed in advanced development (AD) under program element 6.37.45.B, D907, Tactical Electronic Surveillance Systems. All necessary experimental work for interfaces with the two collection systems will have been performed and the proposed system will be ready for full scale development.

4. FY 1980 Planned Program: Continue ED initiated in FY 1979. Increase in funds reflects procurement of prototypes for evaluation and for producibility engineering work.

5. Program to Completion: This is a continuing program.

6. Major Milestones: Not applicable.

7. Resources ($ in thousands):

	FY 1977	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Cost
RDTE: Funds	0	0			Continuing	Not Applicable
Quantities						Not Applicable

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D92v

Title: Tactical Electronic Warfare and Intelligence Command and Control Systems

Program Element: #6.47.45.A

Title: Tactical Electronic Warfare Systems

DoD Mission Area: #445 - Electronic Warfare Counter Command, Control and Communications (C^3)

Budget Activity: #4 - Tactical Programs

A. DETAILED BACKGROUND AND DESCRIPTION: The objective of this project is to provide for full scale development of tactical electronic warfare and intelligence command and control systems for use by Division, Corps and echelons above Corps commanders. Army commanders, at all echelons, depend upon tactical intelligence, combat information and effective electronic countermeasures to win the land battle. The enemy may be expected to have weapons generally as effective as our own, and it may be anticipated that he will have them in greater numbers, at least in the opening stages of conflict. Detection and positive identification of the enemy's main thrust must be made early, while its leading elements are still in the covering force area, so that it can be met with massed armor and anti-tank weapons. The need for processing of the intelligence from electronic sensors and the control of electronic countermeasures systems in as near real time as possible is essential. The tasks within this project provide for command and control of Army tactical signals intelligence and electronic warfare systems, a joint Army/Air Force program to develop and demonstrate the utility of automated correlation and display of sensor derived information to support near real time target nomination and battle management, and a program to develop an automated interface between the intelligence and countermeasures control systems and the supported commander at Corps. This project contains only Intelligence-Related activities (IRA); in FY 1979, all Non-IRA items were transferred to Program Element 6.47.50 Tactical ECM Systems, and all Signal Intelligence items were transferred to National Security Agency (NSA).

B. RELATED ACTIVITIES: Related electronic warfare developments are conducted by the Air Force, Navy and NSA. Coordination is effected between the Services to minimize duplication of effort and insure the interchange of technical data. Coordination is effected by reviews conducted by the Office of the Under Secretary of Defense for Research and Engineering through the exchange of RDTE resume cards and technical reports, attendance at scientific meetings and conferences, and joint participation on subgroups and working panels of The Technical Cooperation Program and by the Joint Tri-Service Electronic Warfare Panel. In addition, each Service's formal requirements documents are reviewed and commented upon by the other Services. Following Program Elements apply: 2.56.74.N Electronic Countermeasures Response, 6.42.55.N Electronic Support Measures Equipment, 6.37.97.N Surface Electro Optic System, 6.47.10.F Reconnaissance Electronic Warfare Equipment, 6.37.43.F Electro-Optic Warfare, and 3.10.11.G, Cryptologic Activities.

Project: #D926 Title: Tactical Electronic Warfare and Intelligence Command and Control Systems

Program Element: #6.47.45.A Title: Tactical Electronic Warfare Systems

DoD Mission Area: #445 - Electronic Warfare Counter Command, Control and Communications (C^3) Budget Activity: #4 - Tactical Programs

C. WORK PERFORMED BY: Major contractors are: GTE Sylvania, Mountain View, CA; TRW Inc., Redondo Beach, CA; RCA Corporation, Burlington, MA. In-house development and contract monitoring is conducted by the Army's Electronic Warfare Laboratory, Fort Monmouth, NJ; and the US Army Signal's Warfare Laboratory, Arlington Hall Station, Arlington, VA.

D. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: Engineering development of [was completed. Development Test (DT) II and Operational Test (OT) II was completed. The system was type classified limited procurement and a limited procurement contract awarded. QUICK LOOK I product improvement was type classified and deployed. Development of [was initiated. Competitive design contracts for were awarded.

2. FY 1978 Program: The tactical electronic support measures systems, [have been transferred to National Security Agency (NSA) The MULTEWS electronic countermeasures system has been transferred to Program Element 6.47.50.A, Project DL12 Division Tactical Electronic Countermeasures Systems, to

3. FY 1979 Planned Program: Fabrication of the [will continue with procurement of Government furnished equipment for delivery to the prime contractor. Development of [will continue with the preparation for and conduct of software system demonstration and a determination made as to the modifications required on sensor subsystems to conduct the required interfaces.

4. FY 1980 Planned Program: Fabrication of the will be completed. Development [will continue with delivery of the system for research and development acceptance test and joint Air Force/Army field tests in Europe.

5. Program to Completion: This is a continuing program. Developments under this project will normally have been transferred from advanced development, Program Element 6.37.45.A, Tactical Electronic Warfare Equipment.

Project: #D926

Title: Tactical Electronic Warfare and Intelligence Command and Control Systems

Program Element: #6.47.45.A

Title: Tactical Electronic Warfare Systems

DoD Mission Area: #445 - Electronic Warfare Counter Command, Control and Communications (C^3)

Budget Activity: #4 - Tactical Programs

6. Major Milestones:

	Date

7. Resources ($ in thousands)

	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
RDTE,A					Continuing	Not Applicable
Quantities						Not Applicable

[OSD 4-11]

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.48.A
DoD Mission Area: #411 - Battlefield Surveillance

Title: Stand-Off Target Acquisition System (SOTAS)
Budget Activity: #4 - Tactical Program

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	8913	12925	36883	27101	35328	128232
	Quantities						7
DI71	Stand-Off Target Acquisition System	8913	12925	36883	27101	35328	128232

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: SOTAS is an Army program to develop an airborne target acquisition system which will provide a new capability to locate moving targets at extended ranges in hostile territory during day or night, under most weather conditions. The information will be displayed in real time at ground stations (Master Ground Station at Division Headquarters and Remote Ground Stations at the Brigades and the Division Artillery) to permit the most timely and efficient attack of these targets. Prior to fabrication of engineering development hardware, the program has used existing equipment to successfully field test the concept. Meanwhile, concurrent study efforts are underway to review and define other pertinent aspects of the program. Extensive field testing of the existing hardware insures that requirements are well defined.

C. BASIS FOR FY 1979 RDTE REQUEST: In FY 1979 the SOTAS prime contractor, selected during the FY 1978 competitive engineering development (ED) solicitation, will initiate the hardware fabrication phase of the SOTAS ED contract. Significant activities will include fabrication of the airborne radar, initiation of UH-60A helicopter modifications (which include installation of both the radar and the data link), and fabrication of a common SOTAS/remotely piloted vehicle (RPV) data link. This latter effort will provide the Army with a common (logistic, maintenance, training) data link for the two programs. Significant efforts will be placed on developing an integrated and coordinated test plan for the Contractor Test/Development Test (DT)/Operational Test (OT) II phases of the program to insure that total testing (logistics, performance, maintainability) is efficient. Emphasis will also be placed on development and integration of suitable training capabilities during the DT II/OT II test phase.

Program Element: #6.47.48.A
DoD Mission Area: #411 - Battlefield Surveillance

Title: Stand-Off Target Acquisition System (SOTAS)
Budget Activity: #4 - Tactical Program

Major Milestones	Date
Army Systems Acquisition Review Council (ASARC) II	2QFY78
Defense Systems Acquisition Review Council (DSARC) II	3QFY78
Initiate Engineering Development (ED)	3QFY78
Development Test (DT) II	3QFY80
Operational Test (OT) II	2QFY81
ASARC III/DSARC III	4QFY81
Begin Production	1QFY82
Initial Operational Capability (IOC)	

D. OTHER APPROPRIATION FUNDS: ($ in thousands)

Other Procurement, Army	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
Funds	0	0	0	0	58500	58500
Quantities					5	5

E. DETAILED BACKGROUND AND DESCRIPTION:

The Stand-Off Target Acquisition System (SOTAS) is an airborne target acquisition system concept comprised of an airborne moving target indicator (MTI) radar, integrated with a position location system, data link, and ground data processing/data display van. This system has demonstrated the capability to detect and accurately locate moving targets at ranges well beyond ground line-of-sight and independent of day/night/weather conditions. A significant feature of the concept, which has been verified, is its ability to store ground referenced radar imagery and to display that data at high data rates (time-compression) to enhance the probability of target detection and to minimize the probability of false targets. SOTAS will provide the basis for the tactically effective engagement of targets located beyond the ground line-of-sight by both Army and Air Force organic weapons systems because of its real time detection and location capability, and will insure maximum interchange and utilization of applicable technology between the two Services.

F. RELATED ACTIVITIES: Initial development efforts of SOTAS were funded in Program Element (PE)/Project 6.37.19.A, DK72, Radars. These development efforts were transferred to PE/Project 6.37.36.A, Stand-Off Target Acquisition Systems, DI71 in FY 1976 to separate funding of the Stand-Off Target Acquisition System from other radars found in the previous PE. A joint Army/Air Force test was accomplished during FY 1975 and FY 1976 with the Air Force effort being conducted in PE 6.37.47.F, Low Visibility

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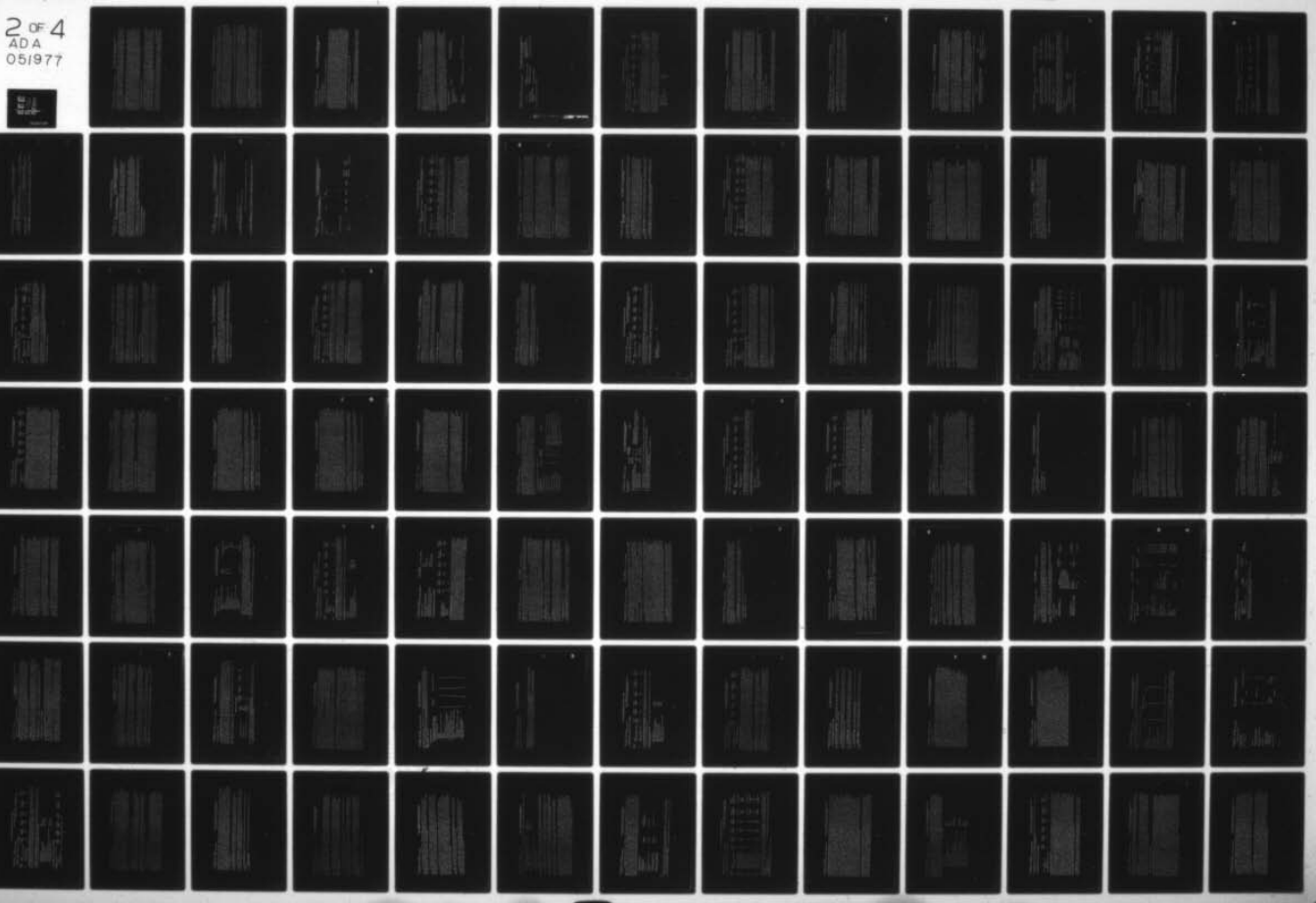

Program Element: #6.47.48.A
DoD Mission Area: #411 - Battlefield Surveillance

Title: Stand-Off Target Acquisition System (SOTAS)
Budget Activity: #4 - Tactical Programs

Stand-Off Target Acquisition/Strike. The joint program was initiated in FY 1975 with the Air Force applying $1.9 million to the development effort from PE 6.47.42.F, Position Location Strike System. It is estimated that the Joint nature of this resulted in a Department of Defense savings of approximately $3.0 million through FY 1976. Advanced development (AD) will be essentially completed by FY 1978 and the program will transition to engineering development (ED) in PE 6.47.48.A, Stand-Off Target Acquisition System. There is no duplication of effort for a SOTAS-like moving target indicator capability within the Army or in the Department of Defense.

G. WORK PERFORMED BY: A Project Manager has been designated by the U.S. Army to intensively manage the SOTAS program. The in-house developing organization for this program is the U.S. Army Electronics Research and Development Command at Ft. Monmouth, NJ, and Adelphi, MD. Additional supporting organizations are the US Army Communication Research and Development Command, Ft. Monmouth, NJ, the Communication and Electronics Readiness Command, Ft. Monmouth, NJ, and the Office of the Project Manager, BLACK HAWK, St. Louis, MO. The prime contractor will have been determined in 3Q/4QFY78. Expected bidders include General Dynamics/Electronics Corporation, San Diego, CA., and International Business Machine Corp., Owego, NY. Prime contractor funding requirements in FY 1979 are anticipated to be approximately $26 million. Bid interest in the Data Link competitive solicitation has been shown by Motorola, Scottsdale, AZ; Harris Corp., Melbourne, FL; Hughes Aircraft, Culver City, CA; and Cubic Corp., San Diego, CA. Current contractors include: General Dynamics/Electronic Corporation, San Diego, CA; Systems Planning Corporation, Arlington, VA; Technology Services Corporation of Santa Monica, CA; Honeywell Systems and Research Center, Minneapolis, MN; and Sikorsky Aircraft Corp., Stratford, CT. Total funds required for these contractors are $9.0 million.

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: FY 1974 and prior accomplishments consisted of establishing the technical feasibility of subsystem elements of the Stand-Off Target Acquisition System (SOTAS). In FY 1975 the fabrication of the initial SOTAS system was initiated and successfully completed. The SOTAS was then tested in an instrumented tactical environment at the US Army Combat Development Experimentation Center (CDEC), Fort Ord, California. This test provided technical data that verified the capability of the SOTAS to detect, locate and conceptually engage enemy targets at ranges well beyond the Forward Edge of the Battle Area (FEBA). In FY 1976, the SOTAS was integrated with the Distance Measuring Equipment (DME) subsystem of the US Air Force Advanced Location Strike System (ALSS) and provided Moving Target Indicator (MTI) data on the location of a ground moving target in real time to a US Air Force modular guided glide bomb.

System studies, man/machine simulations and analyses were conducted. A successful demonstration of the SOTAS in Korea was accomplished in FY 1976. In FY 1977, an AD model SOTAS was tested in REFORGER '76, a US Army Europe field exercise. Assessment by a using unit (1st Armored Division) was that SOTAS filled a critical surveillance and target acquisition void by providing reliable, responsive and accurate data on targets not available from any other sensor system. An advanced radar system design was completed in FY 1977.

Additionally, modifications to improve the timely distribution of SOTAS data within the Division Headquarters were fabricated to support a field test of the SOTAS hardware with the 3d Infantry Division during REFORGER '77. Results of the REFORGER '77 test included real time control of a US Air Force F-111F aircraft in a cooperative beacon bombing mode; artillery engagement of SOTAS detected and located targets; and significant target development when used in a surveillance mode of operation.

2. FY 1978 Program: The SOTAS Engineering Development Program will be initiated on a competitive solicitation basis during 2QFY78 with contract award scheduled for 3QFY78. Competitive solicitation for a single contractor for a common data link to meet the requirements of both the SOTAS and remotely piloted vehicle (RPV) programs will be initiated in 2QFY78. A contract to modify the existing advanced development hardware and build a second system (two modified helicopters and one ground processing station) will be awarded to General Dynamics/Electronics, San Diego, CA. This system will be utilized in Europe to refine tactical doctrine and organizational and operational issues. Data from the on-going test program will be utilized to ensure that the hardware/software/cost tradeoffs required in any development program are based on sound tactical considerations.

Significant system analyses and cost benefit tradeoff studies will be accomplished to ensure that the engineering development (ED) hardware design is efficient and cost effective.

3. FY 1979 Planned Program: The Army will continue the ED program initiated in FY 1978. The prime contractor for the SOTAS System will be engaged in fabricating hardware subsystems such as the ground station, remote station, airborne radar and the associated software. The joint SOTAS/RPV data link contractor will be engaged in the fabrication of data link hardware which will be provided to the prime contractor as Government furnished equipment (GFE). The increased funding requirement in FY 1979 is due to the heavy emphasis, during the second year ED effort, on procurement and building of hardware components and subsystems which resulted from the prime contractor's total sytem design and planning effort initiated in FY 1978. Additional contractual effort will be directed toward the identification of training and maintenance tasks required to support the SOTAS system during Development Test (DT) II/Operational Test (OT) II scheduled to begin in FY 1980.

4. FY 1980 Planned Program: In FY 1980 the SOTAS prime contractor and the SOTAS/RPV data link contractor will provide the basic hardware elements for the initiation of hardware integration and system test of the total SOTAS system. Emphasis will be placed on the integration of the SOTAS radar and data link, with the UH-60A BLACK HAWK helicopter to ensure that the airborne element of the SOTAS meets flight safety, operational, and technical integration requirements. A parallel effort will be concerned with the integration of computer hardware and software for the master and remote ground stations. Following successful hardware integration efforts, the total SOTAS system will undergo extensive contractor system testing prior to the initiation of the formal DT II during 4QFY80.

5. Program to Completion: In 2QFY81, the system will undergo OT II. Upon successful completion of DT II/OT II, it is anticipated that the Army Systems Acquisition Review Council/Defense Systems Acquisition Review Council III decision will be to enter production in FY 1982.

Program Element: #6.47.48.A
DoD Mission Area: #411 - Battlefield Surveillance

Title: Stand-Off Target Acquisition System (SOTAS)
Budget Activity: #4 - Tactical Program

I. Test and Evaluation Data:

1. Development Test and Evaluation:

a. The Advanced Development contractor for SOTAS is General Dynamics.

b. Development Test I (DT I) for SOTAS was accomplished on the prototype system in four phases. The first phase, conducted during 4th quarter, FY 1975 consisted of tests at the Combat Development Experimental Command (CDEC), located at Fort Hunter-Liggett, California. Results of tests provided a data base for the Air Force Multilateration Radar Surveillance Strike System Program. Measurements of SOTAS accuracy as a function of range and other parameters, and performance data on SOTAS in a so-called "mini-war" depicted SOTAS capability to operate in a simulated tactical environment. The second phase of development test I was conducted in a joint exercise with the Air Force at White Sands, NM, during the second quarter of FY 1976. In this test the SOTAS functioned as a target locator and interfaced with the Air Force's Advanced Location Strike System (ALSS), which directed an inert guided glide bomb (GBU 15) to a designated target. The third phase of DT I involved a test in Korea during the 4th quarter, FY 1976. In Korea, SOTAS demonstrated the capability to provide real time information, with the number of detected targets exceeding that detected by any other sensor available within the Korean area of operations. The fourth and final phase of DT I was accomplished during FY 197T when the SOTAS was operated in a tactical environment with the 1st Armored Division during REFORGER '76 in Europe. The results of that test clearly established the capability of the SOTAS to detect and locate tactical moving ground targets, in real time, in a European environment. An independent evaluation of the adequacy of developmental testing was conducted by the US Army Materiel Command Systems Analysis Agency (AMSAA) that concluded, after reviewing the data from the various test phases, that the test requirements for a DT I test had been met.

c. Development Test (DT) II is scheduled to start in 4th quarter, FY 1980.

2. Operational Test and Evaluation:

a. Experimentation and testing was conducted on the prototype system in two phases. The first phase was conducted in Korea in March 1976 during which SOTAS demonstrated the capability to perform satisfactorily in a tactical environment. The second and major phase was conducted during the major US Army, Europe, field exercise, REFORGER '76, (August - October 1976).

During the test, SOTAS was operated by cadre selected from Army Training Schools. Contractor personnel were present only to provide system maintenance. Duration of the field training exercise (FTX) was 14 days. During this period SOTAS performed as an organic element of the 1st Armored Division. It successfully provided (during both day and night) real time data on the movement and location of enemy forces. Comments of the 1st Armored Division in the field training exercise (FTX) were very supportive of the SOTAS concept. Data was collected, independently on the materiel developer, by the US Army Training and Doctrine Command (TRADOC) data collection team led by representatives of the Combat Development Experimentation Command (CDEC), Fort Ord, California, on system performance, mobility, and reliability. An independent evaluation of all field data by the TRADOC Systems Analysis Agency (TRASANA) stated that OT I requirements had been met. Based upon an independent assessment of test results, the Operational Test and Evaluation Agency (OTEA) concluded that a waiver of OT I could be approved, and OT I was subsequently waived.

b. Operational Test (OT) II is scheduled to be conducted early in the 2d quarter, FY 1981. The hardware configuration to be tested at that time will consist of engineering models of the airborne radar integrated in a UH-60A helicopter, and engineering models of the Master and Remote Ground Display Systems. It is anticipated that four Engineering Development models, each consisting of two airborne units, one data link, and one Master and one Remote display station, will be available for test. Following the OT II tests, these models will be deployed overseas for use by an operational unit prior to availability of production items. This deployment will provide a factual basis for any modifications that may be required in production, while simultaneously providing an interim capability to the field.

3. Systems Characteristics:

	Objectives	Demonstrated Performance (Feasibility Model DT I/GT I)
Range (0.9 probability of detecting moving tank sized target		
Accuracy		
Endurance	2-4 hours, IFR	1 hour, VFR only
Target Types	Tanks, Trucks, Helicopter Walking Man	Tanks, Trucks, Helicopter Walking Man
Target Velocity		

Program Element: #6.47.48.A
DoD Mission Area: #411 - Battlefield Surveillance

Title: Stand-Off Target Acquisition System (SOTAS)
Budget Activity: #4 - Tactical Program

	Objectives	Demonstrated Performance (Feasibility Model DT I/OT I)
Type of Scan	X-band coherent mechanical and/or electronic	Mechanical Scan
Rain Performance	Essentially rain independent	Quantified field test not conducted
Electronic Counter-Countermeasure (ECCM) Capability	ACSI threat responsive 1/	

1/ ACSI - Assistant Chief of Staff, Intelligence.

FY 1979 CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.49.A
Title: Tactical Operations System (TOS)
DoD Mission Area: #444 - Tactical Combat Integration
Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	0	0	36772	51482	18580	106834
	Quantities						
D197	Tactical Operations System	0	0	36772	51482	18580	106834

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: TOS is a computer-assisted command and control system which will increase significantly the capability of ground combat commanders and their staffs to manage the employment of Army combat power. Highly sophisticated automated intelligence and combat systems are being fielded to obtain information needed by Corps and Division Commanders and Staffs to "see" the battlefield more clearly to greater depth. The volume of required information generated by these systems is beyond the capability of the current manual system. TOS will provide the required automated assistance to collect, process, store, display, retrieve and disseminate this volume of data quickly to provide commanders accurate, up-to-date information on status, deployment and capabilities of friendly and enemy forces which is critically needed in combat.

C. BASIS FOR FY 1979 RDTE REQUEST: A special Army Systems Acquisition Review Council (ASARC) convened to review preliminary results from initial field test, Operational Test (OT) I, and provide guidance to the program. Costs, effectiveness, and issue plan data are being finalized for presentation to an ASARC in December 1977 and the Defense System Acquisition Review Council (DSARC) in January 1978. This request adds new peripheral equipment to the TOS Operable Segment (TOS^2) test bed to replace equipment determined inadequate in initial field test. New contractual arrangements for hardware integration, maintenance and support services and continued contractual efforts for software development will be needed.

Major Milestones	Date
DSARC II	Jan 78
Procure TOS Contract Award	Oct 78
Field Test (DT/OT II) Begin	Mar 80
Field Test Completed	Sep 80
DSARC III	Feb 81

Program Element: #6.47.49.A
DoD Mission Area: #444 - Tactical Combat Integration

Title: Tactical Operations System (TOS)
Budget Activity: #4 - Tactical Programs

D. OTHER APPROPRIATION FUNDS: Not applicable.

E. DETAILED BACKGROUND AND DESCRIPTION: TOS will constitute an on-line, near real time, automatic data processing (ADP) system which will provide an improved capability to receive, process, store, retrieve, display and disseminate selected information required by commanders and their staffs for decision making. Specific objectives are to provide a system to improve command and control capabilities, reduce reaction time, integrate fire support and maneuver, improve operational and decision-making capabilities, provide enhanced capability for use of operations and intelligence data, and improve the speed and accuracy of plans and estimates. Initial efforts in the TOS program have been devoted to automating a slice of a division command and control system using the TOS Operable Segment (TOS^2) austere test bed.

F. RELATED ACTIVITIES: The TOS Operable Segment (TOS^2) was made up of equipment common to the Tactical Fire Direction System (TACFIRE) Program, Program Element (PE) 2.37.26.A, D322. Division TOS will interface with other systems as TACFIRE and Corps TOS which will be developed in Project D494, PE 6.37.22, Tactical Operations System (TOS); Equipment and Developments from the Integration of Army Tactical Data Systems Program, PE 6.37.23; and Command and Control, PE 6.47.27, will be used in engineering development (ED) for TOS. Project D654, PE 6.37.03.A, Automatic Data Processing Development also has application to the TOS Program. Advanced development for TOS at Division level was conducted in Project D494, PE 6.37.22.A, Tactical Operations System (TOS). Development for TOS at higher levels, particularly Corps, will follow and evolve out of the Division level development. Continued liaison is conducted at laboratory level and by the Project Manager with developers of automated systems in other Services to preclude unnecessary duplication of effort. In addition, there are numerous tri-Service working groups which ensure a continuous dialogue between systems developers.

G. WORK PERFORMED BY: Overall coordination is provided by the Project Manager for Army Tactical Data Systems (PM ARTADS) US Army Communications Research and Development Command (CORADCOM), located at Fort Monmouth, NJ. Contractual efforts are being performed by Litton Industries, Incorporated, Van Nuys, CA; Auerbach Associates, Incorporated, Philadelphia, PA; Systems Development Corporation, McLean, VA; and Singer Company, Librascope Division, Glendale, CA.

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: Not applicable.

2. FY 1978 Program: Not applicable.

3. FY 1979 Planned Program: Continue ED of the ED prototype begun in FY 1978 under PE 6.37.22.A, Tactical Operations System (TOS). This includes contractual hardware integration, hardware maintenance and support services, overhaul/repair support and software development. The increase in FY 1979 over FY 1978 is necessary to fund the level of effort required to complete the

prototype development and to prepare for Development Test/Operational Test (DT/OT) II. Plans are to field one prototype at Fort Hood, TX, in 1979, to test during 1980.

4. FY 1980 Planned Program: Continue engineering development (ED) to include purchase of an additional prototype. Conduct DT/OT II and prepare test report, cost data, and cost and operational effectiveness analysis for Defense Systems Acquisition Review Council (DSARC) III. The program continues software development, maintenance support, and system integration.

5. Program to Completion: The TOS development program is being conducted in three phases as outlined in the approved Decision Coordinating Paper (DCP). Phase I continues through DSARC II, FY 1978, involving development, test, and validation of the TOS concept in an operational environment. Phase II consists of ED through FY 1981 of a division TOS prototype based upon a DSARC II decision. Phase III is the fielding of the division level TOS to be initiated after DSARC III.

Program Element: #6.47.49.A
DoD Mission Area: #444 - Tactical Combat Integration

Title: Tactical Operations Systems (TOS)
Budget Activity: #4 - Tactical Programs

I. Test and Evaluation Data:

1. Development Test and Evaluation: The development contractors for the Tactical Operations System Operable Segment (TOS^2) are Litton Data Systems of Van Nuys, CA (hardware), and Auerbach Associates of Philadelphia, PA (software). The TOS concept has been evaluated and validated using the TOS^2 test bed composed of militarized hardware developed for the Tactical Fire Direction System (TACFIRE). The TOS^2 equipment was configured to permit testing of the preferred automatic data processing (ADP) alternative configuration during Field Test FM222. (FM222 was a combined Force Development Test and Experimentation/Development Test I/ Operational Test I). A component of the test bed, the Message Input Output Devices (MIOD) was found to be of limited utility during FM222 and will be replaced by the Tactical Computer System (TCS) and the Tactical Computer Terminal (TCT). The TCT is the input output device of the TCS. These items are manufactured by the Singer Company, Librascope, Glendale, CA.

a. The initial field test, FM120, was conducted during March-April 1976. It was suspended due to problems encountered with the TOS^2 software functional capability, i.e., reliability, throughput, recovery process, and human interface. Although several attempts were made to fix the software, a satisfactory system could not be achieved and FM120 had to be suspended. While the test objectives were not achieved, valuable data were derived for use in the cost of operational effectiveness analysis performance models and evaluation of the ADP configuration alternatives for subsequent testing. Following test FM120, the TOS^2 software package was thoroughly assessed and corrections/improvements were incorporated. The software package was tested by the contractor using the facilities of the software support center and at Ft. Hood, TX, using the TOS^2 test bed hardware. Final Qualification Testing (FQT) for the software was conducted by the Government during the period September-November 1976. FQT indicated the software would be ready for test FM222.

b. FM222 was conducted at Ft. Hood, TX, during April-July 1977. The test was conducted by the US Army Training and Doctrine Command's Combined Arms Test Activity (TACATA) using III Corps troop units. This test had a full Division Main Command Post, a Division Tactical Command Post, a Brigade Headquarters, and a Battalion Headquarters in the field in a tactical situation depicting European scenarios. Adjacent units, Corps Headquarters, and other units were played by controllers. The test scenario included reserve, movement to contact, active defense, and retrograde operations. A manual Command Post Exercise (CPX) was conducted for a baseline, followed by Automated Data Processing (ADP) training and the CPX using TOS^2.

c. The objectives of the test FM 222, with preliminary results are shown below. The Development Test Evaluation and the Operational Test Evaluation are ongoing.

OBJECTIVES	RESULTS
1. To obtain data that allows assessment of the capability of TOS^2 to support the Commander and staff in planning and operations to accomplish the mission.	- Qualified support to division staff established. - Brigade and battalion assistance requires further examination.

Program Element: #6.47.49.A
DoD Mission Area: #444 - Tactical Combat Integration

Title: Tactical Operations Systems (TOS)
Budget Activity: #4 - Tactical Programs

OBJECTIVES	RESULTS
2. To obtain data that permits identification of hardware and software requirements and refinements of TOS Operable Segment (TOS^2) which would permit it to become division TOS.	- Hardware preference identified - Software refinements identified.
3. To obtain data that allows assessment of the capability of tactical communications means to support TOS^2.	- TOS^2 supportable by VHF and nonsecure FM. - FM secure to be further examined.
4. To obtain data that permits assessment of the training requirements necessary for the division to employ TOS^2.	- Sufficient data generated for use in the preliminary training plan.
5. Demonstrate TOS and Tactical Fire Direction System (TACFIRE) interoperability.	- Successfully demonstrated.

2. Operational Test and Evaluation: US Army Operational Test and Evaluation Agency (OTEA) had management responsibility for FM222 testing and evaluation of TOS using the TOS^2. The final independent operational test evaluation will be available for Army System Acquisition Review Council/Defense System Acquisition Review Council (ASARC/DSARC) II in December 1977/January 1978. The observations from this evaluation are shown in paragraph 1 above. Development Test II and Operational Test II are scheduled for the FY 1980 time frame. Plans for this test are being developed based on the results of test FM222.

3. System Characteristics:

Operational	Objectives 1/	Demonstrated Performance 2/
Total System Reliability	.950	
Computer Center Reliability	.923	
Displacement/Set Up Time	20 min	

1/ Based on the TOS Material Need (MN), Nov 1972.
2/ To be demonstrated during later development and operational testing.

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.50.A
DoD Mission Area: #445 - Electronic Warfare/Counter Command, Control, and Communications (C^3)

Title: Tactical Electronic Countermeasures Systems
Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Cost.
	TOTAL FOR PROGRAM ELEMENT					Continuing	Not Applicable
	Quantities						
DL12	Division Tactical Electronic Countermeasures Systems					Continuing	Not Applicable
DL13	Corps Tactical Electronic Countermeasures Systems					Continuing	Not Applicable
D540	Protective Electronic Warfare Systems					Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program encompasses the development of electronic countermeasures equipment and systems for both ground vehicles mounted, and airborne. These electronic countermeasures (ECM) systems and equipment are for use by division, corps, and higher commanders. The capability to employ effective ECM is critical for success in the land battle. The enemy may be expected to have weapons generally as effective as our own, and it may be anticipated that he will have them in greater numbers, at least in the early stages of conflict. Accordingly, a capability to degrade or deny hostile forces the effective use of their communications, countermortar/counterbattery and surveillance radars and infrared/optical battlefield surveillance systems could be a decisive element of the battle. The systems under this program provide the Army with this capability and can act as force multipliers to offset hostile numerical and firepower superiority. Existing Army ECM systems must be replaced.

C. BASIS FOR FY 1979 RDTE REQUEST: Continue development of the

Initiate development of applications software to allow

intermediate maintenance to be performed at common automatic test systems facilities. Initiate development of the

D. OTHER APPROPRIATION FUNDS: ($ in thousands)

	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Cost
Aircraft Procurement, Army						
Funds						
Quantity						

E. DETAILED BACKGROUND AND DESCRIPTION: The objective of this program is to develop electronic countermeasures (ECM) equipment and systems to deny or degrade the enemy's use of his electromagnetic devices. Equipment developed includes ground vehicular mounted and airborne ECM systems.

F. RELATED ACTIVITIES: Related electonic warfare developments are conducted by the Navy and Air Force. Navy developments are conducted in Program Elements 6.45.54.N, Surface Electronic Warfare; 2.45.75.N, Electronic Warfare Support; 6.45.73.N, Shipboard Electronic Warfare Improvements. Air Force developments are conducted in Program Elements 6.47.38.F, Protective Systems; 6.47.39.F, Tactical Protective Systems; and 6.47.10.F, Reconnaissance Electronic Warfare Systems. Coordination is effected between the Services to minimize duplication of effort and insure the interchange of technical data. Coordination is effected by reviews conducted by the Office of the Under Secretary of Defense for Research and Engineering, through the exchange of technical reports, attendance at scientific meetings and conferences, and joint participation on subgroups and working panels of the Technical Cooperation Program and by the Joint Tri-Service Electronic Warfare Panel. In addition, each Service's formal requirements documents are reviewed and commented upon by the other Services.

Program Element: #6.47.50.A
DoD Mission Area: #445 - Electronic Warfare/Counter Command, Control, and Communications (C^3)

Title: Tactical Electronic Countermeasures Systems
Budget Activity: #4 - Tactical Programs

G. WORK PERFORMED BY: Major contractors are: United Technology Laboratory, Dallas, TX; Bunker-Ramo, Westlake Village, CA; Cincinnati Electronics, Cincinnati, OH; Northrop Electronics, Rolling Meadows, IL. In-house development and contract monitoring is conducted by the Army's Electronic Warfare Laboratory, Fort Monmouth, NJ; and the US Army Signal's Warfare Laboratory, Arlington Hall Station, Arlington, VA.

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments:

2. FY 1978 Program: Development Test (DT) II and Operational Test (OT) II on the will be conducted and the system will be type classified. Contracts will be awarded

All necessary experimental work has been performed and the proposed system is ready for full scale development. These efforts are being performed under program element 6.47.45.A, Tactical EW System, during FY 1978.

3. FY 1979 Planned Program: Initial procurement will be accomplished. development of applications software to allow for intermediate maintenance to be performed at common automatic test system facilities will be initiated. Development will be initiated.

All necessary experimental work will have been performed and the proposed system will be ready for full scale development. Development will continue. The increase in funds results from splitting this Program Element, containing only Electronic Countermeasures Systems (ECM), away from PE 6.47.45.A, Tactical Electronic Warfare Systems, which contained both ECM Systems and Electronic Warfare support measures (ESM) systems. This realignment was accomplished in order to present in a more concise manner those funds associated with Intelligence Related Activities (IRA). No IRA Systems are in this Program Element.

Program Element #6.47.50.A Title: Tactical Electronic Countermeasures Systems
DoD Mission Area: #445 - Electronic Warfare/Counter Command, Control, and Communications (C^3) Budget Activity: #4 - Tactical Programs

4. FY 1980 Planned Program: Development will continue. The contractor will complete system engineering design and the majority of hardware component development will be accomplished. As a parallel effort, during the latter part of FY 1980, an analysis will be conducted

The results will be incorporated into the engineering development model in FY 1981.
Research and development acceptance tests will be conducted during the 2nd quarter (FY 1980) and developmental and operational testing (DT/OT II), will be accomplished in the 3rd and 4th quarter, FY 1980.

5. Program to Completion: This is a continuing program element. Developments under this program element will normally have been transferred from advanced development, Program Element 6.37.55.A, Tactical Electronic Countermeasures Systems.

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #DL12 — Title: Division Tactical Electronic Countermeasures Systems
Program Element: #6.47.50.A — Title: Tactical Electronic Countermeasures Systems
DoD Mission Area: #445 - Electronic Warfare/Counter Command, Control, and Communications, C^3 — Budget Activity: #4 - Tactical Programs

A. DETAILED BACKGROUND AND DESCRIPTION: The objective of this project is to develop electronic countermeasures (ECM) equipment to deny or degrade the enemy's use of his electromagnetic devices. This program includes the development of ECM equipment for operation in the Army Division area to deny and/or degrade enemy communications, counter-mortar/counter-battery radar, infrared and optical battlefield surveillance devices. Equipment development includes ground vehicular and airborne mounted systems.

B. RELATED ACTIVITIES: Related electronic warfare developments are conducted by the Air Force and Navy. Coordination is effected between the Services to minimize duplication of effort and insure the interchange of technical data. Coordination is effected by reviews conducted by the Office of the Under Secretary of Defense for Research and Engineering, through the exchange of RDTE resume cards and technical reports, attendance at scientific meetings and conferences, and joint participation on subgroups and working panels of The Technical Cooperation Program and by the Joint Tri-Service Electronic Warfare Panel. In addition, each Service's formal requirements documents are reviewed and commented upon by the other Services.

C. WORK PERFORMED BY: Major contractors are: Northrop, Rolling Meadows, IL, and United Technology Laboratory, Greenville, TX. In-house development and contract monitoring is accomplished by the US Army Signals Warfare Laboratory, Arlington, VA, and the US Army Electronic Warfare Laboratory, Fort Monmouth, NJ.

D. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments:

Project: #DL12 Title: Division Tactical Electronic Countermeasures Systems
Program Element: #6.47.50.A Title: Tactical Electronic Countermeasures Systems
DoD Mission Area: #445 - Electronic Warfare Counter Command, Control and Communications C^3 Budget Activity: #4 - Tactical Programs

2. FY 1978 Program: Ongoing developments will continue. Development test (DT) II and operational test (OT) II will be conducted and the system will be type classified. A contract will be awarded,

All necessary experimental work has been performed and the proposed system is ready for full scale development.

3. FY 1979 Planned Program:

No IRA systems are developed in this Project.

4. FY 1980 Planned Program: Development will continue. The contractor will complete system engineering design

The results will be incorporated into engineering development models in FY 1981.

5. Program to Completion: This is a continuing program. Developments under this project will normally have been transferred from advanced development, program element 6.37.55.A, Tactical Electronic Countermeasures Systems.

Project: #DL12
Program Element: #6.47.50.A
DoD Mission Area: #445 - Electronic Warfare Counter Command, Control and Communications C^3

Title: Division Tactical Electronic Countermeasures Systems
Title: Tactical Electronic Countermeasures Systems
Budget Activity: #4 - Tactical Programs

6. Major Milestones:

	DATES
a.	
b.	
c.	

7. Resources ($ in thousands):

	FY 1977	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Cost
RDTE	0	0			Continuing	Not Applicable
Quantities						2

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.78.A
DoD Mission Area: #446 - Navigation, Positioning, and Support Systems

Title: NAVSTAR Global Positioning System (GPS) User Equipment
Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	0	5513	9509	7703	Continuing	Not Applicable
	Quantities						32
D168	NAVSTAR GPS	0	5513	9509	7703	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The NAVSTAR Global Positioning System will consist of 24 satellites, a Master Ground Station, and user equipment in vehicles, ships, airplanes, and manportables. The system will provide global, highly accurate information which will serve a broad spectrum of military navigation and positioning missions. This effort includes common modular units that can be easily integrated into weapons and ordnance delivery systems for NATO and US forces. This program addresses the Army's participation in the Joint Program Office (JPO) for the Phase II efforts, i.e., full scale development of the manpack.

C. BASIS FOR FY 1979 RDTE REQUEST: Funds are required to initiate contracts for full scale development of manpacks. A production decision and a full initial operational capability are scheduled for 1982 and 1985, respectively.

D. OTHER APPROPRIATION FUNDS: Not Applicable.

E. DETAILED BACKGROUND AND DESCRIPTION: Fundamental to the successful accomplishment of military functions is the ability to precisely position friendly forces relative to each other and with respect to enemy forces. Over the years, the Services have developed numerous positioning and navigation aids to satisfy specific requirements and to increase the effectiveness of their weapons systems. Technologies available at the time these systems were developed tended to limit their use to specific applications with only a minimum of integration possible. Further improvements in their military utility is constrained by accuracy limits, extent of geographic coverage, and dependence on foreign base rights. Extensive studies, analyses, and tests by all the Services have confirmed the feasibility of a single, highly precise, satellite based positioning system capable of satisfying a broad spectrum of positioning requirements. The objective of the system is to provide the precision required for accurate weapons delivery, in all weather conditions, day or night, anywhere. The NAVSTAR Global Positioning System will provide unprecedented accuracies of position and velocity in three dimensions, i.e., position within 10 meters and velocity within 0.03 meters per second. The 24 satellites will be in 17,600 kilometer orbits. This will greatly enhance military capabilities for navigation and position fixing.

Project: #6.47.78.A
DoD Mission Area: #446 - Navigation, Positioning, and Support Systems

Title: NAVSTAR Global Positioning System (GPS) User Equipment
Budget Activity: #4 - Tactical Programs

F. RELATED ACTIVITIES: This is a Joint Program with all Services participating. The Air Force is executive agency. Funding for Phase I of the Joint Program is derived from Program Elements 63403A, 63401N, and 63421F, NAVSTAR Global Positioning System (GPS). Phase II efforts were identified in FY 1978 RDTE Descriptive Summary in Program Elements 3.51.64A, 3.51.64N, 3.51.64F, NAVSTAR Global Positioning System (GPS) User Equipment, and 3.51.65F, NAVSTAR Global Positioning System (GPS) Space and Control Segment. Phase II User Equipment efforts are now in Program Elements 6.47.78.A, 6.47.78N, and 6.47.78.F. The Program Manager for the joint-Service program coordinates the supporting activities of the Army, Navy, Air Force, Marine Corps and the Defense Mapping Agency through his Service Deputies to provide cohesive and complementary development, test, and evaluation of the NAVSTAR Global Positioning System.

G. WORK PERFORMED BY: The contractor for the ground stations and user equipment is the General Dynamics-Electronics Corp., San Diego, California, with the Magnavox Research Laboratory, Torrance, California as the user equipment subcontractor. Texas Instruments, Inc., Dallas, Texas is developing user equipment for use in high dynamic aircraft applications and for manpack use. Collins Radio Corp., Cedar Rapids, Iowa is developing a receiver for maximum protection from enemy interference, under contract with the Air Force Avionics Laboratory. The satellite contractor is Rockwell International, Seal Beach, California with International Telephone and Telegraph, Nutely, New Jersey as the subcontractor for navigation subsystems. Additional contractors are: General Dynamics, Convair, San Diego, California - Atlas E/F Boosters; Fairchild Industries, Germantown, Maryland - Stage Vehicles; the Aerospace Corporation, El Segundo, California - Engineering Support; the Analytic Sciences Corporation, Reading, Massachusetts - System Simulations; Charles Stark Draper Laboratories, Cambridge, Massachusetts; Stanford Telecommunications, Inc., Palo Alto, California; and Aeronautical Radio, Inc., Annapolis, Maryland. In-house Army developing organizations are the Army Satellite Communications Agency, Fort Monmouth, New Jersey and the Army Satellite Communications Agency Group in the Joint Program Office, U.S. Air Force Space and Missile Systems Organization, El Segundo, California.

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: Studies were conducted to determine operational characteristics, performance parameters and equipment characteristics to meet Army requirements and applications. A cost-effectiveness evaluation of an integrated system using the NAVSTAR Global Positioing System was performed. A Material Need with supporting technical plan and cost analysis was prepared and approved for the manpack. The Joint Program Office awarded a contract on 23 Oct 74 to General Dynamics Corporation for study and fabrication of ground control systems and joint service airborne, vehicle and manportable user system equipments. The Army is to get 10 advanced development models of 3 different unique types of user equipments. Advanced development contracts were initiated for development of complementary manpack equipment in June 1975 for two models from Texas Instruments and in March 1976 for four models from Magnavox. Flight tests at the Yuma Inverted Range, ground control segment testings, and operations with this first Satellite checked out as planned with excellent results in 1977 and the Army's Texas Instrument and Magnavox Manpack successfully received the satellite signals. The radiated power from the satellite was about 80% better than expected. All of these efforts were funded under Phase I Program Elements.

Program Element: #6.47.78.A
DoD Mission Area: #446 - Navigation, Positioning, and Support Systems

Title: NAVSTAR Global Positioning System (GPS) User Equipment
Budget Activity: #4 - Tactical Programs

2. FY 1978 Program: Continue the on-going concept validation efforts in Program Element 6.34.03A, NAVSTAR Global Positioning System (GPS). Continue investigation of multipath and foliage effects on range measurement signal accuracy as related to specific environments at multiple geographic locations. Initiate pre-design contracts for user equipment.

3. FY 1979 Planned Program: Full scale development contracts will be initiated for manpacks as all necessary experimental work has been performed and the manpack is ready for full scale development. Efforts will be continued to: identify scope user equipment vulnerability in the Army environment; integrate user equipment with Artillery Survey systems; develop retrofit kits for wheel, track and existing aircraft and for new land, sea and airborne vehicles; develop maintenance and repair philosophy for implementation in existing Army logistical systems; and participate in Joint Service computer software refinement programs. FY 1979 funding needs are more than the funds required in FY 1978 because of Engineering Development Contract costs, and the Army's share of the cost on a Standard Electronic Module effort by the Joint Program Office. The manpack will provide the user with unprecedented accuracies of position and time, and widespread commonality and interoperability.

4. FY 1980 Planned Program: Contractor in-plant testing of user equipment will commence. Joint Service field test planning will be finalized. Less funding will be required as the Army completes the contracts as scheduled and initiates the necessary government tests.

5. Program to Completion: Present plans call for continued support of the NAVSTAR program and the installation of user equipment in selected airborne and surface vehicles. Global Positioning System equipment will also be made available to NATO and selected allied nations so that they may achieve similar objectives and benefits.

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.79.A

Title: Joint Interoperability of Tactical Command and Control Systems (JINTACCS)

DoD Mission Area: #444 - Tactical Combat Integration

Budget Activity: #4 - Tactical Program

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	0	4262	13520	18572	Continuing	Not Applicable
D310	JINTACCS (Executive)	0	2900	7200	12192	Continuing	Not Applicable
D298	JINTACCS (NATO)	0	0	2000	0	Continuing	Not Applicable
D309	JINTACCS (Army)	0	1362	4320	6380	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This is a new program element starting in FY 1979. This program provides for accomplishment of those unique tasks required of the Chief of Staff, US Army, to perform the mission of Executive Agent for the Joint Interoperability of Tactical Command and Control Systems (JINTACCS) Program. This program element includes funds for accomplishment of the Army's portion of the Joint JINTACCS Program. Funds prior to FY 1979 for accomplishment of the Executive Agent's mission, as outlined above, were included in PE 6.47.47.A, Joint Compatibility and Interoperability. An urgent requirement exists for the Services' automated tactical command and control systems to be compatible and to interoperate in joint military operations. The Tactical Air Control Systems/Tactical Air Defense Systems (TACS/TADS) Program was established to meet this requirement for operational systems. The JINTACCS Program, formerly the Ground and Amphibious Military Operations (GAMO) Program, was established to meet this requirement for future systems and to assume the TACS/TADS responsibilities when a full test capability is attained. These programs now provide the only means available to the Secretary of Defense to assure interoperability among Joint Service automated systems. JINTACCS will also provide a technical capability for addressing future NATO interoperability requirements.

C. BASIS FOR FY 1979 RDTE REQUEST: The primary objective is to complete the establishment of the new management structure and acquire a joint interface testing capability during FY 1979. This will require completing the establishment and operation of a Joint Interface Test Force along with the provision of a Joint test facility equipped with electronic equipment and technical engineering support necessary to allow joint testing to start in July 1979. Engineering efforts will continue in developing documentation such as Joint Test Proposals, Joint Test Plans, Joint Technical Interface Design Standards, and Joint Configuration Management Plans. In addition, tasks relating to NATO initiatives must be accomplished. Army planning will continue in phase with the joint effort. Army test units will be modified as required for participation in the joint test program. Emulation techniques will be utilized to assist in software evaluation.

Program Element: #6.47.79.A

Title: Joint Interoperability of Tactical Command and Control Systems (JINTACCS)

DoD Mission Area: #444 - Tactical Combat Integration

Budget Activity: #4 - Tactical Program

D. OTHER APPROPRIATION FUNDS: Not Applicable.

E. DETAILED BACKGROUND AND DESCRIPTION: The Joint Ground and Amphibious Military Operations (GAMO) program was established by the Joint Chiefs of Staff (JCS) on 1 April 1971 to achieve compatibility and interoperability of the tactical command and control systems to be used by the Services in support of Joint military operations during the 1980's. The Chief of Staff, US Army, was assigned the responsibility to accomplish the joint aspects of this program as the Executive Agent for the JCS with the program to be accomplished in three phases: Phase I - conceptual phase; Phase II - planning phase; and Phase III - joint testing and demonstration phase. Effective 1 August 1977, this program was reorganized and designated the "Joint Interoperability of Tactical Command and Control Systems (JINTACCS)" Program. This program will develop the technical standards necessary for compatibility and interoperability of 30 different tactical command and control systems of the Services and Agencies, 38 different tactical facilities, and will conduct joint testing of over 84 major interfaces between these systems and facilities. In reorganizing this program, the Secretary of Defense directed that the management structure be strengthened to expedite accomplishment of the program.

F. RELATED ACTIVITIES: This program is related to the Tactical Air Control System/Tactical Air Defense System (TACS/TADS) program which is funded under Program Element 6.47.12.A, Joint Advanced Tactical Command, Control, Communications Program.

G. WORK PERFORMED BY: Overall coordination and management of the joint aspects of the program is accomplished by the JINTACCS Program Director and the JINTACCS System Engineering Office which are located within the Office, Deputy Chief of Staff for Operations and Plans (ODCSOPS), of the Army Staff. The JINTACCS System Engineering Office is supported by the Joint Service/Agency Support Office (JSASO) which consists of two full-time representatives from each Service and one full-time representative each from the National Security Agency (NSA) and the Defense Intelligence Agency (DIA). Joint coordination is accomplished by the Joint Service/Agency Support Office which meets monthly and is composed of representatives from all Services and Agencies participating in the JINTACCS program. A five-man nucleus of the Joint Interface Test Force (JITF) has been formed and is located at Fort Monmouth, NJ. Incremental expansion of the JITF to an 85-man organization is planned over the next four years. The initial increment to establish a staff capable of performing joint testing is scheduled during FY 1978. Management of the JINTACCS (Army) program is provided by the US Army Communications Research and Development Command, Fort Monmouth, NJ.

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: The Ground and Amphibious Military Operations (GAMO) Management Office, the Joint Planning Group, the Interface Coordination Committee, and the Joint Management Committees were established prior to February 1976. In addition, the Joint GAMO Management Plan, the GAMO Technical Interface Concepts Plan, and the GAMO Implementation Plan were prepared and approved. Program Memorandum No. 99 outlining the Ground and Amphibious Military Operations (GAMO) program was prepared and approved, and a generalized Technical Interface Test Plan was prepared. In February 1976, the GAMO

program was redirected to achieve a joint testing capability as early as possible by dividing the systems of the Services into four functional groups (Intelligence, Air Operations, Amphibious and Fire Support, and Operations Control) and by placing priorities on these groups for testing. Since February 1976, the Technical Interface concepts document has been revised, a Joint Interface Test Center (JITC) site selection study completed, other GAMO documentation revised to reflect the program orientation, and the Commander-in-Chief, Atlantic was designated to accomplish GAMO operational effectiveness demonstrations. During FY 1977, the Joint Interface Test Center site at Fort Monmouth, NJ was designated, Program Memorandum 99 was revised to reflect changes in the program resulting from budgetary actions, and the Intelligence Group Technical Interface Design Plan was completed. Responsibility for development of joint message standards for the Joint Tactical Information Distribution System (JTIDS) was added to the program. The Army participated in joint activities, investigated emulation techniques relative to joint testing, and planned Army unique support for the program.

2. FY 1978 Program: Congress deleted all but $1.000 million from the FY 1978 program pending reorganization of the Ground and Amphibious Military Operations program into the Joint Interoperability of Tactical Command and Control Systems program with permission for reprograming once the reorganization was accomplished. Reorganization is now completed and reprograming action for additional FY 1978 funds has been undertaken. Based on a program level of $2.900 million ($1.000 million basic and $1.900 million reprogramed), the following work will be accomplished: The Joint Interface Test Force (JITF) staff will be expanded by the Services/Agencies and an initial procurement of equipment will be initiated for Intelligence Interface Testing. All program documentation will be revised to reflect reorganization of the program. Program Memorandum 99 will be revised to reflect program and fiscal changes in the program. Test plans will be prepared for joint intelligence testing, engineering support will be provided for the JITF, and technical interface design plans will be prepared for the other functional groups. Policies and procedures will be developed and directives issued for restructuring the program from GAMO to JINTACCS, development of message standards for the Joint Tactical Information Distribution System (JTIDS) will continue, and the extent to which the JINTACCS program will become involved in NATO standardization activities will be determined. If Congressional reprograming for $1.362 million is approved, the Army will complete Army test site activation, staff the Army test unit, continue emulation of Army systems participating in joint testing, and participate in joint activities.

3. FY 1979 Planned Program: The Joint Interface Test Center (JITC) will be activated, testing hardware and communications equipment will be delivered and installed, joint test plans will be completed and joint preliminary testing of the Intelligence Group will start. The JITC system design plan and the Test Proposal will be completed, plans for testing of the Air Operations Group will be initiated, initial test results of the Intelligence Group will be evaluated and configuration management of developmental standards will start. In addition, a plan for transition of Tactical Air Control Systems/Tactical Air Defense Systems (TACS/TADS) functions into JINTACCS will be completed and documents will be revised such as the Management Plan, JINTACCS Data Elements Dictionary, and the JITF organizational plan. Tasks relating to NATO initiatives will be defined and accomplished. The Army will participate in joint activities, Intelligence Group testing, and continue emulation activities and modification of Army systems for joint testing. Increased funding over the FY 1978 level is due to the activation of the JITC, exploratoration of NATO initiatives related to this program, the delivery and installation of communications equipment.

Program Element: #6.47.79.A Title: Joint Interoperability of Tactical Command and Control Systems (JINTACCS)

DoD Mission Area: #444 - Tactical Combat Integration Budget Activity: #4 - Tactical Program

4. FY 1980 Planned Program: Preparation and refinement of Technical Interface Design Standards, Joint Interface Test Plans, engineering studies, and configuration management plans will continue. Operation of the JINTACCS System Engineering Office, the Joint Service /Agency Support Office, the Joint Interface Test Force, joint technical working groups, and other joint organizations will continue. The Army will prepare systems and participate in interface testing of the Tactical Operation System/Position Locating and Reporting System, Tactical Fire Control System/Remotely Piloted Vehicle, Tactical Fire Control System/Control and Analysis Center, and the Tactical Operations System/Remotely Monitored Battlefield Surveillance System. Increase in funding over the FY 1979 level is due to the transition of the remaining Tactical Air Control Systems/Tactical Air Defense Systems (TACS/TADS) program functions into the JINTACCS program, the acquisition of additional equipment, and increased level of testing.

5. Program to Completion: This is a continuing program.

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: D310

Title: Joint Interoperability of Tactical Command and Control Systems (Executive Agent)

Program Element: #6.47.79.A

Title: Joint Interoperability of Tactical Command and Control Systems (JINTACCS)

DoD Mission Area: #444 - Tactical Combat Integration

Budget Activity: #4 - Tactical Programs

A. DETAILED BACKGROUND AND DESCRIPTION: The Joint Ground and Amphibious Military Operations (GAMO) program was established by the Joint Chiefs of Staff (JCS) on 1 April 1971 to achieve compatibility and interoperability of the tactical command and control systems to be used by the Services in support of Joint military operations during the 1980's. The Chief of Staff, US Army, was assigned the responsibility to accomplish the joint aspects of this program as the Executive Agent for the JCS with the program to be accomplished in three phases: Phase I - conceptual phase; Phase II - planning phase; and Phase III - joint testing and demonstration phase. Effective 1 August 1977, this program was reorganized and designated the "Joint Interoperability of Tactical Command and Control Systems (JINTACCS)" Program. This program will develop the technical standards necessary for compatibility and interoperability of 30 different tactical command and control systems of the Services and Agencies, 38 different tactical facilities, and will conduct joint testing of over 84 major interfaces between these systems and facilities. In reorganizating this program, the Secretary of Defense directed that the management structure be strengthened to expedite accomplishment of the program.

B. RELATED ACTIVITIES: This program is related to the Tactical Air Control System/Tactical Air Defense System (TACS/TADS) program which is funded under Program Element 6.47.12.A, Joint Advanced Tactical Command, Control, Communications Program.

C. WORK PERFORMED BY: Overall coordination and management of the joint aspects of the program is accomplished by the JINTACCS Program Director and the JINTACCS System Engineering Office which are located within the Office, Deputy Chief of Staff for Operations and Plans (ODCSOPS), of the Army Staff. The JINTACCS System Engineering Office is supported by the Joint Service/Agency Support Office (JSASO) which consists of two full-time representatives from each Service and one full-time representative each from the National Security Agency (NSA) and the Defense Intelligence Agency (DIA). Joint coordination is accomplished by the Joint Service/Agency Support Office which meets monthly and is composed of representatives from all Services and Agencies participating in the JINTACCS program. A five-man nucleus of the Joint Interface Test Force (JITF) has been formed and is located at Fort Monmouth, NJ. Incremental expansion of the JITF to an 85-man organization is planned over the next four years. The initial increment to establish a staff capable of performing joint testing is scheduled during FY 1978.

D. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: The Ground and Amphibious Military Operations (GAMO) Management Office, the Joint Planning Group, the Interface Coordination Committee, and the Joint Management Committees were established prior to February 1976. In addition, the Joint GAMO Management Plan, the GAMO Technical Interface Concepts Plan, and the GAMO

Implementation Plan were prepared and approved. Program Memorandum No. 99 outlining the Ground and Amphibious Military Operations (GAMO) program was prepared and approved, and a generalized Technical Interface Test Plan was prepared. In February 1976, the GAMO program was redirected to achieve a joint testing capability as early as possible by dividing the systems of the Services into four functional groups (Intelligence, Air Operations, Amphibious and Fire Support, and Operations Control) and by placing priorities on these groups for testing. Since February 1976, the Technical Interface concepts document has been revised, a Joint Interface Test Center (JITC) site selection study completed, other GAMO documentation revised to reflect the program orientation, and the Commander-in-Chief, Atlantic was designated to accomplish GAMO operational effectiveness demonstrations. During FY 1977, the Joint Interface Test Center site at Fort Monmouth, NJ was designated, Program Memorandum 99 was revised to reflect changes in the program resulting from budgetary actions, and the Intelligence Group Technical Interface Design Plan was completed. Responsibility for development of joint message standards for the Joint Tactical Information Distribution System (JTIDS) was added to the program.

2. FY 1978 Program: Congress deleted all but $1.000 million from the FY 1978 program pending reorganization of the Ground and Amphibious Military Operations program into the Joint Interoperability of Tactical Command and Control Systems program with permission for reprograming once the reorganization was accomplished. Reorganization is now completed and reprograming action for additional FY 1978 funds has been undertaken. Based on the program level of $2.900 million ($1.000 million basic and $1.900 million reprogramed), the following work will be accomplished: The Joint Interface Test Force (JITF) staff will be expanded by the Services/Agencies and an initial procurement of equipment will be initiated for Intelligence Interface Testing. All program documentation will be revised to reflect reorganization of the program. Program Memorandum 99 will be revised to reflect program and fiscal changes in the program. Test plans will be prepared for joint Intelligence testing, engineering support will be provided for the JITF, and technical interface design plans will be prepared for the other functional groups. Policies and procedures will be developed and directives issued for restructuring the program from GAMO to JINTACCS, development of message standards for the Joint Tactical Information Distribution System (JTIDS) will continue, and the extent to which the JINTACCS program will become involved in NATO standardization activities will be determined.

3. FY 1979 Planned Program: The Joint Interface Test Center (JITC) will be activated, testing hardware and communications equipment will be delivered and installed, joint test plans will be completed, and joint preliminary testing of the Intelligence Group will start. The JITC system design plan and the Test Proposal will be completed, plans for testing of the Air Operations Group will be initiated, initial test results of the Intelligence Group will be evaluated and configuration management of developmental standards will start. In addition, a plan for transition of Tactical Air Control Systems/Tactical Air Defense Systems (TACS/TADS) functions into JINTACCS will be completed and documents will be revised such as the Management Plan, JINTACCS Data Elements Dictionary, and the JITF organizational plan. Increase in funding over the FY 1978 level is due to the activation of the JITC and the delivery and installation of communications equipment.

Project: D310

Title: Joint Interoperability of Tactical Command and Control Systems (Executive Agent)

Program Element: #6.47.79.A

Title: Joint Interoperability of Tactical Command and Control Systems (JINTACCS)

DoD Mission Area: #444 - Tactical Combat Integration

Budget Activity: #4 - Tactical Programs

4. FY 1980 Planned Program: Preparation and refinement of Technical Interface Design Standards, Joint Interface Test Plans, engineering studies, and configuration management plans will continue. Operation of the JINTACCS System Engineering Office, the Joint Service/Agency Support Office, the Joint Interface Test Force, joint technical working groups, and other joint organizations will continue. Increase in funding over the FY 1979 level is due to the transition of the remaining Tactical Air Control Systems/Tactical Air Defense Systems (TACS/TADS) program functions into the JINTACCS program, the acquisition of additional equipment, and increased level of testing.

5. Program to Completion: This is a continuing program.

6. Major Milestones:

System Group (Category)	Test Start Date
Intelligence	June 1979
Intelligence Supplement	April 1980
Air Operations	October 1980
Amphibious Fire Support	June 1983

7. Resources ($ in thousands):

	FY 1977	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Cost
RDTE,A: Funds	0	2900	7200	12192	Continuing	Not Applicable

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.57.10.A
DoD Mission Area: #449 - Chemical Biological Defense/ Chemical Warfare

Title: Joint Chemical/Biological Contact Point and Test
Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT					Continuing	Not Applicable
	Quantities						Not Applicable
D049	Joint Chemical/Biological Contact Point and Test					Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program element was directed to be established in the Army RDTE program for conduct of chemical warfare/biological research (CW/BR) testing for the Department of Defense. This program covers overhead costs incurred by Dugway Proving Ground (DPG) in supporting Joint Operational Tests, investigations and/or studies for Unified Commanders (CINCs) and Services; provides for the publication and maintenance of Chemical and Biological (CB) Technical Data Source Books; and supports accomplishments of the Army's Executive Agency responsibilities in RDTE support development of chemical weapons and chemical and biological defense (CW/CBD) for the Services.

C. BASIS FOR FY 1979 RDTE REQUEST: To meet the Unified Commanders (CINCs) and Services requirements, three operations research studies and five operations research tests will be in progress and/or completed. They will include a determination of the residual biological effects in a variety of environments and the residual hazard from chemical and biological decay. CB Technical Data Source Books will also be published and distributed.

D. OTHER APPROPRIATION FUNDS: Not Applicable.

Program Element: #6.57.10.A
DoD Mission Area: #449 - Chemical Biological Defense/ Chemical Warfare

Title: Joint Chemical/Biological Contact Point and Test
Budget Activity: #4 - Tactical Programs

E. DETAILED BACKGROUND AND DESCRIPTION: The objectives of this program are to plan, conduct, evaluate, and report on joint tests and/or operational research studies in response to requirements from the Unified Commanders (CINCs) and the Services and to serve as the Department of Defense joint contact point for all CB defense test and CB Technical Data Source Books. Tests and studies will provide essential data on chemical weapon systems and chemical/biological defense material and will determine whether items and/or systems meet the military technical characteristics required by the user. Joint contact point includes the publication and maintenance of CB Technical Data Source Books and provides data evaluation studies in support of CB data inquiries.

F. RELATED ACTIVITIES: The Department of the Army (DA), (the Department of Defense (DOD) executive agent for research, exploratory development, and advanced development for chemical weapons and chemical and biological defense (CW/CBD) systems) is responsible for joint operational test, investigations and/or studies for CINCs and the Services. Work is coordinated through a joint coordinating group composed of representatives of all Services. Coordination and cooperation is also maintained with the United Kingdom, Canada, and Australia through the Quadripartite, the Technical Cooperation Program Organization and with the North Atlantic Treaty Organization.

G. WORK PERFORMED BY: In-house efforts are conducted at Dugway Proving Ground, Utah. No contract work is performed in this program.

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: This program started in FY76. During FY76 four final reports on field test programs and five chemical/biological (CB) technical source books were completed and published. Two test programs and one operations research study were conducted in support of the development of improved chemical and biological defense materiel and procedures. During FY77 two final reports on field test programs, five studies and five CB Technical Data Source Books were completed and published. Test and studies provided essential data on chemical weapon systems and chemical/biological defense material and determined whether items and/or systems met the military technical characteristics required by the user.

2. FY 1978 Program: Three operations research tests, one operations research study and one CB Technical Data Source Book will be in progress and/or completed in FY78. The basic output of the tests, studies and source books is knowledge leading toward improvements in CB defense. The funding level will support the test/study requirement and will retain the in-house capability and state-of-the-art knowledge essential for complete evaluation of chemical weapons and CB defensive systems requirements received from the Unified Commands (CINCs) and Services.

Program Element: #6.57.10.A
DoD Mission Area: #449 - Chemical Biological Defense/ Chemical Warfare

Title: Joint Chemical/Biological Contact Point and Test
Budget Activity: #4 - Tactical Programs

3. FY 1979 Planned Program: Five operations research tests, three operations research studies and one CB Technical Data Source Book will be in progress and/or completed in FY79. The basic output of the tests, studies and source books is knowledge leading toward improvements in CB defense. The funding level will support the test/study requirement and will retain the in-house capability and state-of-the-art knowledge essential for complete evaluation of chemical weapons and CB defensive systems requirements received from the CINCs and Services. Funding requirements in FY79 are greater than FY78 because two additional operations research tests will be conducted in FY79.

4. FY 1980 Planned Program: Six operations research tests, two operations research studies and one CB Technical Data Source Book, in support of the development of improved CB defense materiel and procedures, will be in progress and/or completed in FY80.

5. Program to Completion: This is a continuing program.

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.57.13.A
Title: Battlefield Systems Integration
DoD Mission Area: #444 - Tactical Combat Integration
Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands):

Project Number	Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	3724	3951	7000	6000	Continuing	Not Applicable
DF26	Battlefield Systems Integration	3724	3951	7000	6000	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program provides funding for creative, interdisciplinary design work treating the Army in the field as a total cohesive system with each combat subsystem (e.g., ground forces, organic aerial units) configured to maximize the full combat capability of the force. Ensures that each new system is considered in terms of how it will fit in with all the others on the battlefield so that incompatibilities and duplications are avoided.

C. BASIS FOR FY 1979 RDTE REQUEST: Continue contractual and in-house effort to develop master battlefield systems integration plan (Army system architecture) and commence experiments to verify that it is a valid representation of the Army in the field. These experiments will necessarily include both computer simulations and comparative field testing. Field experimentation will be oriented toward testing the comparability between the architectural system and automated command operations, fire control, target acquisition, and weapon engagement systems currently under development. Cost versus performance evaluations will be conducted on developing systems to determine the most cost-effective options for the Army's combat capabilities during the 1980-1985 time-frame.

D. OTHER APPROPRIATION FUNDS: Not Applicable.

E. DETAILED BACKGROUND AND DESCRIPTION: Commander, US Army Materiel Development and Readiness Command (DARCOM), formed the Directorate for Battlefield Systems Integration (DBSI) to identify new research and development initiatives that will produce the highest payoff in combat capability. The DBSI formulates broad mission area objectives and plans which take into account existing and planned operational capabilities, technology forecasts, and threat assessment studies. These objectives and plans serve as guidelines in the effort to identify and close gaps in Army battlefield capabilities, provide guidance in the formative stages of systems development, eliminate duplication in materiel acquisition programs, improve the bridge between technological opportunities and operational requirements, promote the interoperability of existing and planned capabilities within the Army and with the other Services, and insure that weapons systems development is synchronized and consistent with doctrinal concepts development by the US Army Training and Doctrine Command (TRADOC). The DBSI also identifies new materiel needs and recommends the initiation of materiel development programs to fill these needs, and recommends the revision, or termination of those programs that do not promise sufficient contributions to the overall combat systems capability.

Program Element: #6.57.13.A
DoD Mission Area: #444 - Tactical Combat Integration

Title: Battlefield Systems Integration
Budget Activity: #4 - Tactical Programs

F. RELATED ACTIVITIES: Exploratory work involving a detailed analysis of existing capabilities in the areas of communications links, data processing, and response transmission was accomplished in FY 1976 under contractual effort funded in Program Element 6.37.23.A, Command and Control. Related background studies involving functional description of combat subsystems were accomplished by the US Army Materiel Systems Analysis Agency (AMSAA), also in FY 1976. Close coordination is maintained with the other Services to discuss solutions to problems or overlapping interest or responsibilities. Both hardware and doctrinal solutions to these problems are then tested in the joint environment to assure their viability across the total battlefield.

G. WORKED PERFORMED BY: MITRE Corporation, (Federal Contract Research Center) McLean, VA, programed for $2.785M in FY 1979. Other contracts (contractor as yet undetermined) are planned for $2.415M, and $1.2M is planned for in-house work by Human Engineering Laboratory and Army Materiel Systems Analysis Agency, Aberdeen Proving Ground, MD, and Night Vision Laboratory, Fort Belvoir, VA.

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: Reviews and analyses were accomplished in the areas of Air Defense, Fire Support, Electronic Warfare (EW), US Army Operations in the Soviet EW Environment, and Corps Echelon Integration and Experimentation Analysis. The basic architecture effort was framed by the Directorate for Battlefield Systems Integration (DBSI) staff with support from MITRE Corporation. Mission areas and functional groups of systems have been identified and approved by Headquarters, Department of the Army. An effort to portray in graphical logic the relationship of the DARCOM Technology Base projects to prioritized requirements for system capabilities (spider charting) was completed in 2d Quarter FY 1977. This project provides a catalog at the work unit level of the technology base related to Army Mission Areas and Functional Groups of Systems by specific capabilities. Furthermore, it provides the basis for continuous data exchange between US Army Training and Doctrine Command schools and DARCOM laboratories. DBSI participated with TRADOC in developments related to military operations in built-up areas, in System Program Reviews, and in other projects that identify existing battlefield gaps, and recommended solutions to these problems. Workshop experimentation to demonstrate graphics and software capabilities to achieve tactical real-time functions were conducted.

2. FY 1978 Program: Continue effort on master battlefield systems integration plan. Expand analyses of functional subsystems necessary to this plan, including target acquisition, communications, command, and control (C_3), weapon engagement, intelligence, surveillance, and command systems. Complete the formulation of the basic structure of the overall Army system architecture, and begin design of experiments to test its validity and functionality. Analyze the Army technology base and its contribution to overall effectiveness.

Program Element: #6.57.13.A
Title: Battlefield Systems Integration
DoD Mission Area: #444 - Tactical Combat Integration
Budget Activity: #4 - Tactical Programs

3. FY 1979 Planned Program: A substantial increase over prior year funding is required in FY 1979 because of the completion of the master battlefield systems integration plan (Army combat system architecture) and the necessity to verify as rapidly as possible that it is a valid representation of the Army in the field. This verification must include both computer simulations and comparative field testing. Field operations will be oriented toward testing the comparability between the architectural system and automated command operations, fire control, target acquisition, and weapon engagement systems currently under development. Cost versus performance evaluations will be conducted on developing systems to determine the most cost-effective options for the Army's combat capabilities during the 1980-1985 time-frame.

4. FY 1980 Planned Program: Design and conduct field experiments/tests to evaluate interoperability of developing systems first within their respective functional areas, and then in terms of the total system (criteria for these tests will be the essential functional inter-relationships developed as framework of system architecture). Measure increase of total system as each developing system is integrated, and identify remaining shortfalls in mission capabilities.

5. Program to Completion: This is a continuing program.

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #2.37.24.A
DoD Mission Area: #412 - Close Combat

Title: Heavy Antitank/Assault Weapon System (TOW)
Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	2769	544	3500	993	0	135892
	Quantities						472
0336	Heavy Antitank/Assault Weapon System (TOW)	2769	544	3500	993	0	135892

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The TOW (tube-launched, optically tracked, wire-command link guided missile system) is the principle close combat, direct fire, heavy antitank/assault weapon used by Infantry and other units to defeat heavily armored vehicles and fortifications. It can be employed on a ground mount, is crew-portable, and is mounted on a variety of military vehicles including the helicopter.

C. BASIS FOR FY 1979 RDTE REQUEST: The engineering development for the TOW Night Sight will be completed with major attention given to test support and correction of deficiencies. A program to develop improved performance in

Major Milestone	Date
Thermal Night Sight Initial Operational Capability	-

Program Element: #2.37.24.A
DoD Mission Area: #412 - Close Combat

Title: Heavy Antitank/Assault Weapon System (TOW)
Budget Activity: #4 - Tactical Programs

D. OTHER APPROPRIATION FUNDS: ($ in thousands)

Missile Procurement, Army	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
Funds (Includes Initial Spares)	121402	63500	42251	0	3000	1124500
Quantities						
Launchers	826	189	0	0	0	5137
Missiles	5720	5720		0	0	
Night Sights*	242	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable

* Beginning in FY 1978, balance of procurement of TOW Night Sights transferred to Other Procurement, Army, as part of the Manportable Common Thermal Night Sight Program.

E. DETAILED BACKGROUND AND DESCRIPTION: The TOW (tube-launched, optically tracked, wire-command link guided missile system) is integral to the family of antitank weapons and is designed to defeat the heaviest current enemy armor out to ranges of 3,000 meters. TOW replaces the 106mm Recoilless Rifle in infantry units. TOW provides a heavy antitank/assault capability for the infantry, airborne infantry, airmobile, and mechanized infantry battalions. It is crew-portable and can be employed on the ground or mounted on a variety of military vehicles. The missile can be fired from helicopters when the necessary airborne control equipment is provided. The missile is tracked in flight by an infrared sensor at the launcher and automatically guided by electronic commands transmitted over a wire link to the missile. The gunner has only to keep the crosshairs of the optical sight on the target until missile impact.

F. RELATED ACTIVITIES: The TOW night sight is the pilot program for developing common components for man-portable night vision devices. The components developed for the TOW night sight will also be used in such systems as the Medium Antitank Assault Weapon (DRAGON) Night Tracker (PE 2.37.27), the Night Observation Device Long Range (NODLR), (PE 6.47.10 Night Vision Devices) and the Ground Laser Locator Designator (GLLD) (PE 6.43.08 Precision Laser Designators). A TOW Cover Artillery Protection (TOWCAP) was completed as a quick fix using a ballistic blanket to provide protection for TOW crews against artillery fire. Modifications to the M113A1 armored personnel carrier are under development to provide a TOW vehicle with crew protection (Improved TOW Vehicle) (PE 6.36.26.A).

G. WORK PERFORMED BY: The major contractors are Hughes Aircraft Company, Culver City, CA; Emerson Electric Company, St. Louis, MO; and Texas Instruments, Incorporated, Dallas, TX. Army management of the TOW Weapon System is performed by the TOW/DRAGON Project Manager, US Army Missile Readiness Command, Huntsville, AL.

Program Element: #2.37.24.A
DoD Mission Area: #412 - Close Combat

Title: Heavy Antitank/Assault Weapon System (TOW)
Budget Activity: #4 - Tactical Programs

B. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: The basic weapon system development was completed. The TOW thermal night sight (TNS) completed advanced development and entered engineering development (ED). Nine night sights were fabricated for Research and Development Acceptance Testing (RDAT) conducted in March 1975. A competition for the night sight engineering development between Texas Instruments (TI) and Hughes Aircraft Company was won by TI. The engineering development (ED) models of the TOW TNS started Developmental Testing (DT) at White Sands Missile Range in FY 1976 and Operational Tests in Europe in FY 197T. In FY 1977 the TOW TNS completed DT/OT II, was type classified standard and the first production contract was awarded. A solid state track link (SSTL) program was initiated to provide TOW with a low susceptibility to The SSTL program continued with the design, fabrication and contractor qualification testing of a new missile flare and detector array.

2. FY 1978 Program: Continue thermal night sight engineering development with major emphasis on correction of deficiencies. Develop requirement for TOW improvement in and release a request for proposals.

3. FY 1979 Planned Program: The TOW (tube-launched, optically tracked, wire-command link guided missile system) night sight development will be completed. Development of alternatives yielding improvement environment will be pursued. This program is necessary to improve the performance of the guidance link to

4. FY 1980 Planned Program: Development of alternatives yielding improvement in will be pursued through breadboard flight tests.

5. Program to Completion: The necessity to continue the program will be reviewed considering the progress of the Advanced Heavy Antitank Missile System (AHAM, PE 6.36.12).

Program Element: #2.37.24.A
DoD Mission Area: #412 - Close Combat

Title: Heavy Antitank/Assault Weapon (TOW)
Budget Activity: #4 - Tactical Programs

I. Test and Evaluation Data:

1. Development Test and Evaluation:

a. Development of the tube launched, optically tracked, wire-guided (TOW) missile system was initiated in October 1963. The prime contractor for TOW is Hughes Aircraft Company (HAC).

b. Development Test (DT) I (Engineer Design Tests) started in August 1963 and were completed in March 1967. In addition to contractor tests, tests were conducted by the US Army Missile Command and the US Army Electronics Command at Huntsville, Alabama. Major deficiencies with the missile case and missile light sources were discovered during this testing.

c. DT II (Engineer Test/Service Test) was conducted from December 1966 to July 1969 by the US Army Test and Evaluation Command (TECOM) at White Sands Missile Range (WSMR), New Mexico; Fort Benning, Georgia; and Fort Greely, Alaska. The major deficiencies with the missile case and light source discovered during DT I had been corrected and no further major deficiencies were discovered.

d. DT III (Initial Production Test) was conducted from November 1969 to May 1970 by TECOM. This test verified that the hand-tooled production items met production specifications and had the same characteristics as the prototypes.

e. A night sight program was initiated in 1968 to provide the TOW weapon system with a night fighting capability without the use of artificial illumination. A pulse gated, laser-aided sight was developed and tested. The maximum range of this sight varied from 700 to 1,600 meters depending on the amount of ambient light. The rapid improvement in far infrared technology resulted in termination of the pulse gated night sight program. In March 1972, a program was initiated to develop a TOW thermal night sight that will enable detection of targets out to the full 3,000 meter range of the system. Prototypes from three contractors were evaluated during DT I from December 1972-May 1973 by the US Army Electronics Command at both the Night Vision Laboratory (NVL), Fort Belvoir, Virginia, and the US Army Missile Command facilities, Huntsville, Alabama. Prototypes from two contractors, Hughes Aircraft Company and Texas Instruments (TI), entered final competition. Government tests included Laboratory Performance Tests at NVL from 18 February to 27 June 1975, Firing Tests at Redstone Arsenal, Alabama, from 3-22 Mar 1975, Acquisition Tests at Camp A.P. Hill from 2 April to 19 May 1975, and other systems and handling tests held at Redstone Arsenal and Fort Benning. Results of Acquisition Tests during clear weather were: Detection, [illegible] meters; and Recognition, [illegible] meters. Firing results are included in paragraph g. The TI sight won the competition and continues in Engineering Development. DT II was conducted primarily at WSMR by TECOM during the period June 1976 through February 1977. A deficiency in boresighting was discovered. A new boresight collimator was used in Operational Test (OT) II, Phase II, which provided a significant reduction in time required to boresight. The new collimator will be evaluated in the Improved Tow Vehicle (ITV) OT III and Ground Laser Locator Designator (GLLD) OT II. A combined Arctic DT II and Operational Climatic Test (OCT) was conducted at Fort Greely from January through April 1977. DT III was determined by Department of the Army to be unnecessary and will not be conducted.

f. Research was conducted by Hughes Aircraft Company (HAC) from FY 1965 through FY 1971 to provide for the TOW system. In FY 1971 Texas Instruments (TI) proposed a Solid State Track Link (SSTL) to provide for TOW. Development Test (DT) I was successfully conducted in July 1972 using an SSTL launcher and three missiles. An engineering development (ED) contract competition followed with a contract awarded to TI in May 1974. ED is scheduled to end in FY 1978. In 1975, four SSTL breadboard and five SSTL prototype missile firings were conducted at 3000 meters from launchers. Four of the missiles were since the launcher must be capable of firing the missile. missiles were successful. The During March to July 1976 , the contractor adjusted the missile flight data link against jammers. A combined DT/OT II was started in March 1977 at White Sands Missile Range with United States Army Infantry Board (USAIB) as the test organization. The test was suspended in April 1977 because of missile beacon failures. The contractor has redesigned the missile beacon which has performed reliably in recent tests. DT/OT II is scheduled in 1QFY78.

g. A tabulation of TOW missile test firings follows:

Summary of Test Firings

Test Program		Dates	Launches 1/	Functional 2/	Hit (1)	No Test (2)	No Test (3)	No Test (4)
Contractor Prototype Test		Before July 1966						
Service Test Missiles		Jul 1966-Mar 1967						
Engineering Test/Service Test Prior to Aug 67		Apr 1967-Aug 1967						
Environmental Test:	Tropic	Aug 1970-Sep 1971						
	Arctic	Nov 1970-Feb 1971						
	Desert	Jun 1970-Nov 1970						
Research Development Acquisition Tests (RDAT/OT Ia) TOW (AN/TAS-4) Night Sight (Stationary & Moving Targets)		3-22 Mar 1975						
OT II - TOW Night Sight		Oct-Nov 1976						
SSTL Breadboard Firing*		Feb-Mar 1975						
SSTL Prototype Firing*		Jul-Oct 1975						

* Misses due to Beacon failures.

1/ Total number of recorded missile launches during the test.
2/ Number of recorded missile launches minus reliability failures.
3/ missed due to "canned" launch shift, missed due to noise in launcher electronics. No misses were due to the night sight.
4/ hit an obstruction in front of target and hit wrong target.

NOTES:

(1) Hits are scored on 7.5 ft. x 7.5 ft. stationary targets and 7.5 ft. x 7.5 ft. moving targets.

(2) No test was indicated when missiles were fired outside range or environmental requirements.

(3) No test due to gunner error, firing through brush or over water.

(4) No test due to other causes.

2. Operational Test and Evaluation:

a. The Confirmatory Troop Test was conducted from July to September 1970 at Camp Roberts, California, by the US Army Combat Developments Command (CD C) using a trained TOW platoon under simulated tactical conditions. Objectives of the test included an evaluation of the TOW system when operated by typical user troops in a simulated battlefield situation and a comparison of the TOW with the 106mm Recoilless Rifle (RCLR). The TOW missile system out-performed the 106mm RCLR in all tests and performed well under simulated tactical conditions.

b. The TOW weapon system was accepted for service use (Type Classified Standard A) in September 1970 and the first tactical units were equipped in Europe in October 1970. Issue of launchers to US Army, Europe (USAREUR) based forces was completed in February 1976. Issue to US forces in Korea has been completed and distribution initiated to Continental United States forces. With approximately 8060 production missile firings, the weapons system is performing well. The system was deployed to US forces in Vietnam in May 1972 and was praised as a highly successful weapon system in combat. Based on operational requirements, a major planned modification to the TOW system is the addition of a thermal night sight.

c. The TOW night sight has been incorporated into the manportable common thermal night sights (MCTNS) program and underwent operational testing (OT) in Europe in MCTNS OT II, completed November 1976. The TOW night sight portion of MCTNS OT II was conducted with preproduction prototype items by the US Army Operational Test and Evaluation Agency (OTEA), using one mechanized infantry company team provided by USAREUR. The test revealed reliability deficiencies within the cryogenic system, and difficulties in boresighting. Design modifications were made and tested in MCTNS OT II, Phase II, during the period 7-18 March 1977 at

White Sands Missile Range. Test results indicated that the new collimator allowed significantly faster boresighting with improved repeatibility. There were no cryogenic failures in 124 hours of operating time. Operational Test (OT) III was determined by Department of the Army to be unnecessary and will not be conducted.

3. System Characteristics:

Operational/Technical Characteristics	Objective	Demonstrated Performance 1/
Range		
Minimum	65 m	65 m
Maximum	2000 m	3000 m
With Night Sight		5/
Probability of a Kill given a Hit		3/
System Reliability		4/
Probability of a Hit given a Reliable Round - Stationary Targets		
Moving Targets		
Using Night Sights against Stationary Targets		5/

1/ Developmental and operational firings.
2/ Sight is in engineering development stage.
3/ Analytical data.
4/ TOW's Probability of Hit given a Reliable System is higher than predicted. Overall mission accomplishment or probability of a first hit is computed by multiplying probability of hit given a reliable system by system reliability. Overall mission accomplishment is higher than the requirement and therefore the Army accepts the demonstrated reliability.
5/ Hitting performance during the combined Research Development Acquisition Tests (RDAT)/Operational Test Ia, with user troops, was

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #2.37.26.A
DoD Mission Area: #413 - Fire Support

Title: Tactical Fire Direction System (TACFIRE)
Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	4942	828	744	0	0	89883
	Quantities						9
D322	Tactical Fire Direction System	4942	828	744	0	0	89883

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The Tactical Fire Direction System (TACFIRE) is a tactical automatic data processing system which improves the accuracy and responsiveness of artillery fires through automation of selected fire control functions and optimizes the use of target acquisition, communications, command and control, and weapon resources. This system is urgently needed to enhance commanders' decisions by responsive application of firepower as a partial offset to potential enemy's numerical superiority in artillery pieces.

C. BASIS FOR FY 1979 RDTE REQUEST: The FY 1979 request provides for correction of any deficiencies remaining from the final development and operational tests and completion of development of diagnostic software for the automatic test equipment to be used by maintenance activities in support of TACFIRE.

Major Milestones	Date
Developmental Test/Operational Test (DT/OT) II	May 1974 to November 1974
Limited Procurement Initiated	January 1975
First Article Test	November 1976 to May 1977
DT/OT III	August 1977 to February 1978
Full Scale Production Initiated	December 1978

CLASSIFIED BY: TACFIRE SCG, 28 Dec 76
EXEMPT FROM GENERAL DECLASSIFICATION
SCHEDULE OF EXECUTIVE ORDER 11652
EXEMPTION CATEGORY: 4
DECLASSIFY ON: 31 December 1988

Program Element: #2.37.26.A
DoD Mission Area: #413 - Fire Support

Title: Tactical Fire Direction System (TACFIRE)
Budget Activity: #4 - Tactical Programs

D. OTHER APPROPRIATION FUNDS: ($ in thousands)

	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
Other Procurement, Army						
Funds	32980	41615	88733	99857	22214	335899
Quantities	8	10	42	48		

E. DETAILED BACKGROUND AND DESCRIPTION: Commanders in future conflicts will face a sophisticated enemy with advantages in size of force, fire support, armor capability, and tactical air. These enemy advantages can be minimized through improvement of the accuracy and speed of the commander's decisions and responsive execution of firepower. Until 1964, manual procedures were used entirely to perform fire control functions in field artillery fire direction centers. Since that time, the Field Artillery Digital Automatic Computer (FADAC) has been issued to field artillery units to compute ballistic and survey data. The objective of this program is to provide the advantages of automatic data processing techniques to those functions as well as selected additional field artillery fire control functions. The Tactical Fire Direction System (TACFIRE) is a completely integrated system of tactical computer elements located at the fire direction centers of Active Army field artillery battalions, field artillery groups, division artilleries, and corps artilleries which will provide for automatic transmission, receipt and computation of firing data. Field artillery functions to be automated with the system include tactical and technical fire control, nuclear and non-nuclear fire planning, processing of artillery target intelligence, preliminary target analysis, fallout prediction, distribution of meteorological data, and maintenance of ammunition and fire unit status. TACFIRE will be interoperable and interface with the Tactical Operations System (TOS) and possibly with other Army Tactical Data Systems (ARTADS) within the conceptual framework of the Tactical Command and Control program as they are fielded. TACFIRE will use an integrated system of computers, local and remote input/output devices, digital storage and retrieval devices, display units and control consoles. TACFIRE will increase the effectiveness of field artillery fire support through increased accuracy, better and more rapid use of target information, reduced reaction time, and greater efficiency in the determination of fire capabilities and the allocation of fire units to engage targets. TACFIRE is designed to replace the present combination of manual and FADAC computational procedures for determination of fire commands, fire planning data, correlation of target intelligence and target analysis.

F. RELATED ACTIVITIES: This program element has application in Program Elements 6.37.22.A (Tactical Operations System (TOS) and 6.43.02.A (Air Defense Control and Coordination System, AN/TSQ-73). To the maximum extent possible, equipment developed for TACFIRE is being used in other Army Tactical Data Systems (ARTADS), such as TOS and the AN/TSQ-73, which require militarized hardware. Advanced development of the Digital Message Device was accomplished under Program Element 6.37.23.A, Project D101 (Integration of ARTADS) which also supports developments to meet TOS/TACFIRE interoperability requirements. Project D101

also supports the computer emulation effort which may provide a fourth generation processor which could replace the computer used in TACFIRE (Tactical Fire Direction System), TOS (Tactical Operations System), AN/TSQ-73, and the AN/TTC-39 family of automatic communications central offices without impact on already developed software. The Battery Level Computer, being developed under Program Element 6.47.27.A (Command and Control) will replace the current TACFIRE Battery Display Unit. Liaison is conducted at laboratory level and by the Project Manager with developers of automatic data processing systems in other Services to preclude duplication of effort.

G. WORK PERFORMED BY: The Project Manager, Army Tactical Data Systems (PM ARTADS), US Army Communications Research and Development Command (USACORADCOM), Fort Monmouth, NJ, is the developer of this system. Technical support is furnished by the US Army Computer Systems Command, Fort Belvoir, VA; and the Center for Tactical Computer Sciences, USACORADCOM, Fort Monmouth, NJ. Contractors for the system are the Data Systems Division, Litton Industries, Van Nuys, CA; and the Magnavox Company, Fort Wayne, IN. Software for the automatic test equipment to be used in support of TACFIRE is being developed by the Radio Corporation of America, Burlington, MA. Additional contractual support has been performed by Auerbach Associates, Inc., Philadelphia, PA; and Meta Systems Corporation, Trenton, NJ. System testing is being performed by the US Army Test and Evaluation Command, Aberdeen Proving Ground, MD; and the US Army Training and Doctrine Command's Combined Arms Test Activity, Fort Hood, TX. The US Army Training and Doctrine Command, Fort Monroe, VA, is performing the cost and operational effectiveness analysis for the system.

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: Prior to 1967, software systems, design descriptions, and test programs for TACFIRE were written. Three contractors participated in a six-month competitive contract definition phase. Evaluation of contract definition proposals resulted in award of a Total Package Procurement (TPP) contract covering development and procurement with Litton Systems Incorporated in December 1967. The contract underwent major changes in 1970 to include the addition of a random access memory to increase storage capacity for the battalion computer. Software was integrated into the system during FY 1970 and initial acceptance tests completed. Research and Development Acceptance Tests (RDAT) were completed in March 1972 and the prototype system entered a scheduled one year period of development testing at Fort Sill, Oklahoma; Fort Huachuca, Arizona; and White Sands Missile Range, New Mexico, on 1 April 1972. Testing at Fort Huachuca, primarily environmental and electromagnetic compatability and vulnerability testing was completed in August 1972. Extensive deficiencies in both the hardware and software portions of the prototype system interrupted the continuity of testing at Fort Sill and White Sands. Despite management actions which included accelerated correction of deficiencies and adjustments to the test schedule, it became evident that the Army would be unable to make a production decision on schedule. During the 2d and 3d Quarters, FY 1973, the system was intensively reviewed by the Army Systems Acquisition Review Council (ASARC) and the Defense Systems Acquisition Review Council (DSARC). This review included revalidation of the requirements for the system and thorough investigation of various alternatives for

continuing the program. In March 1973 the Office of the Secretary of Defense approved restructuring the contract into a Cost Plus Fixed Fee (CPFF). The principal provisions of restructure deleted production commitments, provided options for low rate initial production and full scale production, and provided additional time (12 months) for correction of deficiencies (at the contractor's expense) and development of new/upgraded components identified by the user as essential. The program for correction of deficiencies and development and integration of new/upgraded items continued until March 1974. Development Test/Operational Test II (DT/OT II) was conducted during the period May-November 1974; test results supported proceeding to the next step in the acquisition cycle. A cost and operational effectiveness analysis, incorporating data generated during field testing, was completed in December 1974 and showed the system to be cost effective. The January 1975 Defense Systems Acquisition Review Council (DSARC) authorized the limited procurement of 14 systems to support further developmental and operational testing (DT/OT III) prior to a full scale production decision. In August 1975 Engineering Development was initiated to provide a new forward observer's device, the Digital Message Device (DMD), as authorized by the DSARC. The DMD underwent DT/OT II from June 1976 to January 1977 and was subsequently accepted as a Tactical Fire Direction System (TACFIRE) component. During FY 1977 the Department of Defense and Congress approved Army plans to continue low rate production during the period FY 1977-FY 1978 to keep the production line warm until full production deliveries begin in FY 1980. In September 1977 the full scale production option established in 1973 was restructured into five separate ceiling-priced options to provide for continued production of TACFIRE during the period FY 1977-FY 1981. This restructuring was necessary to establish options for quantities and prices which are consistent with program funding and to incorporate approved changes to the system baseline configuration and quantities required. Option 1 for eight units of TACFIRE was exercised on 30 September 1977. Other FY 1977 accomplishments include successful conduct of production acceptance testing of the first limited production units, conduct of a force development test to examine selected doctrine and tactical concepts for employment of TACFIRE, and initiation of DT III.

2. FY 1978 Program: All development objectives other than the development of diagnostic software for the automatic test equipment to be used in support of TACFIRE should be completed during this period. Significant events for FY 1978 include exercising contract Option 2 for continued low rate production of ten units, completion of DT/OT III, update of the Cost and Operational Effectiveness Analysis, and the full scale production decision.

3. FY 1979 Planned Program: Planned events for this period include completion of development of diagnostic software for the automatic test equipment (ATE) and exercise of contract Option 3 which marks the beginning of full scale production. The completion in FY 1978 of all development objectives except ATE software permits a decrease in funding.

4. FY 1980 Planned Program: Full scale production deliveries will begin.

5. Program to Completion: Completion of full scale production deliveries and worldwide fielding by December FY 1983.

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4. FY 1980 Planned Program: Full scale production deliveries will begin.

5. Program to Completion: Completion of full scale production deliveries and worldwide fielding by December FY 1981.

Program Element: # 2.37.26.A
DoD Mission Area: #413 - Fire Support

Title: Tactical Fire Direction System (TACFIRE)
Budget Activity: #4 - Tactical Programs

I. Test and Evaluation Data:

1. Development Test and Evaluation: The development contractor is the Data Systems Division of Litton Industries, Van Nuys, California, except for the Digital Message Device, which is being developed by the Magnavox Corporation. Development Test (DT) II was conducted 13 May-8 November 1974 by the US Army Test and Evaluation Command at Fort Sill, Oklahoma. DT II showed the system to be within Decision Coordinating Paper (DCP) operational thresholds except for Mean Time to Repair (MTTR) which was 34 minutes compared to the 33 minute threshold. The impact of this one minute breach is a reduction in system inherent availability from 99.55% to 99.54% which is not considered serious. Actions in progress, designed to reduce MTTR to within threshold, include improvements in maintenance and diagnostic software routines, draft technical manuals, and organization level test equipment. Based on chargeable systems failures, the Mean Time Between Failures (MTBF) at the end of DT II was 123 hours which is more than double the 60 hour DCP threshold for DT/OT II. Reliability improvements are being made which should increase system MTBF above the revised DCP threshold for DT/OT III of 150 hours. First Article Test (FAT) of the Limited Production systems was conducted from November 1976 to May 1977 at the development contractor's plant in Van Nuys, California, and White Sands Missile Range. The system met required mission response times except for very minor discrepancies as noted in paragraph I.3 below. Software deficiencies discovered in FAT have been corrected and corrective action is underway for noncompliant cables and a minor mechanical design deficiency in the line printer. FAT was also used to verify correction of DT/Operational Test (OT) II deficiencies and changes to that baseline. A separate DT II for the Digital Message Device (DMD) was conducted at White Sands Missile Range during the period June 1976-January 1977. The Defense Systems Acquisition Review Council authorized development of the DMD to replace the original forward observer device which was unsatisfactory. TACFIRE DT III was initiated at White Sands Missile Range in August 1977 and will be completed in December 1977. This testing has progressed in a very satisfactory manner since correction of a hardware deficiency (tape transport cartridge) and software deficiencies detected during early stages of the test.

2. Operational Test and Evaluation: OT I was not conducted due to the TACFIRE state-of-the-art technology, which exceeded OT I requirements. OT II was conducted by the US Army Operational Test and Evaluation Agency (OTEA) at Ft. Sill, Oklahoma, during 13 May 1974 to 26 July 1974, as part of a combined DT/OT II. A provisional Division Artillery staff was formed for the test. Tactical troops and lower level units operated the TACFIRE equipment during operational testing. Results of operational testing showed that TACFIRE is superior overall to the existing primarily manual system from the standpoint of speed, accuracy, and appropriateness of response; with regard to fire mission processing, tactical fire direction, fire planning, and information handling. Tactical fire direction personnel can operate TACFIRE equipment after receiving substantial training. Current doctrine and organization for employment of TACFIRE is adequate, but greater advantage of TACFIRE, and savings in personnel and equipment can be obtained by study and refinement of TACFIRE doctrine and organization (personnel and equipment).

The operational mean time between failure during OT II was 89.4 hours for the entire system

to include software, and peripheral and remote devices on hand. The Field Artillery Board conducted OT II for the Digital Message Device (DMD) at Fort Sill, OK, during October 1976 to determine its suitability to replace the Fixed Format Message Entry Device (FFMED). The DMD demonstrated significant improvement over the FFMED in this test and, as a result, was added to the system baseline. A TACFIRE Force Development Test and Experimentation (FDTE) was conducted by the Field Artillery Board at White Sands Missile Range during the period May-July 1977. Procedural changes were developed to distribute system inputs and functions as a means of overcoming system saturation which occurred during high intensity portions of the test scenario. Operational Test (OT) III is scheduled to be conducted for OTEA at Fort Hood, Texas, by the US Army Training and Doctrine Command's Combined Arms Test Activity (TCATA) during the period January to February 1978, using the 1st Cavalry Division. Testing will address the readiness of TACFIRE to enter full scale production. The US Army Operational Test and Evaluation Agency (OTEA) will prepare an Independent Evaluation of the system following OT III and prior to the production decision.

3. System Characteristics: (as of 30 September 1977)

Operational/Technical Characteristics	Objectives	Demonstrated Performance		Remarks
Mission Response Times (Sec):				
a. Battalion Fire Mission	10	10.3	1/, 2/	Process firing data for 3 fire units; print and display results.
b. Division Fire Mission	20	21.5	1/, 2/	Analyze targets, store fire commands; print and display results.
c. Nuclear Fire Planning	240	6.6	1/	Compute schedule of fires for 10 targets by 10 fire units; store and print results.
d. Non-Nuclear Fire Planning	900	540	1/	Compute schedule of fires for 150 targets by 30 fire units; store and print results.
e. Preliminary Target Analysis	60	15.5	1/	Recommend appropriate means to attack a particular target.
f. Nuclear Target Analysis	180	157.7	1/	Analyze 1 target for 10 fire units, display all weapons/delivery options.

Program Element: # 2.37.26.A
DoD Mission Area: #413 - Fire Support

Title: Tactical Fire Direction System (TACFIRE)
Budget Activity: #4 - Tactical Programs

Operational/Technical Characteristics	Objectives	Demonstrated Performance		Remarks
Mean-Time-to-Repair (MTTR) (Min)	NOT MORE THAN 30 3/	34	4/	Threshold is 33 minutes.
Mean-Time-Between-Failures (MTBF) (Hrs)				System demonstrated 123 hours MTBF during Development
a. Battalion Fire Direction Center (FDC)	150 3/	123	4/	Test/Operational Test (DT/OT) II compared to objective
b. Division Artillery FDC	150 3/	123	4/	of 60 hours. DT/OT III objective is 150 hours.
Data Transmission Accuracy				
a. Undetected Errors (bits)	1 in 10^6	1 in 10^6	5/	
b. Detected Errors (bits)	1 in 10^5	1 in 10^5	5/	

1/ Results of First Article Test conducted at contractor's plant (Van Nuys, CA) and White Sands Missile Range, NM, November 1977-May 1978.
2/ Noncompliance is caused by increased time required to print improved/expanded warning messages.
3/ As stated in revised Decision Coordinating Paper dated 15 Jul 75.
4/ Development Test/Operational Test II combined data.
5/ Results of data accuracy tests conducted at Fort Huachuca, AZ, April-August 1972.

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #2.37.27.A
DoD Mission Area: #412 - Close Combat

Title: Medium Antitank Assault Weapon (DRAGON)
Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	4804	2836	407	0	0	121524
	Quantities						822
D306	Medium Antitank Assault Weapon (DRAGON)	4804	2836	407	0	0	121524

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: DRAGON is the principle close combat direct fire antitank/assault weapon used by Infantry and other units to defeat heavily armored vehicles and fortifications. It is an accurate medium antitank/assault weapon that is lightweight and manportable. The gunner keeps the crosshairs of the optical sight on the target until impact. A beacon in the tail of the missile is sensed by the gunner's tracker and electronic guidance commands are sent to the missile via a wire link.

C. BASIS FOR FY 1979 RDTE REQUEST: The funds are required for completion of night tracker development. The test hardware will be refurbished and any deficiencies noted in testing will be corrected.

Major Milestones	Date
Night Tracker Operational Test II	Jun - Aug 78
Night Tracker Initial Operational Capability	

Program Element: #2.37.27.A
DoD Mission Area: #412 - Close Combat

Title: Medium Antitank Assault Weapon (DRAGON)
Budget Activity: #4 - Tactical Programs

D. OTHER APPROPRIATION FUNDS:($ in thousands)

Missile Procurement, Army	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
Funds 1/	54049	49629	0	0	0	404200
Quantities						
Trackers	3409		0	0	0	
Missiles	9496		0	0	0	
VDM	1228		0	0	0	

1/ Includes Initial Provisioning Spares; excludes Night Tracker procurement funded in Other Procurement, Army.

E. DETAILED BACKGROUND AND DESCRIPTION: The DRAGON is a weapon system which provides the infantryman with an improved capability against tanks and hard targets over that provided by its predecessor (90mm Recoilless Rifle M67). DRAGON is the US Army's medium range antitank/assault weapon that is lightweight, manportable, accurate, and lethal. It will provide an antitank/assault capability for all infantry platoons. The primary purpose of the weapon is to defeat enemy armored vehicles at ranges out to 1,000 meters. It also will be employed against fortifications, emplacements, and other materiel targets. DRAGON weighs 30.9 pounds in a ready-to-fire condition. The weapon is comprised of a 24.4 pound "round" made up of a launcher and missile, both expendable, and a non-expendable tracker weighing 6.5 pounds. DRAGON utilizes a command to line-of-sight guided missile that is tube launched with minimum recoil and is optically tracked and guided to a target by electrical impulses transmitted by a wire link. DRAGON will be organic to infantry companies and employed at the platoon level. The Viscous Damped Mount will provide increased stability and tracking capability for DRAGON when fired from the M113A1 Armored Personnel Carrier or from the ground mount of the M60 machinegun. The Night Tracker provides the capability of engaging targets under conditions of limited visibility.

F. RELATED ACTIVITIES: The DRAGON Night Tracker, now under development, will utilize components common to the TOW (tube-launched, optically tracked, wire-command link guided missile system) Night Sight. This is part of an Army program to establish standardized components for manportable night vision devices such as the TOW and DRAGON Night Sights (PE 2.37.24, Heavy Antitank/Assault Weapon System TOW), the Night Observation Device Long Range (NODLR) (PE 6.47.10 Night Vision Devices), and the Ground Laser Locator Designator (GLLD) (PE 6.43.08, Precision Laser Designators). Duplication of effort with other Services is avoided since the Director of the Night Vision Laboratory (NVL), ERADCOM, Ft Belvior, VA, is the configuration manager for DoD Thermal Imaging Systems Common Modules. NVL is the lead test laboratory, the common module document custodian and the change incorporation and distribution center for common modules. The Army is the executive Service and NVL is the agent for the multi-Service configuration control board.

Program Element: #2.37.27.A
DoD Mission Area: #412 - Close Combat

...cle: Medium Antitank Assault Weapon (DRAGON)
Budget Activity: #4 - Tactical Programs

G. WORK PERFORMED BY: The development and previous prime production contractor is McDonnell Douglas, Titusville, FL. McDonnell Douglas continued to deliver trackers and missiles through the end of CY 1977. The multi-year prime contractor for trackers, as of September 1976, is Kollsman Instruments Company, Nashua, NH. Raytheon Company, Bristol, TN, is the new prime contractor for missiles. The prime military proponent is the TOW/DRAGON Weapon System Project Manager, US Army Missile Readiness Command, Huntsville, AL.

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: DRAGON entered engineering development in 1966. The pilot production line was completed in 1970. ASARC III/DSARC III (Army and Defense Systems Acquisition Review Councils) approved the continuation of production at a low rate, system and training equipment was type classified standard, and second source contracts were awarded to round and tracker producers. The following major test programs were completed: System Engineering Test (Development Test II); System Expanded Service Test (Development Test II/Operational Test II); Launch Effects Trainer (LET) Check/Operational Test (LC/OT) on training equipment; Development Test III on LET (follow-on from the LC/OT) and System Operational Test III. Due to user dissatisfaction, the decision was made not to type classify or procure the DRAGON AN/TAS-3 Night Vision Sight. Engineering development began on the Common Module AN/TAS-5 Night Vision Sight. The Texas Instrument AN/TAS-5 Thermal Night Sight concept was selected for full scale engineering development. The AN/TAS-5 was integrated into a bracket mount to which the DRAGON Day Tracker was bolted-on. This bolt-on sight encountered bore sight shift problems that were partially corrected by strengthening the mount. A prototype model of a DRAGON Night Tracker (DNT) was made which combined the common Thermal Night Sight and Day Tracker components thus conserving weight, and the decision was made to proceed with DNT development. ASARC IIIa approved DRAGON for full production. Competitive contracts, giving 60% of the production to the winner and 40% of the production to the loser, were awarded on the round and tracker for FY 1975 and FY 1976 procurements. The Decision Coordinating Paper (DCP), developed in support of DSARC IIIa decision, was approved by the Office of the Secretary of Defense. The Viscous Damped Mount (VDM) and Launch Simulator (LS) began development. Discussions continued within the Army concerning the need for developing additional and improved training equipment. A follow-on Operational Test IIIa system test was completed at Fort Bragg, NC. A multi-year production contract was completed with Kollsman Instrument Company winning the primary Tracker contract and Raytheon Company winning the primary missile contract. The DRAGON Night Tracker was type classified Limited Procurement in Aug 77.

2. FY 1978 Program: LS development, through OT I will be completed and a decision made concerning entry into Phase II, engineering development. Phase II will be entered into only if the OT I test firings indicate a substantial improvement in hit probability for those gunners trained with the LS. The DNT will continue in engineering development completing DT/OT II, and the initial procurement contract will be awarded. The VDM was type classified standard and initial procurement contract awarded.

3. FY 1979 Planned Program: Development of the DNT will be completed. Any test shortcomings or deficiencies detected during DT/OT II will be corrected. The Technical Data Package will be completed and any changes to the documentation package necessitated by the test will be made.

4. FY 1980 Planned Program: None.

5. Program to Completion: None.

Program Element: #2.37.27.A
DoD Mission Area: #412 - Close Combat

Title: Medium Antitank/Assault Weapon (DRAGON)
Budget Activity: #4 - Tactical Programs

I. Test and Evaluation Data:

1. Development Test and Evaluation:

a. The development and previous prime contractor is McDonnell Douglas, Titusville, Florida. McDonnell Douglas will continue to deliver trackers and missiles throughout the end of CY 1977. The multi-year prime contractor for trackers, as of September 1976, is Kollsman Instruments Company, Nashua, New Hampshire; Raytheon Company, Bristol, Tennessee, is the new prime contractor for missiles.

b. Prototype Flight Evaluation Test (Development Test (DT) I) was accomplished by the US Army Missile Command from September 1966 to November 1971. The testing included components tests, launch environment tests, system integration tests and guided flight tests. The flight test program included a 157 round guided flight test with 91 unmanned firings and 66 manned firings against both moving and stationary targets. Problems encountered involved the flare lamp and window, guidance wire and the gyro. A 78 round engineering analysis and design verification flight program was conducted between March and October 1971 to correct reliability and quality control problems. Additional problems with guidance wire breakage were found. Fixes were applied to the missile and prototype flight evaluation test were conducted at Redstone Arsenal, Alabama with [44] firings in October and November 1971. Failures occurred in [7] firings and were attributed to quality control problems in the firing circuit board and the gyro. Changes were instituted in the assembly quality control.

c. Engineering test/service test (ET/ST) (Development Test II) (DT II) was conducted by US Army Test and Evaluation Command (TECOM) at White Sands Missile Range (WSMR), New Mexico, and Fort Benning, Georgia, from January through November 1972 using hard tooled preproduction rounds. No deficiencies were found in the tactical weapon system (round and tracker). Reliability deficiencies were found in the launch effects trainer (LET) (training equipment).

d. No specific DT III was planned because no deficiencies were found in the hard tooled tactical system during DT II. However, during the Launch Effects Trainer Check and Operational Test conducted during April through December 1973, it was determined that a DT III would be conducted on the LET. The purpose of the DT III was to verify that the reliability, availability, maintainability (RAM) problems encountered during the LET check and operational test had been corrected and to evaluate the training value of a modified LET. The test was conducted during August through October 1974 at Fort Benning, Georgia, by US Army Infantry Board and validated that the RAM problems had been corrected and that the modified LET was not as good a trainer as the standard LET.

e. Arctic environmental tests were conducted at the Arctic Test Center, Fort Greely, Alaska, from October 1972 through March 1973. Tropic Testing was conducted at the Tropic Test Center, Panama, from January 1974 through December 1974. No problems were encountered in either test that would indicate that DRAGON performance would be degraded in an arctic or tropic environment.

f. The original Development Test (DT) II of the interim DRAGON Night Sight, AN/TAS-3, was reduced in scope to the minimum essential to support a limited procurement. The reduced testing resulted from actions to redirect development in order to provide greater commonality in night sights. Therefore, DT II for DRAGON Night Sight was limited to temperate testing at White Sands Missile Range, New Mexico, Fort Benning, Georgia, and Fort Bragg, North Carolina, during the period May 1973 through February 1974.

g. The DRAGON Night Sight (AN/TAS-5), a member of the manportable common thermal night sight program (MCTNS), was evaluated in a DT I during March - June 1975, as a basis for selection of the DT/OT II prototypes. Although the basic thermal sights exceeded the required specification, an interface problem between the thermal sight and DRAGON missile tracker resulted in excessive boresight displacement. A redesign of the mounting bracket was accomplished. Although tests confirmed the AN/TAS-5 remounting was successful, the mount was heavy and therefore, an integrated night tracker (INT) was designed and evaluated. Government Engineering Design Test I of the INT was conducted in June 1976 at the US Army Missile Command (MICOM) and resulted in [redacted] was due to a missile failure and [redacted] to gunner error. The INT continues in development. DT II is scheduled to be conducted by TECOM at WSMR from January to May 1978.

h. At the request of the US Army Training and Doctrine Command (TRADOC) and United States Army Infantry School (USAIS), the Human Engineering Laboratory developed a mount for DRAGON incorporating a viscous damped device to increase DRAGON utility on the Armored Personnel Carrier and from the standard machinegun tripod mount for use with Mechanized Infantry. Concept evaluation tests investigated employing DRAGON with the Viscous Damped Mount (VDM). The results of these tests indicate the VDM has the potential of increasing the DRAGON hit probability when used. DT III, to evaluate production models of the VDM, is scheduled April - May 1978.

i. A tabulation of DRAGON test missile firings follows:

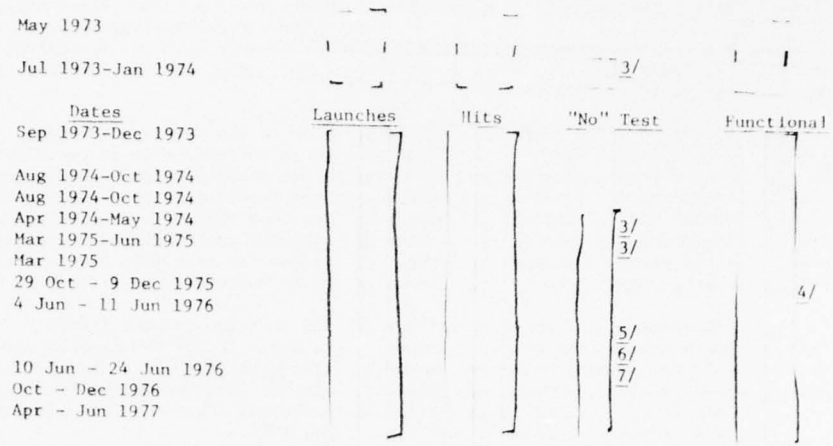
Summary of Test Firings

Test Program	Dates	Launches	Hits	"No" Test	Functional
Prototype Flight Evaluation Test 1/	Oct 1971-Nov 1971				
Engineering Test (DT II)	Jan 1972-Sep 1972				
Expanded Service Test (DT/OT II)					
Temperate	Mar 1972-Sep 1972	[redacted]	[redacted]		[redacted]
Arctic	Dec 1972-Feb 1973				
Tropic	Jan 1974-Dec 1974				
		[redacted]	[redacted]		[redacted]

Program Element: #2.37.27.A
DoD Mission Area: #412 - Close Combat

Title: Medium Antitank/Assault Weapon (DRAGON)
Budget Activity: #4 - Tactical Programs

Tactical Effectiveness Testing of Antitank Missiles (TETAM)
Night Vision Sight (AN/TAS-3) DT II (Engineering Phase)



Test Program
Launch Effects Check Test/OT
Launch Effects Trainer
DT III
OT III
Night Sight (AN/TAS-3) OT II
Night Sight (AN/TAS-5) DT I
Viscous Damped Mount
OT IIIa
Night Fighting Test
Bolt-on Thermal Night Sight
Integrated Night Tracker (INT)
Engineering Design Test I
Integrated Night Tracker OT I
Viscous Damped Mount OT II

NOTES:

1/ Configuration of these rounds was essentially the same as the current Technical Data Package (TDP). However, quality screening and testing added to the TDP prior to the test did not begin to mature until FT/ST hardware was built.
2/ firings were attempted at temperature below the required lower limit of -25 degrees F. firing test set LP deficiency.
3/ Involved night sight failure.
4/ tracker and missile failures of varying types.
5/ failures because of various tracker and missile malfunctions. Bolt-on "no test" caused when night sight objective lense fell out.
6/ The INT "no test" was caused by gunner error.
7/ missile failure and gunner error.

Program Element: #2.37.27.A
DoD Mission Area: #412 - Close Combat

Title: Medium Antitank/Assault Weapon (DRAGON)
Budget Activity: #4 - Tactical Programs

2. Operational Test and Evaluation:

a. The plans for combined engineer test/expanded service test (ET/ST) were prepared by the US Army Test and Evaluation Command (TECOM) and the US Army Combat Developments Command (CDC) working jointly so that the combined test could provide both the development evaluation data required by TECOM and the operational data needed by CDC. CDC, the independent test agency (at that time), provided test control personnel during the test and submitted an independent test report.

b. The temperate phase of the Engineering Test/Service Test (ET/ST) was conducted by typical military personnel supported by a mechanized infantry platoon at Fort Benning, Georgia, from March to September 1972. Hardware was produced from a pilot production line and was identical to full production items with the exception of minor modifications made to correct deficiencies and shortcomings found during the test. Two hundred twenty-one missiles were fired, of which 76 were used for training, 126 were used during the field evaluation phase, and 19 were used for countermeasures testing. Eight trackers were used. During the field evaluation phase, firings were conducted using various simulated combat scenarios. During ET/ST no deficiencies were found in the basic tactical system (tracker and round) or in the test set. The hit and kill probabilities achieved for DRAGON during Operational Test (OT) demonstrated a significant improvement over the medium antitank weapon, M67 90mm Recoilless Rifle. Reliability problems with the launch effects trainer (LET) and low gunner accuracy (hit probability) during tactical missile firings required modifications to provide acceptable reliability and more realistic missile launch effects to the trainer. Revised training procedures were examined to improve gunner accuracy.

c. The check/operational test of DRAGON training equipment was conducted by the US Army Infantry Board (USAIB) and the US Army Operational Test and Evaluation Agency (OTEA) at Fort Benning, Georgia, from May through October 1973. Typical infantry personnel were involved in the testing of the LET. Test objectives were to verify the correction of deficiencies found during DRAGON ET/ST and to validate the training program and training equipment. Testing involved 194 production missiles. The LET check/operational test was a combined DT/OT. OTEA provided evaluation personnel and submitted an independent evaluation in April 1974.

d. Operational Test III (OT III) was conducted by Modern Army Selected System Test Evaluation and Review (MASSTER) (now Tradoc Combined Arms Test Activity (TCATA)) under the direction of OTEA at Fort Hood, Texas, during the period September - October 1974. OT III utilized a mechanized infantry battalion task force. Two hundred and four production missiles were fired during OT III. The independent evaluation of the DRAGON was prepared and submitted by OTEA. As a result of the DRAGON Army and Defense Systems Acquisition Review Councils ASARC/DSARC) IIIa (June - July 1975), the Army was directed by OSD to conduct additional testing of the DRAGON system to assess the validity of the logistical support concept, adequacy

of the design changes to the DRAGON tracker, and to investigate the minimum effective range capability of DRAGON. DRAGON OT IIIa was conducted at Fort Bragg, North Carolina, during November - December 1975. The test reinforced the need to improve the DRAGON logistic concept, and TRADOC proposed changes to improve the logistic system. Improved training techniques significantly upgraded hit performance, and the test showed DRAGON's ability to hot at short ranges to be consistent with its probability of hit (P_h) at greater ranges. Total results: Thus, the tests showed the design modifications to be effective.

e. The DRAGON night sight is a separate program with separate testing. OT II for an interim Night Sight (AN/TAS-3) was conducted by the US Army Operational Test and Evaluation Agency (OTEA) at Hohenfels, Germany, March - May 1974 utilizing a mechanized infantry company reinforced with a Heavy Antitank/Assault Weapon (TOW) section. Based on troop participation and observation of the test and test results, US Army Europe recommended that the DRAGON Night Sight (AN/TAS-3) not be procured. The Army Materiel Development Acceptance In-Process Review, held 30 October 1974, recommended that the interim DRAGON Night Sight (AN/TAS-3) not be type classified; that accumulated data be retained and utilized in related development; and that the technical data package be completed and retained. The original DRAGON night sight in the Manportable Common Thermal Night Sight (MCTNS) program was a separate thermal sight that mated to the day tracker in a "bolt-on" fashion. Interfacing and boresight retention problems were initially experienced during research development acceptance testing and limited operational testing, but were resolved as indicated by DRAGON Night Sight OT Ia follow-on evaluation (FOE) during April - May 1976. Additionally, the DRAGON Night Sight demonstrated operationally acceptable performance in the night fighting test However, the DRAGON Night Sight/DRAGON Day Tracker combination was still overweight. The Dragon Night Tracker (DNT) was developed as a solution to the interface and weight problem. This DNT demonstrated feasibility by achieving two hits in three firings of DRAGON in the night fighting test at Fort Knox, KY, in addition to missile firings during Government Engineering Design Tests during June at Redstone Arsenal. A DNT OT I was conducted by the US Army Infantry Board (USAIB) under OTEA direction at Fort Benning, Georgia, from October - December 1976 to obtain data to assess the night and obscured conditions capability of the DRAGON with the DNT as compared to the AN/TAS-5 bolt-on sight. As compared to the bolt-on sight, the DNT is not significantly different in its performance at night. As compared to the day tracker,

OTEA is scheduled to conduct OT II from June to August 1978 at Ft Benning, GA.

f. OT II for the Viscous Damped Mount (VDM) was conducted by the US Army Infantry Board at Fort Benning, Georgia, from April to June 1977. The VDM hit probability was significantly better than the hit probability achieved in 1974 during OT III The VDM was compatible with the M122 Tripod. Durability deficiencies noted have been corrected.

Program Element: #2.37.27.A
DoD Mission Area: #412 - Close Combat

Title: Medium Antitank/Assault Weapon (DRAGON)
Budget Activity: #4 - Tactical Programs

3. Systems Characteristics:

Operational/Technical Characteristics	Objective	Demonstrated Performance
Range		
Maximum	1000M	1000M
Minimum		110M
System Reliability	[ ]	1/ 4/
Single Shot Kill Probability (SSKP)		
Stationary Target		2/ 4/
Moving Target		2/ 4/
Probability of a Hit ($P_{h/R}$)		
Stationary Target		
Moving Target		
Probability of a Kill Given a Hit (P_u/H)		
Stationary Target		
Moving Target		
System Weight	30.9 pounds 3/	30.9 pounds 3/

1/ System reliability is which is three points below the DCP threshold Reliability degradation is attributed to the round caused by workmanship problems during manufacturing, less than desirable process controls, and miscellaneous hardware problems. Corrective actions, including improved training, tighter process controls, increased inspections and tests, and hardware changes have been implemented to correct production quality problems as well as round reliability problems, and will significantly reduce round failure rate. System reliability was calculated using 4799 firings since beginning of the ET/ST program. System reliability based on operational testing and annual service practice has averaged

2/ SSKP decreased because system reliability decreased.

3/ Ready to fire weight.

4/ Corrective actions to improve tracker reliability have been implemented and tested. See paragraph 2d above.

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #2.37.30.A
Title: CHAPARRAL
DoD Mission Area: #414 - Field Army Air Defense
Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	6000	4229	100	0	0	84300
	Quantities						
	Fire Units						5
	Missiles						163
D697	CHAPARRAL	6000	4229	100	0	0	84300

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program element provides for the development of missiles, ground support equipment, and system improvements for the CHAPARRAL air defense missile system, and for improvements to the Forward Area Alerting Radar (FAAR) System. The CHAPARRAL Air Defense Missile System provides low altitude, fair weather air defense for Infantry/Mechanized Infantry/Armor Divisions and key rear area activities and installations. The FAAR provides alert warning information for CHAPARRAL as well as for the REDEYE and VULCAN Forward Area Air Defense Systems.

C. BASIS FOR FY 1979 RDTE REQUEST: Funds are required to complete the development of a smokeless motor for the CHAPARRAL missile. Program milestones:

MILESTONE	DATE
CHAPARRAL RDTE Program Initiated	February 1965
Initial Operational Capability	November 1969
System Type Classified Standard	November 1970
Improved CHAPARRAL Missile (less smokeless motor type classified standard)	November 1974

Program Element: #2.37.30.A
DoD Mission Area: #414 - Field Army Air Defense

Title: CHAPARRAL
Budget Activity: #4 - Tactical Programs

MILESTONE (Continued)

	DATE
Initiated Smokeless Motor Development	November 1975
Completed Design Verification Test Smokeless Motor	September 1977
Initiated Government Testing of Smokeless Motor	October 1977
Complete Government Testing of Smokeless Motor	May 1978 (Projected)
Production Decision for Smokeless Motor	June 1978 (Projected)

D. OTHER APPROPRIATION FUNDS: ($ in thousands)

	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
Missile Procurement, Army						
CHAPARRAL Missiles	59700	30000	31800	3100	9500	457400
Missile Modifications	0	0	7100	15200	0	50600
Quantities						
Fire Units	0	0	0	0	0	
Missiles	2000	850				

E. DETAILED BACKGROUND AND DESCRIPTION: In November 1964, the Secretary of Defense directed the initiation of a development program for an interim air defense system to provide low altitude, fair weather, air defense protection in the forward areas of the theater army. Existing missile systems such as HAWK were too large and expensive to provide the mobility and proliferation required to counter modern fighter aircraft using very low altitude attack techniques. A combination missile/gun defense was determined to be the optimum means of meeting the requirement. The CHAPARRAL and VULCAN air defense systems were developed and fielded as composite battalions. CHAPARRAL/VULCAN battalions are currently authorized in all US Army divisions, except airborne and air assault, which only have VULCAN. Additional nondivisional battalions have the mission of protecting selected targets in the Corps rear areas, such as airfields and vital installations. The CHAPARRAL system consists of the MIM-72A Basic or MIM-72C Improved CHAPARRAL missile (derivative of the Navy Sidewinder 1C Air-to-Air missile), the M54 guided missile launching station, the M730 tracked vehicle carrier and appropriate communications, maintenance, and test equipment. The MIM-72A Basic Missile, originally fielded with the CHAPARRAL system, has several recognized limitations including a tail chase only engagement capability. The MIM-72C Improved

CHAPARRAL Missile was developed to alleviate those limitations. The significant improvements incorporated by the MIM-72C are the AN/DAW-1 Guidance Section, Directional Doppler (DIDO) Fuze, Blast Fragmentation Warhead and a Smokeless Missile Motor. The AN/DAW-1 Guidance Section provides an all aspect forward hemisphere firing capability, increases the close-in engagement capability, has improved producibility and improves the system's performance against such

The DIDO Fuze has much increased and coupled with the new warhead, provides increased lethality for the missile. The Smokeless Missile Motor, which is still in development, reduces the system's battlefield signature and reduces gunner reaction time for succeeding engagements. The M54 Launching Station is a movable turret with supporting base structure which provides the gunner with full capability for aiming and firing the missiles. The M730 fully-tracked vehicle transports the five-man crew, launching station and basic load of 12 CHAPARRAL missiles. The system currently relies on visual target identification; however, development is essentially complete on a Mark XII, Crypto-Secure Identification Friend or Foe (IFF) set for the system. The forward area alerting radar (FAAR) is a lightweight, highly mobile radar which provides alerting and tentative identification data on aircraft to ranges of A FAAR platoon consisting of eight radars is authorized for divisional CHAPARRAL/VULCAN battalions. Nondivisional FAAR platoons have six radars. Alerting data are received on portable target alerting data display sets (TADDS) authorized for CHAPARRAL/VULCAN fire units and REDEYE teams. (REDEYE is the Army's current short range, man-portable, shoulder fired air defense missile system. It is designed to move with the troops and provide continuous and immediately responsive air defense).

F. RELATED ACTIVITIES: VULCAN (Program Element 2.37.32.A), ROLAND (Program Element 6.43.09.A) and STINGER (Program Element 6.43.06.A) are complementary programs. Duplication of effort is avoided by continuous CHAPARRAL project office coordination with the Naval Weapons Center, China Lake, CA, developer of the Sidewinder 1C, the US Army Missile Research and Development Command Laboratories, which maintain cognizance of Army and other service programs, and through continuous coordination with other project offices.

G. WORK PERFORMED BY: The CHAPARRAL ground support equipment is contracted through US Army Missile Materiel Readiness Command, Huntsville, AL, to Ford Aerospace and Communications Corporation (formerly Aeronutronic Ford), Newport Beach, CA. The basic CHAPARRAL missile (MIM-72A), less guidance section, was procured by Military Interdepartmental Procurement Request (MIPR) through the Navy. The guidance section was contracted to Raytheon, Bedford, MA. The Improved CHAPARRAL Missile (MIM-72C) is contracted through US Army Missile Materiel Readiness Command to Ford Aerospace. The contractor for the CHAPARRAL carrier, M730, is the FMC Corporation, San Jose, CA. The Forward Area Alerting Radar (FAAR) was contracted to Sanders Associates, Incorporated, Bedford, MA for the first procurement and to Sperry, Gyroscope Division, Great Neck, NY for the second procurement.

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: CHAPARRAL development began in Feb 1965. Limited production (LP) was approved for the CHAPARRAL missile in September 1965 and for the CHAPARRAL fire unit in November 1965. The first tactical CHAPARRAL unit was deployed in November 1969 and the system was type classified Standard in November 1970. The Improved Missile was type

classified standard November 1974. A program to develop a prototype target acquisition air (TAA) which would permit CHAPARRAL to engage targets under nighttime/reduced visibility conditions was completed in December 1974. However, the TAA has not been adopted due to cost and complexity. The original AN/DAW-1 Guidance Section remained and an indepth study of the problem was made in 1974. In 1975 the US Army Missile Research and Development Command (MIRADCOM) conceived and evaluated a fix (later to be designated "GOLDEN I") which promised to provide the improved missile with a significant capability both quicker and cheaper than the techniques identified in the study. MIRADCOM, in conjunction with the contractor, validated and finalized the "GOLDEN I" design and improved CHAPARRAL missiles incorporating this fix were successfully fired. These firings confirmed that the "GOLDEN I" fix provided the CHAPARRAL with a throughout much of the launch boundary. A development effort to optimize the "GOLDEN I" fix was initiated in April 1976. additional firings were conducted in connection with that effort, of which were successful and confirmed predictions of improved performance over "GOLDEN I". Improved CHAPARRAL missiles incorporating "GOLDEN I" are

The smokeless motor development effort was initiated in November 1975. This program is currently on schedule and within budget. Firing tests have demonstrated that the smokeless motor meets the performance requirements of the CHAPARRAL at both the low and high temperature extremes. The Identification Friend or Foe (IFF) Development program began in June 1975 as a product improvement proposal. The development concept called for integration of the IFF interrogator and programmer developed for STINGER (replacement for REDEYE), with an antenna, electronic controls and interconnections developed for the CHAPARRAL fire unit. The IFF was approved for production in September 1977, subject to approval for production of the STINGER interrogator and programmer. During the FY 1977 budget hearings the Army was directed by Congress to initiate an adverse weather CHAPARRAL demonstration program to provide a hedge against ROLAND technical and funding problems. The demonstration hardware consists of the current CHAPARRAL fire unit with minor modifications, the CHAPARRAL missile, modified with a radio frequency (RF) guidance section, and the following components from the British RAPIER BLINDFIRE Air Defense System: DN-181 Tracking Radar, Television Gathering Unit and Command Transmitter. The program plan calls for four adverse weather CHAPARRAL firings flown command-to-line-of-sight to the target during March and April 1978. Work commenced on the Forward Area Alerting Radar (FAAR) in May 1966. The FAAR was initially approved for Limited Production in October 1968. Approval for LP was rescinded in March 1969 because of equipment deficiencies. Following modification and test, the system was returned to LP status, and approved for full production in April 1971. The first nine FAAR Platoons were deployed beginning December 1972 and the FAAR was type classified standard in February 1973. The second procurement of FAAR to complete the fill of active Army units was contracted in May 1974.

2. FY 1978 Program: The principle efforts will focus on the smokeless missile motor program and the adverse weather demonstration program. For the smokeless motor program, the government is to complete developmental testing of the motor and the contractor is to complete the physical configuration audit, design to unit production cost and finalization of the technical data package. For the adverse weather program, the contractor will complete the fabrication of demonstration hardware (started in FY 1977), and perform engineering, analysis, hardware integration and computer simulation necessary for the

four-flight demonstration. The contractor will also conduct the four-flight demonstration and prepare a final report. Government tasks for the adverse weather demonstration program include simulation work necessary for proof of the command-to-line-of-sight concept, the provision of government furnished equipment, program management and test range support. The following tasks, of lesser magnitude than those described for the aforementioned programs, will be performed in connection with closing out the Identification Friend or Foe Program: fabrication, test and certification of special acceptance inspection equipment, completion of the government's final test report; and depot refurbishment of fire units, test equipment and training equipment utilized in testing of the IFF.

3. FY 1979 Planned Program: Complete the Smokeless Missile Motor Development Program to include the following tasks: Review and approve contractor's final technical report; review and analyze the government's final test report and determine what corrective actions, if any, are required; review and analyze the final technical data package to insure completeness and adequacy.

4. FY 1980 Planned Program: No RDTE tasks currently planned after FY 1979.

5. Program to Completion: Not Applicable.

Program Element: #2.37.30.A
DoD Mission Area: #414 - Field Army Air Defense

Title: CHAPARRAL
Budget Activity: #4 - Tactical Programs

I. Test and Evaluation Data:

1. Development Test and Evaluation:

a. The prime development contractor for CHAPARRAL was Ford Aerospace and Communications Corporation (formerly Aeronutronic Ford) Newport Beach, California. The US Naval Weapons Center, China Lake, California, performed redesign, modification and evaluation of the SIDEWINDER 1C missile for use in the CHAPARRAL program. The system consists of the MIM-72A or MIM-72C CHAPARRAL missile (SIDEWINDER adaptation), the M54 guided missile launching station, the M730 tracked vehicle carrier and appropriate communications, maintenance and test equipment. The MIM-72A Basic CHAPARRAL missile was originally fielded with the system. Engineering design/military potential testing of the CHAPARRAL system was conducted during the period March 1965 to August 1965. Based on the favorable results of those tests, limited production (LP) type classification was approved in September 1965 for the MIM-72A Basic CHAPARRAL missile and in November 1965 for the ground equipment. Engineering test (ET) and service test (ST) were initiated in May 1967 and the major portions had been completed by March 1969. A portion of an initial production test (IPT) was integrated with ST and completed therewith. The remainder was assigned to the ET agency and completed in January 1970. As a result of ET/ST/IPT the system was found suitable for deployment. Tropic environment tests were conducted from July 1968 to February 1970 and Arctic environment tests were conducted from October 1969 to February 1970. These tests resulted in no change in the Army's position concerning the system's suitability for deployment. The CHAPARRAL system was type classified Standard in November 1970.

b. The MIM-72C Improved CHAPARRAL Missile was developed to alleviate limitations in the MIM-72A Basic version. The significant improvements incorporated by the MIM-72C are the AN/DAW-1 Guidance Section, Directional Doppler (DIDO) Fuze, Blast Fragmentation Warhead, and a Smokeless Missile Motor. Prototype and engineering tests of the MIM-72C, all-aspect Improved CHAPARRAL missile, less the Smokeless Motor, were conducted from May 1971 through July 1973. firings were successful, of which were contact hits on the target. Development test (DT) II was conducted from November 1973 through December 1974. were successful. The missile tested was essentially the same as the one procured, with the exception of the AN/DAW-1 "GOLDEN" modifications and Smokeless Missile Motor discussed below. Reliability, availability and maintainability characteristics of the Improved missile equaled or exceeded that of the Basic missile.

c. The original AN/DAW-1 Guidance Section remained and a fix designated "GOLDEN I" was developed and tested during the period January to December 1975. This effort culminated with the successful firing of CHAPARRAL missiles incorporating "GOLDEN I" against FIREBEE targets These firings confirmed that the "GOLDEN I" fix provided the CHAPARRAL with a throughout much of the launch boundary. However, it was found that "GOLDEN I" could be further optimized and in April 1976 a development effort was undertaken for that purpose. additional firings were conducted in connection with

this effort, of which were successful and confirmed predictions of improved performance over "GOLDEN I". The resulted from the and was in no way connected with the AN/DAW-1 "GOLDEN" fix. Improved CHAPARRAL missiles incorporating "GOLDEN I" are currently Optimized "GOLDEN" (GOLDEN II) was cut into production following an initial Improved missiles with "GOLDEN I" only. Improved missiles with "GOLDEN II" should begin reaching the field by

d. The Smokeless Motor began advanced development in November 1975 and is being tested under a Single Integrated Test Program concept. Contractor design verification tests were completed successfully in September 1977 and Government testing began in October 1977.

e. An Identification Friend or Foe (IFF) Development Program was initiated in June 1975 as a Product Improvement Proposal. Again, a single integrated test program concept was used. Contractor and Government tests have been completed successfully, and based on the favorable results of those tests, the IFF was approved for production in September 1977, subject to approval for production of STINGER-Common Hardware used with CHAPARRAL IFF.

f. During the FY 1977 Budget Hearings the Army was directed by Congress to initiate an adverse-weather CHAPARRAL demonstration program to provide a hedge against ROLAND technical and funding problems. The demonstration hardware consists of slightly modified CHAPARRAL fire unit, the CHAPARRAL missile modified with a radio frequency (RF) section and the following components from the British RAPIER BLINDFIRE Air Defense System: DN-181 Radar, Television Gathering Unit, and Command Transmitter. The program plan calls for four adverse-weather CHAPARRAL firings flown command-line-of-sight to the target during March and April 1978.

g. The Forward Area Alerting Radar (FAAR) engineer design tests (EDT) were conducted during the period April 1967 to October 1968. Type classification Limited Production (LP) was awarded upon completion of EDT. Engineering test (ET) and service test (ST) began in March 1968 and May 1968, respectively. These tests were suspended in March 1969 due to numerous equipment deficiencies. The LP type classification was rescinded as a result. ET and ST resumed in January 1971, following verification that problems previously identified had been corrected. ST was completed in July 1971 and ET in September 1971. Initial production tests were conducted from December 1971 through August 1972. These tests resulted in the FAAR being type classified Standard in February 1973. Additional testing has included a tropic test conducted from June through December 1973 and a special evaluation (SE), Phase I test, conducted at Modern Army Selected Systems Test and Evaluation Review (MASSTER), Fort Hood, Texas, in November and December 1973. A second production contract for FAAR was let in May 1974 and initial production and first article testing conducted.

Program Element: #2.37.30.A
DoD Mission Area: #414 - Field Army Air Defense

Title: CHAPARRAL
Budget Activity: #4 - Tactical Programs

2. Operational Test and Evaluation:

a. CHAPARRAL: The US Army Operational Test and Evaluation Agency (OTEA) conducted Operational Test II (OT II) of the MIM-72C Improved missile in two phases with troops, a nonfiring phase at Fort Lewis, Washington, in February 1974 and a firing phase at Fort Bliss, Texas, in March 1974. The firing phase was planned to consist of firings. The first [six firings were all] successful and generated sufficient data to satisfy test objectives. Because of this, further operational testing was not required. An independent evaluation was prepared and submitted by OTEA.

b. Forward Area Alerting Radar (FAAR): Phase II of the special evaluation (SE) test was completed by OTEA at Fort Lewis, Washington, during February 1974. The results of Phase I and Phase II were briefed to the Director, Defense Research and Engineering, on April 5, 1974. Based on these actions, the second procurement was approved.

3. System Characteristics:

a. CHAPARRAL:

Operational/Technical	Objective	Demonstrated Performance 1/	Comments
Mobility and Transportability	Self-propelled 100 percent mobile; Capable of travel over rough terrain; Transportable by rail, Phase II air operations, highway and ship; Move from beached craft to shore under own power; Transport by helicopter.	Met	Not Applicable
Reload (rounds/minute)	4/5	Met	Not Applicable
Emplacement Time	45 seconds.	Met	Not Applicable
Launching Station Weight (empty)	10,000 pounds.	8,726 pounds	—
Minimum/Maximum Intercept Range	MIM-72A:	MIM-72A:	
	MIM-72C:		Not Applicable

Program Element: #2.37.30.A
DoD Mission Area: #414 - Field Army Air Defense

Title: CHAPARRAL
Budget Activity: #4 - Tactical Programs

System Characteristics: (cont)

Operational/Technical	Objective	Demonstrated Performance 1/	Comments
Fuze: MIM-72A			
MIM-72C		Met	
Warhead: MIM-72A		Met	Not Applicable
MIM-72C		Met	Not Applicable
System Mean Effectiveness (Benign Environment)			Not Applicable
Accuracy (Successful Intercepts)	Not Specified		2/ Not Applicable
Direct Hits	Not Specified		2/ Not Applicable
Period of Operation	Continuous for 18-hour day	Met	2/ Not Applicable
Mean Reaction Time	15 seconds.	Met	Not Applicable
Launch Sequence	Less than 1 second	Met	Not Applicable
Energize System from Standby	Less than 40 seconds.	Met	Not Applicable
Crew Size	Operate by one man; 5 man crew.	Met	Not Applicable
b. FAAR:			
Probability of Detection			Not Applicable
Range			Not Applicable
Elevation			Not Applicable
Altitude			Not Applicable
Emplacement	20 minutes	Met	Not Applicable
March Order	15 minutes	Met	Not Applicable

Program Element: #2.37.30.A
DoD Mission Area: #414 - Field Army Air Defense

Title: CHAPARRAL
Budget Activity: #4 - Tactical Programs

System Characteristics: (cont)

Operational/Technical	Objective	Demonstrated Performance 1/	Comments
Frequency	Not Specified		Not Applicable
Scan Rate			Not Applicable
Radar Mean Time Between Failures	100-350 hours	142 hours	3/

1/ During engineering test, service test, initial production test and user tests.
2/ Demonstrated during prototype and engineering tests and DT II/OT II for Improved missiles.
3/ Based on Product Assurance Quarterly Reliability Report 1QFY75.

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #2.37.31.A

Title: Surface-to-Air Missile HAWK/HAWK Improvement Program (SAM HAWK/HIP)

DoD Mission Area: #414 - Field Army Air Defense

Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	18722	12538	3143	6593	3920	179842
	Quantities (Msls/GSE Sets)						(5/2)
D690	SAM HAWK/HIP	18722	12538	3143	6593	3920	179842

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Development work in this program is to upgrade Improved HAWK system effectiveness, maintainability, and survivability to meet the projected threat into the 1980s.

C. BASIS FOR FY 1979 RDTE REQUEST: To continue development of Antiradiation Missile (ARM) countermeasures and electronic counter-countermeasures to maintain system effectiveness and survivability and to conduct systems analysis in support of Army planning for the Improved HAWK to PATRIOT transition.

Major Milestones	Date
Engineering Development Contract Awarded	Nov 64
Initial Operational Capability	Nov 72

D. OTHER APPROPRIATION FUNDS:($ in thousands)

	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
Missile Procurement, Army						
Funds	88800	93300	72270	60497	10180	989600
Quantities (Msls/GSE Sets)	526/3	509/0	608/0		0/0	
Military Construction	0	0	0	0	0	1300

CLASSIFIED BY: 1-HAWK SCG, 15 Feb 77
EXEMPT FROM GENERAL DECLASSIFICATION
SCHEDULE OF EXECUTIVE ORDER 11652
EXEMPTION CATEGORY 1

DECLASSIFY ON: 31 December 1987

Program Element: #2.37.31.A

Title: Surface-to-Air Missile HAWK/HAWK Improvement Program (SAM HAWK/HIP)

DoD Mission Area: #414 - Field Army Air Defense

Budget Activity: #4 - Tactical Programs

E. DETAILED BACKGROUND AND DESCRIPTION: Technical assessments and operational testing confirmed the low reliability of the Basic HAWK System. Consequently, a HAWK Improvement Program (HIP) was initiated in 1964 to meet the Soviet high performance fighter and light bomber threats until replaced by Surface-to-Air Missile Development (SAM-D). The HAWK Improvement Program (HIP) provides a significant increase in HAWK system effectiveness due to a new missile, reduced reaction time by the addition of a computer, and electronic warfare counter-countermeasures. Modifications to the various radars and other ground support equipment were also developed to incorporate built-in test equipment and to achieve compatibility with the new missile and computer. Development of additional product improvements was initiated in FY 1973 to correct significant field problems and to enable the system to meet threat requirements into the 1980s.

F. RELATED ACTIVITIES: The US Marine Corps is actively participating in the HAWK Improvement Program. Program coordination is accomplished by exchange of technical reports and attendance at scientific meetings and conferences. The Identification Friend or Foe (IFF) System (AN/TPX-46) for HAWK is part of a National Defense Program. (Program Element #6.47.09.A, IFF Equipment.) The NATO HAWK Consortium, under the HAWK European Limited Improvement Program Agreement, contracted direct with US Industry to convert their HAWK assets to the Improved System. Under the US-Japan Co-production Agreement, Japan is manufacturing Basic HAWK.

G. WORK PERFORMED BY: The project is managed by the US Army Missile Materiel Readiness Command (MIRCOM), Huntsville, AL. It is conducted by contract and in-house efforts. The prime contractor is Raytheon Company, West Andover, MA.

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: The HAWK Improvement Program was initiated in November 1964 and engineering development was completed by the end of FY 1969. A series of flight test programs from March 1970 to September 1971 demonstrated the required performance and high reliability of the new missile and led to subsequent system type classification Standard A in December 1971. The Secretary of Defense approved a Revised Program Memorandum on 10 January 1972 and the procurement contract was signed on 14 January 1972. A combined Development Test III/Operational Test III (DT III/OT III) was conducted from May through July 1972 and led to a decision to field the system. The first battalion's formal Initial Operational Capability (IOC) was 10 November 1972. Missile modifications were developed to increase missile capability against Flight tests of these modifications were successfully completed in July 1974 and approved for incorporation into production and for retrofit. A development program to provide selected system improvement to correct field problems and to meet threat requirements into the 1980s was initiated in FY 1973. Development was completed on four improvements in FY 1977: (1) new modulator-oscillator for the Improved Continuous Wave Acquisition Radar (ICWAR) to improve its reliability, availability, and maintainability (RAM) characteristics; (2) new Digital Signal Processor for the Improved Pulse Acquisition Radar (IPAR) to improve its acquisition capability in a high clutter environment; (3) hardware associated with increasing the memory of

Program Element: #2.37.31.A

Title: Surface-to-Air Missile HAWK/HAWK Improvement Program (SAM HAWK/HIP)

DoD Mission Area: #414 - Field Army Air Defense

Budget Activity: #4 - Tactical Programs

the Automatic Data Processor (ADP) in the Information Coordination Central which enhances the usefulness of the ADP in the areas of threat ordering, training, maintenance, and low altitude aircraft correlation. This improvement also includes a digital computer-to-computer interface with the AN/TSQ-73 Air Defense Command and Control System; and (4) an system and Emission Control (EMCON) capability for the Improved High Powered Illuminator Radar (IHPI) to increase system capability against multiple targets and in electronic countermeasures (ECM) and Antiradiation Missile (ARM) environments. Development was terminated in FY 1977 on several improvements such as improved system mobility based on Army plans to field the PATRIOT system on an accelerated basis.

2. FY 1978 Program: Continue development of previously started system improvements and system analysis in support of Improved HAWK/PATRIOT transition. Development of an ultra-low-sidelobe antenna for the Improved Pulse Acquisition Radar (IPAR) to improve its detection capability in an ECM environment will be completed. Development will continue on an Emission Control (EMCON) modification to improve the survivability of the IPAR in an ARM environment and on an active fuze for the Improved Missile to improve its performance in an ECM environment. Additionally, a military utility test of the system will be conducted in Europe.

3. FY 1979 Planned Program: Continue development of the IPAR EMCON modification; continue system analysis in support of Improved HAWK/PATRIOT transition; and conduct Development Test (DT) III testing of the Improved Continuous Wave Acquisition Radar (ICWAR) modulator-oscillator, IPAR Digital Signal Processor, and increased memory and AN/TSQ-73 Air Defense Command and Control System data link modifications. These modifications will increase the effectiveness and survivability of the Improved HAWK system in an ever increasing electronic countermeasures and antiradiation missile environment.

4. FY 1980 Planned Program: Complete development of the IPAR EMCON modification; continue systems analysis in support of Improved HAWK/PATRIOT transition; and conduct DT III testing of the IPAR Ultra Low Sidelobe Antenna (ULSA) modification.

5. Program to Completion: DT III testing of IPAR EMCON and, if approved for production, IHPI EMCON will be conducted in FY 1981. Systems analysis in support of Improved HAWK/PATRIOT transition will continue in FY 1981.

Program Element: #2.37.31.A
DoD Mission Area: #414 - Field Army Air Defense

Title: Surface-to-Air Missile HAWK/HIP
Budget Activity: #4 - Tactical Programs

I. Test and Evaluation Data:

1. Development Test and Evaluation: The Improved HAWK Development Test II began with an Engineering Test/Service Test conducted Janaury through December 1969 during which 16 missiles were fired. Special missile "CORE" tests were conducted March through July 1970. After a review of the "CORE" test results, fuze improvements were made and a Performance Demonstration Test (PDT) was conducted from January to April 1971. All of the PDT performance objectives were met but the reliability of the missile was less than required. Following action taken by the contractor to improve quality control, a reliability demonstration test was conducted August through September 1971. Eighteen scorable flights showed a point reliability of DT III (Initial Production Tests) were conducted May through November 1972. All missile requirements were met but test results directed investigation toward improving performance against multiple and maneuvering targets. Six modifications were successfully tested in July 1974.

The six modifications were approved for production and retrofit into previously produced missiles. A tabulation of Improved HAWK Missile firings as of 30 September 1977 follows:

Summary of Test Firings

	Dates	Attempted Firings 2/	Successful Flights 1/	Unsuccessful Flights	No Test
Development/Operational Test	Aug 67 - Jul 74	150 3/			
Lot Acceptance Test	May 72 - Continuing	93			
Annual Service Practice	Mar 74 - Continuing	222			

1/ Successful flights were those in which the test objectives were met.
2/ of these launches were in a tactical configuration and resulted in successful flights, failure, and no test.
3/ 21 of these firings were to test missile modification and were of several configurations to support differing test objectives and were therefore not scored as success or failures.

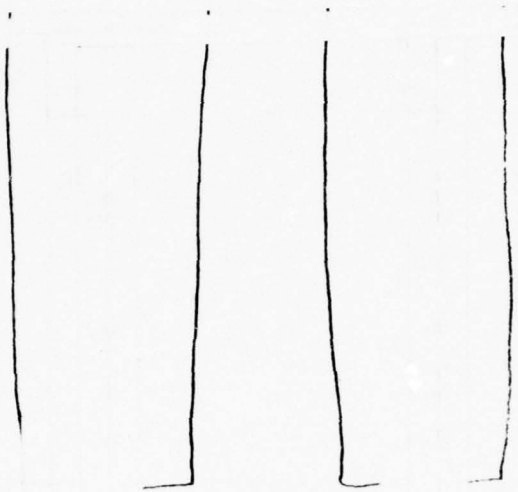
In addition to missile firing tests, temperate zone development tests were completed in November 1969, tropic zone tests were completed in December 1973 and arctic zone tests were completed in March 1974. An Integrated Development Test/Operational Test (DT/OT) II test of four product improvements was completed during FY 1977: (1) new transmitter (modulator-oscillator) for the Improved Continuous Wave Acquisition Radar (ICWAR); (2) new digital signal processor for the Improved Pulse Acquisition Radar (IPAR); (3) increased memory of the Automatic Data Processor (ADP) and computer-to-computer interface with the Air Defense Command and Control System, AN/TSQ-73, and (4) The four product improvements were subjected to an integrated test jointly planned and conducted by contractor, Government developmental and Government operational test representatives. The first phase of test measured system performance, using approximately sixty aircraft tracking missions and was followed by environmental roadability and Reliability, Availability, and Maintainability (RAM) tests. An I-HAWK Battery modified with the four product improvements was successfully used to fire two lot acceptance missiles. DT/OT testing was completed on three of the four product improvements in July 1977. The]will be subjected to further testing in Europe based on recommendations from both the US Army Test and Evaluation Command and the US Army Training and Doctrine Command. Based on test results, affirmative hardware production decisions were made on the ICWAR transmitter, IPAR digital signal processor, and ADP increased memory in August 1977.

2. Operational Test and Evaluation: The Improved HAWK Initial Operational Test and Evaluation (IOTE) was conducted May through July 1972 at McGregor Range, New Mexico. Typical military personnel conducted round-the-clock operation of the equipment, engaged 405 live aircraft tracks and conducted live firings. Thirty-seven minor deficiencies were discovered during test. These minor deficiencies have since been corrected. Reliability failure in out of missiles fired during the test indicated that normal handling by troops might adversely affect missile reliability. The Combat Development Command (CDC) recommended additional tests. FY 1970 missiles were subjected to extensive field handling. of these missiles successfully passed theater readiness monitoring facility (TRMF) tests. of these missiles were fired and all successfully intercepted targets, thus indicating that field handling has no adverse effect on missile reliability. An In-Process Review on 15-16 August 1972 directed immediate fielding. The Improved HAWK became operational in Europe on 10 November 1972. The Operational Test and Evaluation Agency (OTEA) conducted a follow-on test during June and September 1973 in Europe to ascertain that earlier noted deficiencies had been corrected. Problems were noted in areas of communications, Identification Friend or Foe (IFF), supply and generators. Improvements in all four of these areas have since been effected. Overall analysis indicated that the system performed extremely well in an operational environment against a realistic threat. During March and April 1977, the user conducted a four-week operational test of four product improvements: (1) new Improved Continuous Wave Acquisition Radar (ICWAR) transmitter; (2) new Improved Pulse Acquisition Radar (IPAR) digital signal processor; (3) increased Automatic Data Processor (ADP) memory and computer-to-computer interface with the AN/TSQ-73 fire distribution system; and (4) system. The test included a two week period of continuous, around-the-clock operation. Approximately thirty aircraft tracking missions were conducted during the test period. The test set up consisted of two remotely located HAWK firing units interconnected by the Army Tactical Data Link (ATDL) through the AN/TSQ-73 Air Defense Command and Control System. It was demonstrated that target information could be passed automatically from computer-to computer. Target acquisition information acquired by one firing unit was passed across the data link and used by a remotely located fire unit to designate the tracking

radar and achieve target track. Operational Test (OT) II testing on three of the four product improvements was completed in April 1977. Follow-on testing of the system will be conducted in Europe, starting January 1978. Based on test results, decisions to proceed with hardware production were made on the Improved Continuous Wave Acquisition Radar (ICWAR) transmitter, Improved Pulse Acquisition Radar (IPAR) digital signal processor, and Automatic Data Processor (ADP) increased memory in August 1977.

3. System Characteristics:

Operational/Technical Characteristics	Objectives	Demonstrated Performance 1/
o Intercept Dead Zone (slant range-km)		
o Max Intercept Range (slant range-km)		
o Intercept Altitudes (km)		
Minimum		
Maximum		
o Target Speed Handling Capability (M/Sec)		
Minimum		
Maximum		
o Average Reaction Time (sec)		
Automatic Operation in Low Altitude, Non-Electronic Countermeasure (ECM) mode		
o Missile Mission Reliability 4/		
o Inherent System Availability (Ai) 5/		
o Systems Probability of Detection Evaluation and Transfer (PDET) (no ECM)		
o Probability of Single Shot Kill (PSSK) (MIG-21, K-Kill)		
Single Target (no ECM)		
Single Target in a Multiple Target Formation (no ECM) 6/		
Single Target (ECM deception)		
o Inherent System Effectiveness (ES) (Single Target, no ECM) 5/		



Program Element: #2.37.31.A
DoD Mission Area: #414 - Field Army Air Defense

Title: Surface-to-Air Missile HAWK/HIP
Budget Activity: #4 - Tactical Programs

1/ Improved HAWK test reports through September 1977.
2/ [illegible]

3/ Limited by target capability.
4/ Defined as the success versus attempt ratio for a particular test of completing the launch, guide on target, and fuze operation without malfunction for a variety of mission profiles (multiple, single ECM targets) which the missile is designed to handle.
5/ Inherent availability and effectiveness do not include actual support environment.
6/ The Probability of Single Shot Kill (PSSK) results from computer simulations with the six missile modifications and is an average across the performance envelope. The simulations have been validated by live firings against multiple targets.

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #2.37.33.A
DoD Mission Area: #413 - Fire Support

Title: Improved Nonnuclear LANCE Warhead Section
Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	1050	4218	5921	3000	0	14189
	Quantities (XM74): To be determined.						
D231	Improved Nonnuclear LANCE Warhead Section	1050	4218	5921	3000	0	14189

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Develop improved munition and incorporate into M251 Nonnuclear Warhead Section to double the effectiveness of Nonnuclear LANCE. The Army Authorized Objective for Nonnuclear LANCE is based on the effectiveness of the improved Warhead Section.

C. BASIS FOR FY 1979 RDTE REQUEST: Conduct studies, analysis and tests to develop the XM74 bomblet for use in the M251 Nonnuclear Warhead Section.

Major Milestones	Date
Begin Improved Bomblet Development	Oct 76
Improved Bomblet Final Design Selected	Oct 78
Begin Warhead Section Loading	Jan 79
Begin Development Testing	Aug 79
Complete Development Testing	Jan 81
Release for Production	Jan 81
Complete Production of Improved Nonnuclear LANCE Warhead Sections	

Program Element: #2.37.33.A
DoD Mission Area: #413 - Fire Support

Title: Improved Nonnuclear LANCE Warhead Section
Budget Activity: #4 - Tactical Programs

D. OTHER APPROPRIATION FUNDS: ($ in Thousands)

	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
Procurement (Missile Procurement, Army)						
Funds	0	0	0	0	17159	17159
Quantities (Improved Nonnuclear LANCE Warheads)					720	720

E. DETAILED BACKGROUND AND DESCRIPTION: The Nonnuclear LANCE (NNL) missile system is an all weather, general support artillery system to provide nonnuclear fires on high priority targets. NNL is type classified Standard and is currently being produced for US and foreign military sales. The US Army has been authorized and funded to procure 720 NNL missiles, 360 in FY 1977 and 360 in FY 1978. The long term objective of this improvement program is to the effectiveness of the Nonnuclear LANCE Missile System with a unit price increase of $15 thousand (FY 1976 constant $) or less. This will be accomplished by development and incorporation of an improved munition. The tasks to be completed in FY 1979 are XM74 bomblet producibility studies, XM74 bomblet qualification tests, and full-scale LANCE flight testing of the improved bomblet. Additional activities include: studies and analyses necessary to ensure that overall system performance, accuracy, reliability and operational characteristics are not degraded by the incorporation of the improved munition; and purchase of long lead time components to support system flight tests early in FY 1980.

F. RELATED ACTIVITIES: The US Army Armament Research and Development Command, Dover, NJ has demonstrated the feasibility of improving the XM74 bomblet by incorporating high density fragment materials for use against light materiel and personnel. US Air Force Project Program Element 6.46.02.F is currently investigating and evaluating other improvements to similar munitions. All similar other service efforts are coordinated with this program to preclude duplication of effort.

G. WORK PERFORMED BY: Honeywell Inc., Hopkins, MN; Vought Corporation, Michigan Division, Warren, MI; Chamberlain Manufacturing Corporation, Waterloo, IA; AJAX Hardware Corporation, City of Industry, CA; Mallory Matallurgical Corporation, Indianapolis, IN; Kulity Tungsten Corporation, Richfield, NJ; Alcoa Aluminum, Cleveland, OH; Ordnance Research Institute, Fort Walton Beach, FL; Martin-Marietta Corporation, Milan, TN; Teledyne Corporation, Powder Alloys Division, Clifton, NJ; Wah Chang Division, Albany, OR; US Army Missile Research and Development Command, Huntsville, AL; Project Manager for Selected Ammunition, Dover, NJ; and US Army Armament Research and Development Command, Dover, NJ.

Program Element: #2.37.33.A
DoD Mission Area: #413 - Fire Support

Title: Improved Nonnuclear LANCE Warhead Section
Budget Activity: #4 - Tactical Programs

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: Prototype bomblets were tested and fragmentation data developed. Vulnerability data was generated for some LANCE targets. Data has verified theoretical effectiveness calculations. Mass properties of the improved bomblet were measured by using prototype hardware.

2. FY 1978 Program: Significant activities include selection of the Improved XM74 bomblet final design, development testing of the Improved XM74 bomblet, full-scale LANCE Warhead Section system study and analysis aimed at incorporation of the improved bomblet into the LANCE Warhead Section. Items will also be procured (warhead sections and missile components) to support full-scale System Development Testing in FY 1980.

3. FY 1979 Planned Program: The principal effort will be qualification testing of the developed bomblet for incorporation into the LANCE Warhead Section. Flight testing of full-scale LANCE Warheads will be conducted following flight tests using HONEST JOHN rockets. The system studies will be completed. The increase in funds from FY 1978 is required due to the tests performed this fiscal year.

4. FY 1980 Planned Program: A Development Test II/Developmental Test III flight test program will be conducted in FY 1980. This program will lead to type classification of the Improved LANCE Warhead.

5. Program to Completion: Following type classification action planned for January 1981, improved munition will be procured and incorporated into the inventory of LANCE Nonnuclear Warhead Sections. This action is scheduled to be completed in July 1983.

Program Element: #2.37.33.A
DoD Mission Area: #413 - Fire Support

Title: Improved Nonnuclear LANCE Warhead Section
Budget Activity: #4 - Tactical Programs

I. Test and Evaluation Data:

1. Development Test and Evaluation: The prime contractor for the LANCE Missile System is the Vought Corporation, Sterling Heights, Michigan. A total of 383 US LANCE missile flight tests have been conducted since the LANCE firing program began in 1965 through November 1977. The contractor has fired 176 engineering development missiles. Eighty-six missiles were fired during the time period January 1970 through July 1974 - Development Test (DT) I (nuclear) - 27; DT II (nuclear) - 30; DT I (nonnuclear) - 23; DT II (nonnuclear) - 6. The remaining 90 contractor firings were for early prototype testing, stockpile sampling, and product assurance for the period 1965 through September 1976. The Army firing program of 151 missiles through October 1975 included early operational testing (38), annual service practice (83), safety certification (6) and Operational Test (OT) II of the current configured system (24). Environmental testing was conducted at Fort Greely, Alaska, from October 1969 to February 1970, and at Fort Sherman, Panama, from April 1970 to February 1971. The tests at Fort Greely included a live firing. Reliability, availability, and maintainability were scored during DT/OT II and are addressed in the Operational Testing Section. A problem with the warhead fuze (XM811) was a primary cause for delay in the Nonnuclear LANCE (NNL) Warhead Development Program. The combined DT/OT II program, using new production fuzes, was resumed in April 1974 and completed in July 1974. The revised program consisted of eleven live firings of the XM251 nonnuclear warhead (6 DT II and 5 OT II). The first of the 11 warhead flights was the tenth and final round of the engineering design test (12 April 1974). An additional 13 new production fuzes (XM811E6) were successfully fired on regularly scheduled annual service practice (ASP) missiles in order to increase confidence in the fuze (the 13 ASP flights were not counted as part of DT/OT II). The XM251 warhead was type classified Standard on 23 October 1974. The LANCE Nonnuclear Warhead Section DT III Program consisted of a 7 round program, six production warhead sections and one DT II configuration warhead section that had been exposed to 6 months simulated battalion storage. The flight tests began 19 November 1975. After two successful flight tests, three tests yielded abnormally high dud rates and the DT III program was delayed in April 1976 to investigate the causes of the high dud rate. Three nonnuclear warhead sections were flown in July 1976 thru September 1976 that aided in the dud rate investigation. Two remaining rounds were successfully flight tested in October 1976 completing DT III. A nine round flight test DT II/DT III test program is planned for the improved nonnuclear LANCE system to demonstrate that all technical performance requirements are satisfied. In addition to this flight test series, a three round nonflight series is planned during DT II/DT III to evaluate safety and verify hazards classification. These tests are planned for FY 1980.

Program Element: #2.37.33.A
DoD Mission Area: #413 - Fire Support

Title: Improved Nonnuclear LANCE Warhead Section
Budget Activity: #4 - Tactical Programs

2. Operational Test and Evaluation:

a. A combined Development Test (DT)/Operational Test (OT) II of the LANCE Missile System was prepared by the US Army Test and Evaluation Command (TECOM) and the US Army Training and Doctrine Command (TRADOC) so that the test could provide both developmental evaluation data and operational data. The tests were conducted at White Sands Missile Range, New Mexico, during June 1971 through March 1972 using missiles and equipment from hard tooled production lines by an HONEST JOHN field artillery battalion organized as a provisional LANCE battalion. A separate evaluation and a report were accomplished by TRADOC. Extensive field exercises and 19 firings were conducted by the provisional battalion. Deficiencies were found in the Guided Missile System Test Set (GMSTS) and Monitor Programmer (MP). The LANCE Missile System minus these items was type classified Standard on 23 May 1972. Inflight reliability, preflight reliability after loading and checkout at the firing site, and ground support reliability were all met; however, the ground mobility of the lightweight launcher was more restricted than desired when towed over rough terrain and requirements for modification of the checkout equipment were identified. The testing of corrections of OT deficiencies and system accuracy are included in the Joint Army/Atomic Energy Commission (AEC, now Energy Research and Development Agency (ERDA)) testing (June 1972-January 1973). Testing verified deficiencies noted in the GMSTS and MP, and these were corrected and the GMSTS and MP were type classified Standard. Testing of operational suitability (OT III) was conducted in conjunction with the six missile annual service practice and operational readiness test of the 1st Battalion, 12th Artillery, evaluated by TRADOC in December 1972. The US Army Operational Test and Evaluation Agency (OTEA) tested doctrine and tactical employment of the system during a battalion operational readiness test conducted at Fort Sill, Oklahoma, March-April 1973. Test results revealed that doctrine, organization, training, and support packages were adequate. Some minor changes in organization and the training support package were identified. Operational Test II of the Nonnuclear LANCE was conducted in two phases concurrently with, but separately from, DT II of the XM251 warhead. Phase I (nonfiring) was conducted 8-19 April 1974 at Fort Sill, Oklahoma, by OTEA and evaluated operational effectiveness, reliability, and maintainability. Phase II (firing) was conducted 25 April-25 May by OTEA at WSMR and consisted of five live firings. Both phases were independently evaluated by OTEA, and data generated by live firings was used for reporting both DT II and OT II results. No major discrepancies were identified during this test, and no further operational testing of the nonnuclear system is currently planned. The nonnuclear warhead for LANCE was type classified Standard in October 1974.

b. No operational tests are planned on the Improved Nonnuclear LANCE because the man-machine interface has not changed from that of the Basic Nonnuclear LANCE (incorporation of Improved BLU-63 bomblets into the Nonnuclear LANCE Warhead Section will not affect the man-machine interface).

A Tabulation of LANCE missile firings as of 30 September 1977 follows:

Summary of Test Firings

Test Program	Launches	Hits 1/	Misses
Development Tests			
Nuclear System			
Nonnuclear (Heavy Warhead) System			
Operational Tests			
Nuclear System			
Nonnuclear System			
Safety Certification (Heavy Warhead Section Nonnuclear M198)			
Initial Production Tests			

A total of 313 production configuration missiles have been flown. Of these, [redacted] were successes and [redacted] were failures.

NOTES:

1/ A hit is defined as a missile impacting within the reliability circle around the target. At short ranges (less than [redacted] the reliability circle has a constraint radius of [redacted] around target center. At other than short ranges the reliability circle has a constant radius of [redacted] mils about target center. (The [redacted] mils is convertible to a distance which varies with the range fired). [redacted] of the reliable missiles from a population having a Circular Error Probable of [redacted] will impact within the reliability circle.

Program Element: #2.37.33.A
DoD Mission Area: #413 - Fire Support

Title: Improved Nonnuclear LANCE Warhead Section
Budget Activity: #4 - Tactical Programs

3. Systems Characteristics:

Operational/Technical Characteristics	Objective	Demonstrated Performance 1/
System Accuracy (CEP):		
	Nuclear	
Range (km)		
Missile Preflight (at Launch Checkout) Reliability	Nuclear/Nonnuclear	
Missile Inflight (Less Warhead) Reliability		
Maintainability:		
Inherent Availability	.80	.78
Mean-Time-to-Repair		
Organization Level	55 minutes	51 minutes
Direct Support	4 hours	2.9 hours
General Support	9 hours	Not Tested
System Accuracy (CEP):	Nonnuclear	
Range (km)		

Program Element: #2.37.33.A
DoD Mission Area: #413 - Fire Support

Title: Improved Nonnuclear LANCE Warhead Section
Budget Activity: #4 - Tactical Programs

Systems Characteristics: (cont)

Operational/Technical Characteristics	Objective	Demonstrated Performance 1/
Preflight (at Launch Checkout) Reliability	—	—
Inflight Reliability	—	—
Maintainability:	—	—
Inherent Availability	3/	3/
Mean-Time-to-Repair		
Organization Level		
Direct Support		
General Support		

1/ As of 31 Sep 77 Selected Acquisition Report (SAR).
2/ This figure represents the cumulative program value and differs from the SAR value of [ ] which is calculated from a 25 round moving average.
3/ Same as Nuclear System characteristics.

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #2.37.35.A
DoD Mission Area: #412 - Close Combat

Title: M60A1 Tank Product Improvement Program
Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	4111	9831	9996	13500	6162	73508
DE01	M60A1 Tank Product Improvement Program	4111	9831	9996	13500	6162	73508

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Provides for continuing (Phase I in procurement, Phase II now in RDTE) series of improvements in firepower, RAM (reliability, availability and maintainability) survivability and night capability of the M60A1 tank. An improved M60 tank is required in the near time frame to counter potential enemy armor threats until replacement by the XM1 and after that as the mainstay of the Reserve component forces for the period of the 1990s.

C. BASIS FOR FY 1979 RDTE REQUEST: Funds will provide for producibility, engineering and planning (PEP) for improved final drive, muzzle reference system, improved commander's seat, and adaption kits and Development Test (DT)/Operational Test (OT) II of the muzzle reference system and adaption hardware will be conducted.

Major Milestones	Date
Engine Smoke Generator DT/OT II	Dec 77-Apr 78
Muzzle Reference System DT/OT I	Jun 78-Sep 78
Adaption Hardware, XM1	Oct 78-Jun 79
Track Adaption, Auto	
Fire Suppression, DT/OT II	
Production Validation In-Process Review, M60A3 Tanks	May 79
Auxilliary Power Unit, DT/OT I	Jun 79-Sep 79
Muzzle Reference System, DT/OT II	Aug 79-Dec 79

D. OTHER APPROPRIATION FUNDS: ($ in thousands)

Weapons and Tracked Combat Vehicles Procurement, Army	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
Funds	44300	41500	98400	124800	297000	702500
Quantities*						

* Varying quantities of Phase I and Phase II kits procured as modification kits.

Program Element: #2.37.35.A
DoD Mission Area: #412 - Close Combat

Title: M60A1 Tank Product Improvement Program
Budget Activity: #4 - Tactical Programs

E. DETAILED BACKGROUND AND DESCRIPTION: Phase I of the M60A1 Tank Product Improvement Program (PIP) included the development/engineering and application of nine major product improvements: a main gun stabilization system, a solid-state ballistic computer, a laser rangefinder, a tube-over-bar suspension system, an improved reliability engine, T142 track, an improved electrical system, top-loading air cleaners, and passive night vision. The application of these improvements provides M60 series tanks increased capabilities in the areas of reliability, mobility, firepower, and night operations. The development/engineering effort associated with the program is funded from RDTE and Procurement resources. With exception of the tube-over-bar suspension system, Phase I of the PIP was completed in FY 1975, and is in procurement. Phase II, or follow-on product improvement of the M60A1 tank, was initiated in FY 1975. Phase II includes a muzzle reference system, an improved commander's seat*, an engine smoke generator*, a vehicle heading reference unit*, an automatic fire suppression system, foliage brackets*, and auxilliary power unit/winterization kit, an improved final drive, a motorcycle bracket*, wiring for mounting secure radio equipment and laser/radiation/gas alarm systems*, a series of training devices, improvements to the gun mount and adaption of the vehicle to use XM1 track.

* Asterisked items are included under the description of "Adaption Kits" elsewhere.

F. RELATED ACTIVITIES: In FY 1972 this program was carried as Project DE01 under Program Element (PE) 6.46.04.A, Mobility. The thermal sight prototype effort reported in FY 1973 under PE 6.46.04.A is now under PE 6.46.15.A, Tank Thermal Sight. Advanced development of the Turret Integrated Xenon Illuminator (TIXI) was accomplished under PE 6.37.17.A, Surveillance, Target Acquisition and Night Observation, Project DK70, Night Vision Devices. The TIXI project was terminated in FY 1976.

G. WORK PERFORMED BY: In-house efforts on this program are accomplished by the Project Manager for M60 Tanks (Development), Warren, MI; the US Army Electronics Research and Development Command, Night Vision Laboratory, Fort Belvoir, VA. Major contractors are Chrysler Defense Engineering, Centerline, MI; Hughes Aircraft Company, Culver City, CA; Teledyne-Continental, Muskegon, MI; Honeywell, Minneapolis, MN; and Texas Instruments, Dallas, TX.

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: Development of the solid-state computer, laser rangefinder and tube-over-bar suspension was initiated in FY 1971. Three solid-state computers and one laser rangefinder were delivered for engineering design, qualification, and reliability tests. Development prototypes (laser rangefinder, solid-state computer, and tube-over-bar suspension) were integrated along with the other product improved components into three test tanks for contractor testing. Contractor testing commenced in December 1972 but was terminated 14 March 1973 due to reliability problems and an inability to maintain sight alignment of the main gun. A program extension of six months resulted from a redesign effort to correct deficiencies in the fire control components. Development effort on the solid-state computer, laser rangefinder, and tube-over-bar suspension; engineering of the Reliability Improved Selected Equipment (RISE) engine and improved electrical system; and design system engineering continued in FY 1974. Contractor testing resumed in September 1974. Development Test (DT) II was completed in May 1975 and Operational Test (OT) II testing was completed in January 1975. A Cost and Operational Effectiveness

Analysis was performed by Concepts Analysis Agency and various analyses made by independent agencies in support of the Development Acceptance In-Process Review (DEVA-IPR). All parties to the November 1975 DEVA-IPR concurred in the Project Manager's recommended program which was: to apply the three passive devices (M35E1 Gunner's Sight, M36E1 Commander's Sight, and AN/VVS-2 Driver's Viewer) the AN/VVG-2 laser range finder, and the XM21 solid-state computer to the M60A1 (RISE) baseline tanks, designate it the M60A1E3, and initiate low rate initial procurement. This essentially ended RDTE efforts on Phase I product improvements. Two more prototypes of the hydropneumatic suspension system were delivered for side-by-side testing against the conventional system, high strength torsion bars, and hybrid tube-over-bar suspension. This testing was completed in mid-1977 and a Cost and Operational Effectiveness Analysis performed. Procurement of the system was not initiated due to marginal cost effectiveness and the high cost of retrofit application. The FY 1977 program consisted of engineering and design of the muzzle reference system and the items described as adaption kits.

2. FY 1978 Program: Development Test (DT)/Operational Test (OT) I of the muzzle reference system will be conducted. Engineering design of adaption kits will be completed along with full scale engineering development of the automatic fire suppression system. DT/OT II of the engine smoke generator and an IPR (In-Process Review) on it will be completed.

3. FY 1979 Planned Program: Full scale engineering of the muzzle reference system will be completed and DT/OT II will begin in August 1979. DT/OT II of adaption hardware, use of XM1 track, and the automatic fire suppression system will be held from October 1978 through June 1979 and a DEVA-IPR is scheduled for August 1979. A production decision on the engine smoke generator will be made and developing of training devices will be initiated in FY 1979.

4. FY 1980 Planned Program: DT/OT II of the auxilliary power unit will be held and testing of training devices will be initiated.

5. Program to Completion: DT/OT on training devices and the auxilliary power unit will be completed in FY 1981 and production decisions made.

Program Element: #2.37.35.A
DoD Mission Area: #412 - Close Combat

Title: M60A1 Tank Product Improvement Program
Budget Activity: #4 - Tactical Programs

I. Test and Evaluation Data:

1. Development Test and Evaluation:

a. The Chrysler Corporation was awarded a production contract for the M60A1 Tank and deliveries were initiated in October 1962. The M60A1 Tank is an improved version of the M60 Tank. The original M60A1 Program started with the fabrication of three Research and Development (R&D) pilots. Testing similar to Development Test II (DT II) was accomplished at Aberdeen Proving Ground (APG), Maryland; Yuma Proving Ground (YPG), Arizona; and Fort Knox, Kentucky, from May to December 1961. Test results indicated that the M60A1 was suitable for adoption and production. The M60A1 was type classified Standard-A 14 December 1961.

b. Modifications to the M60A1 are being added to improve the combat effectiveness, efficiency and reliability of the tank. These product improvements are the-Top Loading Air Cleaner; T-142 Steel Track; Improved Electrical System; Improved Reliability (RISE) engine; and Gun Stabilization System. All five of these improvements were included in the FY 75 M60A1 Tank Program. In addition to these improvements, the Laser Rangefinder, Solid State Ballistic Computer, Tank Commander's and Gunner's Passive Night Sight, and the Driver's Passive Night Viewer are included on a limited quantity of M60A1 Tanks in the FY 1976/197T and FY 1977 programs. With application of these additional improvements, the M60A1 is planned for redesignation as the M60A3 1/ Tank.

c. Prior to acceptance, extensive qualification testing and development testing (Engineering Test/Service Test) were conducted on the first three improvements during the mid-to-late 1960's.

(1) A design project was initiated in 1967-68 for the top loading air cleaner (TLAC). Reliability analysis and qualification testing on the air cleaner were completed in July 1971. Contractor testing was conducted at Fort Knox, Kentucky; Fort Hood, Texas; and YPG from February 1969 to October 1972. All early testing proved the air cleaner satisfactory and it was released to tank production in FY 1971 Program.

(2) The add-on stablization (AOS) was designed in 1965. During the period 1966-1971, the AOS successfully completed reliability tests, qualification tests, contractor tests (including arctic testing), DT II, check testing, and troop testing. A total of 30,000 test miles were completed. Based on the success of these tests, the AOS was incorporated in FY 1972 production tanks and retrofit kits were placed on contract with FY 1974 funds. Initial production tests (DT III) of the FY 1972 tank with AOS were conducted during the period April to December 1973. Test results were satisfactory to continue production of the M60A1 with AOS.

1/ Until Classified STANDARD, the M60A3 is designated the M60A1E3.

(3) The T-142 track was designed in 1965. The T-142 track has been tested over 100,000 miles under all kinds of climate and terrain environments. Based on these results, the T-142 was approved for production and underwent Initial Production Testing successfully during the period April 1972 to October 1972. The track was included on new production tanks beginning with the FY 1974 tank procurement. The track has also been procured with Operation and Maintenance Army (OMA) funds (beginning FY 1972) as replenishment track for field replacement.

(4) The improved-reliability (Reliability Improved Selected Equipment - RISE) engine and improved electrical system (oil-cooled alternator and solid state regulator) were subjected to extensive reliability and qualification testing in the early 1970's during Development Test I (DT I) of the M60A3, conducted during the period December 1972 to June 1974. The RISE engine and the improved electrical system met all established requirements and had demonstrated such favorable results that the Army proceeded to include them on the FY 1975 M60A1 production tank. Additional DT II testing was conducted at Yuma Proving Ground during CY 1974 to insure hot climate reliability of the engine and electrical system.

d. The total M60A3 system, incorporating the five improvements noted above plus the gunner's and commander's passive night sight, driver's viewer, and the laser rangefinder and solid state ballistic computer, is being subjected to a complete series of development tests. Initial components were subjected to laboratory reliability, qualification, life, and environmental test requirements. Three tanks were used for early development; one for engineering design tests, one for math model and system analysis and one for logistical support, maintenance evaluation, and publications. Three additional tanks were assembled for contractor engineering tests which completed about 4000 miles of operation and fired 800 rounds of main gun ammunition for each tank. Eight tanks were used in DT II, January to October 1974; two at Aberdeen Proving Ground (APG), MD., one at Yuma Proving Ground (YPG), AZ., initially and later shipped to APG for electromagnetic interference testing, and the remaining five to Fort Knox, Kentucky. DT II testing was successfully completed in May 1975 with a total of 23,000 miles and 4,000 rounds of testing accumulated.

e. DT III will take place in 2 phases: the Production Validation Test-Contractor (PVT-C) at APG from April 1978 to September 1978 and the PVT-Government at APG from August 1978 to January 1979. Seven new production M60A3 tanks are scheduled for these tests, accumulating some 28,000 miles of operation.

f. A limited number of follow-on product improvements to the M60A3 tank are undergoing development. DT/OT I of the Muzzle Reference System (or Muzzle Position Sensor - MPS) will take place from June to September 1978 and DT/OT II from August to December 1979. DT/OT II of adaption hardware components and the automatic fire supression system is scheduled for January to June of 1979. The engine smoke generator will be tested (DT/OT II) from December 1977 to April 1978 with application scheduled for March 1979.

Program Element: #2.37.35.A
DoD Mission Area: #412 - Close Combat

Title: M60A1 Tank Product Improvement Program
Budget Activity: #4 - Tactical Programs

The following are projected milestones in development and production of the M60A3 tank and the product improvements of the M60A3.

(1)	First Production (Low Rate Initial Production)	Feb 78
(2)	Initial Production Tests (DT III)	Apr 78-Jan 79
(3)	Production Validation, Initial Production Rate	Mar 79
(4)	DT/OT[2/] of M60A3 PI's	Jun 78-Dec 79
(5)	Application of M60A3 PI's	Jan 81

2/ Development Test/Operational Test (DT/OT)

2. Operational Test and Evaluation:

a. The M60A1 tank has been in the Army inventory since 1962. It was approved for service use in December 1961 (type classified Standard-A). It is the main battle tank for all Active Army armored, mechanized, and infantry divisions and all armored cavalry regiments. The tank has met with widespread user acceptance.

b. Normal qualification and check tests were performed on the top loading air cleaner and the T-142 track. Both items were on the M60A2 tanks during Service Testing at Fort Knox, Kentucky, and were separately monitored and evaluated.

c. The gun stablization system successfully completed its Engineering Test/Service Test during the period 14 June-15 September 1971 at Fort Hood, Texas, and White Sands Missile Range, New Mexico. The US Army Combat Developments Command (CDC) prepared an independent evaluation and report on the test. A production decision was made in November 1971.

d. The improved reliability engine and improved electrical system are reliability improvements accomplished by modifications to basic components. Both improvements have undergone testing since June 1973 at Fort Knox, Yuma Proving Ground and Detroit. Established reliability goals were exceeded.

e. The five improvements (paragraph 1b above) along with the laser rangefinder, solid state ballistic computer, tank commander's and gunner's passive night sights, and the driver's passive night viewer were evaluated during Operational Test (OT) II to determine the operational capability of the product improved system. OT II was conducted separate from Development Test (DT) II by the US Army Operational Test and Evaluation Agency (OTEA) from 21 October 1974 to 24 January 1975 at Fort Knox, Kentucky, using ten US Army Training and Doctrine Command (TRADOC) tank crews. Ranging and firing exercises were also conducted from 20 to 24 March 1974 and from 26 March to 4 April 1975 at Fort Knox, Kentucky. Overall results of OT II indicated that the improvements provided the M60A3 with superior hitting performance, reduced range error, and improved operational performance at night. The test also identified requirements for more comprehensive crew and maintenance personnel training. OTEA provided an independent evaluation and report to the Development Acceptance In-Process Review (DEVA-IPR) for consideration in a production decision on the M60A3 tank. The decision of the November 1975 DEVA-IPR was to initiate low-rate initial production and conduct testing towards type classification Standard and full production.

f. The separate Operational Test (OT) III scheduled for September 1978 thru January 1979 at Fort Hood, Texas, was waived by the Department of the Army on 20 October 1976 based on the recommendation of US Army Test Operational and Evaluation Command (OTEA) since all major operational issues had been addressed in OT II. Department of Defense has concurred with this waiver action. In lieu of an OT III, the US Army Training and Doctrine Command (TRADOC) will conduct an Initial Operating Capability Force Development Test and Experimentation (IOC FDTE) to fully refine doctrinal and training packages. This test will take place during the period September 1978 to January 1979 and will utilize 17 M60A3 tanks in a US Army Forces Command unit at Fort Carson, Colorado, to assess training and logistical implications of the M60A3 and concurrently perform an OT III, if necessary, on the Tank Thermal Sight. OTEA will review the test design plan, monitor the IOC-FDTE, and provide an independent evaluation. This evaluation will particularly assess operational reliability, availability, and maintainability (RAM) data of the XM21 solid state computer and laser range finder; and the training and logistical support implications of the M60A3 system.

3. Systems Characteristics:

Operational/Technical Characterisitics	Objective	Demonstrated Performance (DT II)
Service Life	1/	1/
Reliability (Mean Miles Between Failures)	140 miles	128/150/191 2/
Maintainability (Mean Time to Repair) (Organization level)	6 hours 95% of time	6 hours 96.4% of time
Maintenance Ratio (Maintenance Man-hours/Operational Hours	1.3/1	1.3/1

Notes:

1/ The service life of a tank has not been defined as a specific number of miles or years, rather action is being taken to define a system of weighted tests which will determine when a specific vehicle is a candidate for overhaul based upon the actual wear which the vehicle exhibits.

2/ Source: DT II (Service Phase). Values are: early data/adjusted early data based on fixes/data subsequent to fixes.

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #2.80.10.A
DoD Mission Area: #443 - Tactical Communications

Title: Joint Tactical Communications Program (TRI-TAC)
Budget Activity: #4 - Tactical Programs

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	36622	58847	55210	42715	Continuing	Not Applicable
	Quantities						*
D104	Joint Tactical Communications (TRI-TAC) Office	5550	5911	5996	6100	Continuing	Not Applicable
D110	Mobile Subscriber Equipment	147	354	2968	7500	11073	123600
D111	Digital Group Multiplexer	7323	8902	2661	1703	1928	32772
D113	Super High Frequency (SHF) Satellite Modulator - Demodulator (Modem)	280	2292	2300	1215	17069	23406
D114	Other Service Assigned TRI-TAC Tasks	980	1451	1470	2071	Continuing	Not Applicable
D116	Facility Support Element	0	500	500	500	Continuing	Not Applicable
D117	Short Range Wideband Radio (SRWBR) Assemblages**	0	0	1500	500	300	2300
D119	Modular Record Traffic Terminal (MRTT)	0	574	6000	10500	3600	20674
D172	Net Radio Interface (NRI)***	0	1253	2315	1626	655	6206
D178	Joint Test Support****	0	1100	1200	1300	Continuing	Not Applicable
D222	Automatic Communications Central Office AN/TTC-39	22342	36510	28300	9700	1536	215800

* Quantities include 9-AN/TTC-39 Circuit Switches, 7-AN/TYC-39 Message Switches, total of 516 items of DGM family (13 components), 6-AN/GRC-144 Radio Set SRWBR Modification Kits, and 3 each prototype assemblages of the AN/TPC-173 Radio Terminal, AN/TRC-174 Radio Repeater, Standard SRWBR Assemblage and the Modified AN/TRC-138 Radio Repeater. Other RDTE quantities represent a number of diverse items.

** Program transfered from USAF to Army in May 1977. FY 1978 funding increased by $2.5 million military interdepartmental purchase request from Air Force.

*** NRI part of project D110 prior to FY 1978.

**** Joint Test Support part of project D222 prior to FY 1978.

Program Element: #2.80.10.A
DoD Mission Area: #443 - Tactical Communications

Title: Joint Tactical Communications Program (TRI-TAC)
Budget Activity: #4 - Tactical Programs

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The Joint Tactical Communications (TRI-TAC) Program is a joint Service and DOD Agency program to develop and field future tactical multichannel switched communications equipment required to satisfy the tactical communications needs of the Military Services. The TRI-TAC program was established as a joint program under the Secretary of Defense to achieve interoperability between Army tactical communications systems and other Department of Defense (DoD) telecommunications systems; to provide new tactical communications equipment which reflects the most recent technology; and to eliminate duplication among the Service/Agency communications systems. TRI-TAC developed systems/equipments are needed to provide combat forces with tactical communications equipments to meet the mobility, security, reliability and availability requirements of the modern battlefield, to provide resistance to the intercept and electronic warfare threat of potential enemies, and to reduce life cycle support and personnel costs. The current inventory Army tactical multichannel switched communications systems and equipments are characterized by obsolete, manpower intensive, predominately manual telephone and record traffic (messages) switchboards; obsolete, low speed, electro-mechanical, unreliable teletypewriters; non-secure analog telephones; a digital, solid state multichannel transmission system capable of only link security and manual technical control and management facilities. Current tactical voice telephone systems are not capable of end to end voice security. Tactical record traffic, while secure, is slow, unreliable and manual. Mobility and tactical flexibility in the division and brigade are reduced by the slow installation and displacement times for the current division multichannel equipments. The Army's implementation of equipments developed under the TRI-TAC program will provide a significant increase in capability over current systems/equipments. The Army's Integrated Tactical Communications System employing TRI-TAC equipments will be capable of end to end voice, record and data security. TRI-TAC equipments bridge the span from the current analog equipments to digital systems. Digital systems/equipments take advantage of Large Scale Integration (LSI) solid state technology for increased reliability and reduced maintenance, size, weight and power consumption; provide increased efficiency of transmission systems without increasing the number of radio systems or radio spectrum occupied; and lend themselves to the cost effective application of voice communications security (COMSEC) and jam resistance techniques. Mobility and installation/displacement items in the division area will be significantly improved thru a Mobile Subscriber Access system that provides the addressability of an automatic telephone system and the mobility and voice security of a net radio. Both voice and record traffic switching functions will be secure, automated and processor controlled, and telephone subscribers will have the capability of end to end security.

C. BASIS FOR FY 1979 RDTE REQUEST: Complete the AN/TYC-39 Message Switch and start the AN/TTC-39 Circuit Switch Development Test and Evaluation/Initial Operational Test and Evaluation (DTE/IOTE). Continue DTE/IOTE on Digital Group Multiplexer (DGM) family of 13 components and complete fabrication and start DTE/IOTE on the AN/TRC-173/174 Radio Terminal and Repeater Assemblages housing DGM components. These assemblages provide the packaging of inventory multichannel radios and DGM equipments into transportable transmission systems. Complete the development of the Short Range Wideband (SRWBR) modification to the inventory AN/GRC-144 Radio Set and the associated assemblage fabrication. The SRWBR modification allows the high quality current inventory AN/GRC-144 Radio to be used to satisfy the short range wideband radio requirement without developing a totally new multichannel radio set. It also

allows the life cycle of the AN/GRC-144 to be extended and used as the high capacity multichannel radio during the transition to TRI-TAC developed equipments. Continue full scale development on the Net Radio Interface family which provides the secure interface capability for combat net radios into the tactical switched multichannel network of TRI-TAC developed equipments. Start full scale development on the Modular Record Traffic Terminal (MRTT) family of secure record traffic equipments to replace the obsolete, low speed, electro-mechanical teletypewriters currently in the field. Complete the Mobile Subscriber Equipment (MSE) Special Task Force, conduct Defense Systems Acquisition Review Council (DSARC) I and award a validation contract. MSE is the secure, mobile, radio-telephone system to replace the limited mobility, non-secure multichannel system currently used at brigade and in the division area. Continue funding support of the TRI-TAC office, Joint Test Element and Facility Support Element in accordance with DoD Directive 5148.7 and DoD Instruction 5148.8. Continue monitoring other Service assigned TRI-TAC programs to insure Army technical, logistical, training, testing and user requirements are being satisfied.

Major Milestones*	Date
Engineering Development Contract Award	Apr 74
Preliminary Design Review	Sep 74
Integrated Test Plan	Feb 75
Final Design Review	Dec 75
Prototype Qualification Test (PQT)	
Start Message Switch/Circuit Switch	May 77/Mar 78
Complete Message Switch/Circuit Switch	Apr 78/Nov 78
Development Test and Evaluation/Initial Operational Test and Evaluation (DTE/IOTE)	
Start Message Switch/Circuit Switch	Jul 78/Feb 79
Complete Message Switch/Circuit Switch	May 79/Nov 79
Defense Systems Acquisition Review Council (DSARC III) - AN/TYC-39 Message Switch Production Decision	Oct 79
AN/TYC-39 Production Award	Nov 79
DSARC III - AN/TTC-39 Circuit Switch Production Decision	Sep 80
An/TTC-39 Production Award	Oct 81
Initial Operational Capability (IOC)	Jun 82

Program Element: #2.80.10.A
DoD Mission Area: #443 - Tactical Communications

Title: Joint Tactical Communications Program (TRI-TAC)
Budget Activity: #4 - Tactical Programs

* Milestones shown for Project D222, Automatic Communications Central Office, AN/TTC-39, which is the only current major system in the program element and is the lead TRI-TAC development item.

D. OTHER APPROPRIATION FUNDS: ($ in thousands)

	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Cost
Other Procurement, Army						
Funds	0	0	0	30700	Continuing	Not Applicable
Quantities *	*	*	*	*	*	*

* Large number of diversified items.

E. DETAILED BACKGROUND AND DESCRIPTION: TRI-TAC has been established as a joint Army, Navy, Marine Corps, Air Force, and National Security Agency (NSA) program to: (1) assure compatibility and a high degree of commonality of tactical communications systems and devices used in joint combat force operations; and (2) achieve maximum economy through Joint Service development, acquisition, and follow-on support of tactical communications equipment. TRI-TAC developed equipments will provide a common, integrated, compatible, secure, multichannel tactical communications system for trunking and switching to support US combat forces in the early 1980's. It will interconnect with the Defense Communications Systems (DCS) and have the capability to interface with systems of our allies (i.e., North Atlantic Treaty Organization). The planned TRI-TAC program will provide a Joint Service tactical switched trunking capability for voice and record communications and for data communications to support the employment of evolving computerized weapon systems. Advances in solid-state electronic circuit technology and the increasing availability of low cost, wide band transmission media will be exploited to obtain: (1) a faster rate of information transfer; (2) transmission and voice security; (3) increased mobility through size and weight reductions; and (4) improved reliability and maintainability. The scope of this program includes: (1) costs of operating the TRI-TAC Office, Fort Monmouth, New Jersey, and the Army share of the Joint Test Element (JTE), Fort Huachuca, Arizona, including support contracts; (2) cost of accomplishing acquisition tasks for the TRI-TAC program assigned to the Army by the Office of the Secretary of Defense; and (3) cost associated with monitoring the Army's interest in TRI-TAC tasks assigned to other Services for development. There are nineteen items in the TRI-TAC program which have been assigned to the Services. Seven programs have been assigned to the Army: Automatic Communication Central Office Family (AN/TTC-39 and AN/TYC-39); Digital Group Multiplexer (DGM) family; Super High Frequency (SHF) Satellite Modulator/Demodulator (Modem); and Mobile Subscriber Equipment (MSE); Net Radio Interface (NRI); Modular Record Traffic Terminal (MRTT); and the Short Range Wideband Radio (SRWBR) modification to the inventory AN/GRC-144 Radio Set.

F. RELATED ACTIVITIES: The Army, Air Force, Navy, Marine Corps, National Security Agency (NSA) and the Defense Communications Agency (DCA) are participating agencies in the Joint Tactical Communications (TRI-TAC) program. TRI-TAC is a joint Service program under the guidance and direction of the Director, Joint Tactical Communications (TRI-TAC) Office and is chartered

by Department of Defense Directive (DODD) 5148.7, dated 16 February 1976. Related programs include other Service and National Security Agency (NSA) assigned TRI-TAC tasks under program elements 2.80.10.F, 2.80.10.M, 2.80.10.N and 3.34.01.G (Communications Security Equipment). The TRI-TAC Office monitors all of the assigned TRI-TAC programs and any Service/DoD Agency related programs to insure there is no duplication of effort.

G. WORK PERFORMED BY: Overall system architecture and interservice coordination is performed by the Joint Tactical Communications Office (TRI-TAC), Fort Monmouth, NJ. The Director, TRI-TAC Office reports to the Assistant Secretary of Defense for Communications, Command, Control, and Intelligence. Acquisition (development and production) of TRI-TAC equipment is performed by the tasked Service or Agency as assigned by the Secretary of Defense. Current Army contractors are: GTE-Sylvania, Needham Heights, MA (AN/TTC-39 Family of Switches) and Raytheon Company, Sudbury, MA (Digital Group Multiplexer Family). The TRI-TAC Office which is totally funded by the Army has one support contractor, Booz-Allen Applied Research, Inc., Tinton Falls, NJ. In-house developing organization for TRI-TAC tasks assigned to the Army is the US Army Communications Research and Development Command, Fort Monmouth, NJ (Project Manager, Multi-Service Communications Systems (MSCS)).

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: A performance specification was completed and two competitive advanced development contracts were awarded for the AN/TTC-39 family of circuit and message switches in 1972. The two AN/TTC-39 switch contractors submitted prototype model design plans and completed development and testing of prototype models in December 1973. The Defense Systems Acquisition Review Council (DSARC) approved entry into full scale engineering development on 12 April 1974 and an engineering development contract was awarded to GTE-Sylvania on 16 April 1974. Performance specifications were developed for a family of Digital Group Multiplexers and after evaluation of competitive bids, a full scale engineering development contract was awarded to Raytheon Company in May 1975. A study contract was awarded to Communications Satellite Corporation in April 1975 to develop concepts and optimum methods for Army employment of a Super High Frequency (SHF) Demand Assigned Multiple Access (DAMA) Satellite Modulator/Demodulator (Modem). The AN/TTC-39 Automatic Communications Central Office Integrated Test Plan and Final Design Reviews were completed in 1975. Preliminary and Final Design Reviews were completed in 1976 on the Digital Group Multiplexer (DGM) family. The SHF Satellite Modem study was completed and used to assist in preparation of the performance specification. A Special DSARC Review was conducted in November 1976 on the AN/TTC-39 family of switches due to a projected breach of Development Concept Paper #135 cost and schedule thresholds, and resulted in a revised program baseline that extended the circuit switch schedule by 16 months and the message switch schedule by 9 months. The AN/TTC-39 contractor was directed to implement replanning actions constraining development effort through FY 1977 with a cumulative funding cap of $100.5 million. Research and Development Acceptance Test (RDAT) began on the AN/TYC-39 Message Switch in May 1977 and the first of seven Formal Qualification Tests (FQT) on the AN/TTC-39 Circuit Switch Software was completed in June 1977. DGM models to support the Air Force Technical Communications Control Facilities (TCCF) program were delivered in August 1977. The DGM Prototype Qualification Test (PQT) Test Plan Review was completed in September 1977. Work continued on the efforts to prepare for a Net Radio Interface (NRI) FY 1978 engineering development contract award. Other Service and Agency TRI-TAC assigned programs were monitored. Army provided funding support for the TRI-TAC Office and the Joint Test Element (JTE).

Program Element: #2.80.10.A
DoD Mission Area: #443 - Tactical Communications

Title: Joint Tactical Communications Program (TRI-TAC)
Budget Activity: #4 - Tactical Programs

2. FY 1978 Program: Complete Research and Development Acceptance Test (RDAT), deliver test models to the Joint Test Facility (JTF) and start Development Test and Evaluation/Initial Operational Test and Evaluation (DTE/IOTE) on the AN/TYC-39 Message Switch. Complete design and fabrication, and start RDAT on AN/TTC-39 Circuit Switch. Prototype Qualification Test (PQT) will be conducted, RDTE models delivered to the JTF, and DTE/IOTE will begin on the Digital Group Multiplexer (DGM) Family. Fabrication will continue on the AN/TRC-173 and 174 DGM Assemblages. A Mobile Subscriber Equipment (MSE) Special Task Force will be established to prepare the documentation necessary to obtain a Defense Systems Acquisition Review Council (DSARC) I decision to enter advanced development. A Net Radio Interface (NRI) Full Scale Development (FSD) contract will be awarded and planning for DTE/IOTE will begin. A validation phase contract for the Super High Frequency (SHF) Satellite Modulator/Demodulator (Modem) will be awarded. Army begins separate funding of the assigned portion (35%) of the TRI-TAC Joint Test Element. Complete the establishment of the Facility Support Element to provide the baseline of inventory equipments necessary to support the testing of all TRI-TAC equipments as required by DoD Instruction 5148.8, 9 April 1976. Continue support of the TRI-TAC Office. Continue efforts to prepare for a FY 1979 Modular Record Traffic Terminal (MRTT) FSD contract award. Award engineering development contract for Short Range Wideband Radio (SRWBR) modification to the AN/GRC-144 Radio Set. Continue monitoring other Service assigned TRI-TAC programs.

3. FY 1979 Planned Program: Complete the AN/TYC- 39 Message Switch and start the AN/TTC-39 Circuit Switch Development Test and Evaluation and Initial Operational Test and Evaluation (DTE/IOTE). Continue the DGM family DTE/IOTE. Complete fabrication and conduct DTE/IOTE on AN/TRC-173 and 174 DGM Assemblages. Complete AN/GRC-144 SRWBR modification development, assemblage fabrication, and prepare for DTE/IOTE. Continue Full Scale Development (FSD) effort on Net Radio Interface (NRI) and validation efforts on SHF Satellite Modem. Complete Mobile Subscriber Equipments (MSE) Special Task Force, conduct DSARC I and award validation phase contract. Continue operation and maintenance of Facility Support Element to support the TRI-TAC test program. Continue funding support to the TRI-TAC Office and the Joint Test Element. Award FSD contract for Modular Record Traffic Terminal (MRTT) as all necessary work will have been performed and the MRTT will be ready for FSD. Continue monitoring other Service assigned TRI-TAC programs. Funding decrease in FY 1979 from FY 1978 is due primarily to the completion of the AN/TYC-39, AN/TTC-39, and DGM family RDTE equipment fabrication. These items will be undergoing DTE/IOTE during most of FY 1979. Funding increases are primarily for starting the SHF Satellite Modem Validation Phase and the MRTT FSD Phase.

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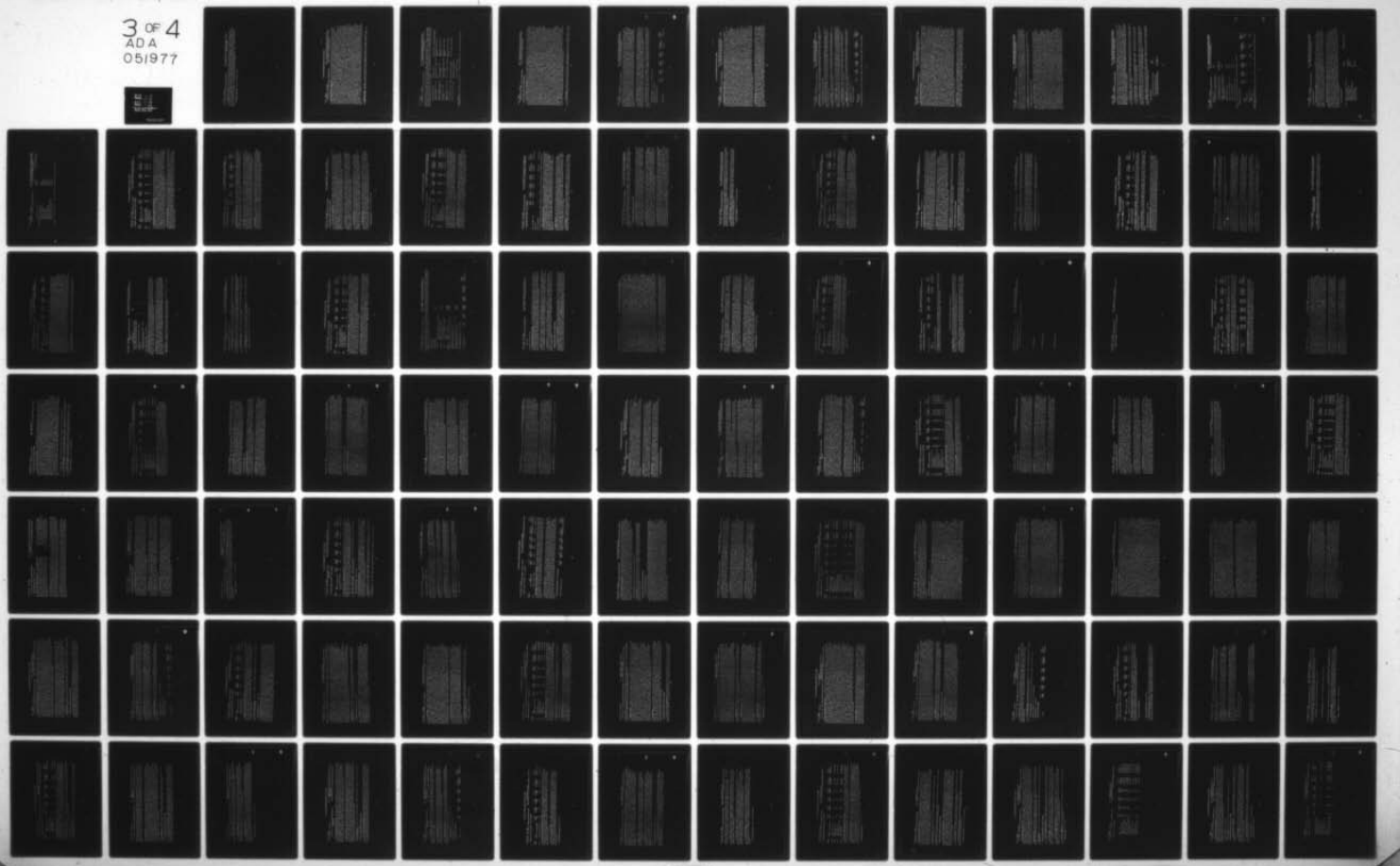

Program Element: #2.80.10.A
DoD Mission Area: #443 - Tactical Communications

Title: Joint Tactical Communications Program (TRI-TAC)
Budget Activity: #4 - Tactical Programs

4. FY 1980 Planned Program: Production decision and award of initial production contract for AN/TYC-39 Message Switch. Complete DTE/IOTE on AN/TTC-39 Circuit Switch, DGM Family and AN/TRC-173/174 DGM Assemblages. Prepare for and conduct DSARC III on AN/TTC-39. Continue validation efforts on SHF Satellite Modem and MSE. Complete FSD on NRI and start DTE/IOTE. Continue FSD on MRTT. Complete DTE/IOTE on the AN/GRC-144 SRWBR modification and associated assemblages. Continue monitoring other Service assigned TRI-TAC Programs. Continue operation and maintenance of Facility Support Element to support the TRI-TAC test program. Continue funding support to the TRI-TAC Office and the Joint Test Element.

5. Program to Completion: This is a continuing program.

TR 58-77

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D104
Program Element: #2.80.10.A
DoD Mission Area: #443 - Tactical Communications

Title: Joint Tactical Communications (TRI-TAC) Office
Title: Joint Tactical Communications (TRI-TAC) Program
Budget Activity: #4 - Tactical Programs

A. DETAILED BACKGROUND AND DESCRIPTION: The Joint Tactical Communications (TRI-TAC) Program is a Joint Service and Defense Agencies program for the development and acquisition of a family of tactical communications equipments which will replace the current inventory of predominately manpower intensive manual and non-secure tactical multichannel switched communications equipments in each Service. The major thrusts of the program are to provide equipment and systems that are common/interoperable between Services, that permit the transitioning from analog to digital communications, that are capable of end to end security to meet national goals and that reduce life cycle cost/manpower requirements thru automation, technological advances and improved supportability. Each Service/Agency is tasked by the Secretary of Defense as the acquisition agency for elements of the TRI-TAC program. The tasked Service/Agency totally funds the R&D effort for the tasked item of equipment and becomes the procuring Service for all Department of Defense (DOD) quantities. Additionally, each Service/Agency is required to budget for its assigned pro-rata share of the TRI-TAC Joint Test Element. Overall joint management of the program is performed by the Joint Tactical Communications (TRI-TAC) Office. The TRI-TAC Office was established by the Secretary of Defense through Department of Defense Directive 5148.7 and the Director, TRI-TAC Office is under the primary staff supervision of the Assistant Secretary of Defense for Communications, Command, Control and Intelligence. The purpose of Project D104 is to provide the funding support to the TRI-TAC Office as tasked to the Army in DOD Directive 5148.7. TRI-TAC Office funding levels are recommended by the Director, approved by the Assistant Secretary of Defense for Communications, Command, Control and Intelligence (ASD(C3I)) and then programmed by the Army in Program Element 2.80.10.A. The Director is responsible for system definition and engineering of TRI-TAC systems and equipments and serves as the architect (system engineer) and principal planner for the TRI-TAC program. He serves as the single point of coordination for technical aspects of TRI-TAC matters as may arise between the US and NATO and other allied governments. He prepares equipment specifications, performs equipment configuration control, maintains integrity of systems design, prescribes the technical and performance standards for TRI-TAC systems and equipments; and prescribes interface design and specifications to assure overall system compatibility and satisfaction of performance requirements. He is also responsible for coordinating the conduct, planning and reporting of joint Development Test and Evaluation and Initial Operational Test and Evaluation (DTE/IOTE) of TRI-TAC systems and equipments to include the establishment and overall management of a Joint Test Element and a Joint Test Facility. In addition, the Director coordinates the production planning of TRI-TAC systems and assists the ASD(C3I) in the management of financial resources authorized for the development and acquisition of TRI-TAC systems and equipment.

B. RELATED ACTIVITIES: This project is part of the Joint Tactical Communications (TRI-TAC) Program. Tasking for the development and initial procurement of TRI-TAC equipments has been assigned to the Services and National Security Agency (NSA).

Project: #D104 — Title: Joint Tactical Communications (TRI-TAC) Office
Program Element: #2.80.10.A — Title: Joint Tactical Communications (TRI-TAC) Program
DoD Mission Area: #443 - Tactical Communications — Budget Activity: #4 - Tactical Programs

The Army related projects in Program Element 2.80.10.A are: D110 - Mobile Subscriber Equipment; D111 - Digital Group Multiplexer Family; D113 - Super High Frequency (SHF) Satellite Modulator-Demodulator (Modem); D114 - Other Services assigned TRI-TAC Tasks; D222 - Automatic Communications Central Office AN/TTC-39; D172 - Net Radio Interface; D178 - Joint Test Support; D116 - Facility Support Element (FSE); D117 - Short Range Wideband Radio (SRWBR) Assemblages; and D119 - Modular Record Traffic Terminal (MRTT). The other Services/NSA related efforts are as follows:

Air Force (PE 2.80.10.F)	Navy (PE 2.80.10.N)	NSA (PE 3.34.01.G - Comm Security Equipment)
Technical Communications Control Facilities (TCCF)	Tactical Digital Facsimile (TDF) AN/UXC-4	TENLEY Communications Security (COMSEC)
Digital Tropospheric Scatter Radio Terminal (TROPO) AN/TRC-170V( )	Ultra High Frequency (UHF) Satellite Modem	SEELEY Communications Security (COMSEC)
Data Adapter (DA), MX-9810 and MX-9811	Advanced Narrowband Digital Voice Terminal (ANDVT)	SELDON Communications Security (COMSEC)
Digital Non-Secure Voice Terminal (DNVT), TA-954	Joint Test Element (JTE) Support	ANDVT - Communications Security (COMSEC)
Short Range Wide Band Radio (SRWBR)	Marine Corps (PE 2.80.10.M)	Joint Test Element (JTE) Support
Joint Test Element (JTE) Support	Unit Level Switch (ULS) Family, AN/TTC-42V( ) & SB-3865	
	Joint Test Element (JTE) Support	

C. WORK PERFORMED BY: TRI-TAC Office, Fort Monmouth, NJ. Supporting contractor effort is performed by Booz Allen Public Administration Service, Inc., Tinton Falls, NJ.

Project: #D104 Title: Joint Tactical Communications (TRI-TAC) Office
Program Element: #2.80.10.A Title: Joint Tactical Communications (TRI-TAC) Program
DoD Mission Area: #443 - Tactical Communications Budget Activity: #4 - Tactical Programs

D. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: The Joint Tactical Communications (TRI-TAC) Office was officially established by the Secretary of Defense and became effective on 1 July 1971. The development of a Joint Service specification for the TRI-TAC Switch (AN/TTC-39) including the related Communications Security (COMSEC) equipment was completed and validation contracts were awarded by Project Manager, Army Tactical Communications Systems and National Security Agency (NSA). A joint test facility was established for testing of the AN/TTC-39 and related COMSEC. The Joint Tactical Communications Master Plan, Land Based Switched System Plan, Naval Switched Subsystem, Transitional Plan, Subsystem Plans, and Test plans were prepared and distributed to all program participants by the TRI-TAC Office. In April 1974 engineering development of the AN/TTC-39 was approved. Contracts for full scale development of the AN/TTC-39 and the related COMSEC equipment were awarded by the Army and NSA respectively. The Air Force awarded a contract in May 1975 for development of the Technical Control Facility and the Army awarded a FY75 engineering development contract for a family of Digital Group Multiplexers (DGM). The TRI-TAC Office revised plans including Aspect Papers, Architecture documents and continued efforts in areas of Interoperability and Interface Control, Logistics and Data Management and Test Planning Activities. Activities related to program review and configuration control as well as Program Budget Reviews including issuance of a Program/Budget Guide were accomplished. The Air Force awarded contracts in FY76 for the full scale development (FSD) of the Digital Tropospheric Scatter Radio Terminals and advanced development of the Digital Non-secure Voice Terminal. The Navy awarded a contract in Sep 1976 for the FSD phase of the Ultra High Frequency (UHF)-Demand Assigned Time Division Multiple Access (TDMA) Satellite Modems. DOD Directive 5148.7 was revised by the Deputy Secretary of Defense (DEPSECDEF) in February 1976 and assigned Director, TRI-TAC increased responsibilities for coordinating the conduct, planning and reporting of Joint Testing of TRI-TAC developed equipments. By Memorandum dated 12 March 1976, the DEPSECDEF established the Joint Test Facility and Organization for the TRI-TAC Program. DOD Instruction 5148.8, 9 April 1976, provided implementing instructions to the participating Services/DOD Agencies and amplified responsibilities of the TRI-TAC Office in Joint Test and Evaluation of TRI-TAC Equipment. Major efforts of the TRI-TAC Office included the overall coordination and evaluation of all equipments under development including interoperability, interface and configuration control. On 26 August 1976, the Director, TRI-TAC Office was designated the Executive Agent for development of the Advanced Narrowband Digital Voice Terminals (ANDVT) for securing narrowband radio and telephone circuits. The TRI-TAC Program/Budget Guide was revised in February 1977 and the TRI-TAC Test and Evaluation Plan (TEMP) was revised and forwarded to the Secretary of Defense in May 1977. A draft Program Management Plan (PMP) was prepared and coordinated with the Services and participating DOD agencies in August 1977. Bi-monthly program status reviews were conducted along with a separate Logistics Status Review and Joint Testing Review during FY 1977. Numerous performance and interface specifications and Interface Control Documents were prepared, revised and issued in 1977. Participated in the source evaluation and selection process for the Tactical Digital Facsimile (TDF) and the Unit Level Circuit Switch (ULCS) engineering development contracts awarded by the developing service.

2. FY 1978 Program: Continue the level of effort required to support the mission of the Director, TRI-TAC Office. Major efforts will be in evaluating contractor performance during full scale development (FSD) phase of the AN/TTC-39 Family of Switches,

Project: #D104 — Title: Joint Tactical Communications (TRI-TAC) Office
Program Element: #2.80.10.A — Title: Joint Tactical Communications (TRI-TAC) Program
DoD Mission Area: #443 - Tactical Communications — Budget Activity: #4 - Tactical Programs

TENLEY/SEELEY COMSEC Equipments, Communications Nodal Control Elements (CNCE), Digital Group Multiplexer (DGM) family, Digital Tropo AN/TRC-170, Tactical Digital Facsimile (TDF) and the Unit Level Circuit Switch (ULCS) family. Monitor the validation phase efforts of the Communications Systems Control Element (CSCE) and SHF Satellite Modem. Participate in the selection process for the Digital Net Radio Interface (NRI), Modular Record Traffic Terminal (MRTT), Digital Non-Secure Voice Terminal (DNVT), and the Short Range Wideband Radio Modifications to the AN/GRC-144 Radio Set contract awards. Participate in the Mobile Subscriber Equipment (MSE) Special Task Force. Revise and publish the Program/Budget Guide and publish the Program Management Plan (PMP). Provide overall management and coordination for the completion of the Joint Test Facility. Provide management and guidance for the start of the Development Test and Evaluation/Initial Operational Test and Evaluation (DTE/IOTE) on the AN/TYC-39 Message Switch, Communications Nodal Control Element (CNCE), Digital Group Multiplexer (DGM) Family (13 items) and TENLEY/SEELEY COMSEC programs.

3. FY 1979 Planned Program: Continue overall management for the test, evaluation and system architecture aspects of the TRI-TAC program. Continue preparation of specifications, coordination and monitoring of Services/National Security Agency (NSA) efforts, monitoring and evaluating contractor performance, management of the Joint Test Organization, management of interface and configuration control and providing overall program guidance. Increase in FY 1979 funding over FY 1978 is due primarily to the increased level of joint testing on TRI-TAC equipments at Fort Huachuca, Arizona. DTE/IOTE will be in progress on the AN/TTC-39 Circuit Switch, AN/TYC-39 Message Switch, CNCE, TENLEY/SEELEY COMSEC, DGM family and Digital Tropo AN/TRC-170.

4. FY 1980 Planned Program: Continue overall management for the test, evaluation and system architecture aspects of the TRI-TAC program. The resources under this project will continue to support the operation of the TRI-TAC Office, to include civilian salaries, operating expenses and support contract(s) in the accomplishment of the assigned mission prescribed by DOD Directive 5148.7.

5. Program to Completion: This is a continuing program.

6. Major Milestones: Not Applicable.

7. Resources ($ in thousands):

	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
RDTE, A Funds	5550	5911	5996	6100	Continuing	Not Applicable

TE. 174-77

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D119 Title: Modular Record Traffic Terminal (MRTT)
Program Element: #2.80.10.A Title: Joint Tactical Communications (TRI-TAC) Program
DoD Mission Area: #443 - Tactical Communications Budget Activity: #4 - Tactical Programs

A. DETAILED BACKGROUND AND DESCRIPTION: The Modular Record Traffic Terminal (MRTT) family is a set of secure, ruggedized, tailorable tactical record traffic terminal equipments and assemblages designed to provide facilities to compose, edit, process, transmit, receive and distribute record traffic required by combat operations and combat operations support. Two levels of employment are planned; Single Subscriber Terminals (SST) and Tactical Communications Centers (TCC). The SST consist of individual equipment items configured as terminals to meet the requirements of individual end-users. The TCC will assemble varying numbers of SST equipments into a cluster arrangement within a processor controlled tactical message center environment. The MRTT family is needed to replace the obsolete, low speed, unreliable, manpower intensive, electro-mechanical teletypewriters, paper tape punches and tape readers employed as individual terminal equipments at battalion, brigade and division level and in teletypewriter and message center assemblages (AN/MSC-29, AN/MSC-17 and AN/GSQ-80A) employed at brigade, division, and Corps levels. The MRTT family represents the users terminal equipment in the tactical record traffic system. SST's and TCC's are interconnected thru the AN/TYC-39 Automatic Message Switch and/or the AN/TTC-39 Automatic Circuit Switch which are also Army assigned TRI-TAC programs under Project D222 (Automatic Communications Central Office AN/TTC-39). The MRTT family will provide a direct user to user terminal capability (SST) for high volume subscribers that will eliminate the slow response time due to multiple reformating written messages and preparation of punched paper tapes for transmission. Low volume subscribers will be served thru the common user TCC located at major headquarters (i.e. Division, Brigade) or other concentrations of low volume users. The TCC will provide service thru the AN/TYC-39 or AN/TTC-39 switch direct to other TCC's or SST's and will eliminate the slow response time due to the punched paper tapes used in the current transmission of message traffic. The planned program will be essentially an assemblage task addressing software/interfaces and interoperability requirements with minimal hardware engineering development required. Maximum utilization is to be made of existing militarized hardware items (i.e., AN/UGC-74 Intelligent Teletypewriter Terminal) and available state-of-the-art commercial equipments. The MRTT program is an outgrowth and includes the requirements of the TRI-TAC Composition and Editing Display (COED) program initially assigned to the Air Force. The Office of the Secretary of Defense (OSD) cancelled the Air Force assigned COED program in February 1976, directed a MRTT study by the TRI-TAC Office and finally assigned the MRTT development program to the Army in May 1977. The Phase I Study Program was initiated in May 1976 and is scheduled for completion in December 1977.

B. RELATED ACTIVITIES: All Services and the National Security Agency (NSA) are participating in the development of the Modular Record Traffic Terminal (MRTT) through their respective TRI-TAC programs. Development efforts within the Army related to the MRTT program are conducted in Program Element 2.80.10.A under Project D110 - Mobile Subscriber Equipment (MSE); D111 - Digital Group Multiplexer (DGM) family; D113 - Super High Frequency (SHF) Satellite Modulator-Demodulator (Modem); D114 - Other Service assigned TRI-TAC programs; D116 - Facility Support Element; D117 - Short Range Wideband Radio Assemblages; D172 - Net Radio Interface (NRI); D178 - Joint Test Element Support; D222 - Automatic Communications Central Office AN/TTC-39 family; and D104 - Support to the TRI-TAC Office per DOD Directive 5148.7. These related programs do not duplicate MRTT developments. They represent other elements of the Army's Integrated Tactical Communications System (INTACS) that must be interoperable with MRTT to insure a viable and integrated program.

Project: #D119 Title: Modular Record Traffic Terminal (MRTT)
Program Element: #2.80.10.A Title: Joint Tactical Communications (TRI-TAC) Program
DoD Mission Area: #443 - Tactical Communications Budget Activity: #4 - Tactical Programs

C. *WORK PERFORMED BY: Project Manager, Multi-Service Communication Systems; Project Manager, Army Tactical Communications Systems (ATACS); US Army Communications Research and Development Command; and the TRI-TAC Office, all located at Fort Monmouth, NJ.

D. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: Army has participated in the TRI-TAC MRTT Study Program since April 1976. The Study Program has produced a requirements analysis, strawman characteristics, a draft requirements document and a candidate item survey. Work is in progress on performance specifications and a final technical report. MRTT task was formally transferred to the Army on 10 May 1977 by OSD.

2. FY 1978 Program: Participate in the completion of the MRTT Study Program, obtain specification approval, prepare procurement data package, prepare and submit Determinations and Findings (D&F), prepare and submit Advanced Procurement Plan (APP), issue Request for Proposals (RFP) and evaluate RFP.

3. FY 1979 Planned Program: Award full scale engineering development (FSED) contract as all necessary experimental work will have been performed and the MRTT program will be ready for FSED. Other activities will be to monitor and evaluate contractor performance, participate in Preliminary and Final Design Reviews and initiate planning for Development Test and Evaluation and Initial Operational Test and Evaluation (DTE/IOTE). Increase in FY 1979 funding over FY 1978 is due to the award of the FSED contract.

4. FY 1980 Planned Program: Complete engineering and fabrication efforts, conduct Prototype Qualification Tests (PQT) on hardware and Formal Qualification Tests (FQT) on software. Complete planning and preparation for start of DTE/IOTE. Continue to monitor and evaluate contractor performance.

5. Program to Completion: Conduct Development Test and Evaluation and Initial Operational Test and Evaluation (DTE/IOTE), evaluate DTE/IOTE results, conduct Development Acceptance (DEVA) In-Process Review (IPR) and Type Classification action and solicit, evaluate and award production contract(s).

6. Major Milestones: Not Applicable.

7. Resources ($ in thousands):

	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
RDTE, A: Funds	0	574	6000	10500	3600	20674
Quantities						*

* Various small quantities of existing militarized terminal equipments and available commercial terminal equipments.

CCS 152-77

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D222
Program Element: #2.80.10.A
DoD Mission Area: #443 - Tactical Communications

Title: Automatic Communications Central Office, AN/TTC-39
Title: Joint Tactical Communications (TRI-TAC) Program
Budget Activity: #4 - Tactical Programs

A. DETAILED BACKGROUND AND DESCRIPTION: The AN/TTC-39 is a family of modular and transportable communications switching systems designed to provide secure, automatic, processor controlled switching for tactical voice and message traffic. The family consists of hybrid (analog and digital) circuit switches (AN/TTC-39) varying in nominal size from 450 (300 line) to 750 terminations (600 line) by increments of 150 analog or digital terminations, and message switches (AN/TYC-39) equipped for 25 and 50 lines. Circuit switches can be grouped to provide up to 3000 terminations (2400 lines) and the message switch can be employed either with or independent of the circuit switch. The AN/TTC-39 family is planned for multiservice use: from Corps level back thru Theater Army; at Tactical Air Base, Special Headquarters elements of the Tactical Air Control System, Air Force Components and Joint Task Force Headquarters and other concentrations of forces and Emergency Action forces; by Marine Division/Wing and Marine Air Ground Task Forces of Marine Amphibious Brigade size or larger; and within the Defense Communications System. The AN/TTC-39 family is needed to replace the following inventory switches: obsolete, predominately manual, manpower intensive telephone central offices (i.e., AN/MTC-1, AN/MTC-9, and AN/TTC-22); obsolete, manpower intensive, electromechanical automatic telephone central offices (i.e., AN/TTC-28); interim processor controlled automatic central offices (i.e., AN/TTC-25, AN/TTC-30 and AN/TTC-38); and obsolete, manpower intensive, manual record traffic (messages) central offices and relays (i.e., AN/MGC-19, AN/MSC-29, AN/TSC-58, AN/MGC-9, AN/MGC-32, AN/MGC-23, AN/MGC-22 and AN/MYQ-2). The AN/TTC-39 family provides the transition from the current inventory analog switching systems (manual and interim automatic) to a digital system which provides improved reliability/availability and reduced life cycle cost thru solid state technology, provides capability for end to end security thru digital techniques and reduces manpower requirements for operation and maintenance thru automation and digital technology. Automation of the message switch also eliminates the manpower intensive, slow, error prone manual punched paper tape methods of transmitting and switching message traffic. The AN/TTC-39 family is the heart and lead development item of the Joint Tactical Communications (TRI-TAC) Program. The TRI-TAC program is a joint Service and Defense Agency, program to develop and field a family of securable, digital, mobile/transportable trunking, access and switching equipments to satisfy the Services' tactical multichannel switched communications systems requirements in the early 1980's. It will be interoperable with the Defense Communications System (DCS) and interface with systems of our allies. Overall management is provided by the Office of the Secretary of Defense (OSD) thru the Director, TRI-TAC Office. Each Service/Defense Agency is tasked by OSD to develop various elements of the TRI-TAC system architecture. The tasked Service/Agency totally funds the R&D phase and acts as the procuring Service for all DoD quantities in the production phase. Test and Evaluation is managed by the Director, TRI-TAC Office thru a Joint Test Element that is funded by each Service/Agency on a pro-rata basis. The AN/TTC-39 family development was assigned to the Army by OSD in January 1972. The Advanced Development phase was completed in March 1974.

B. RELATED ACTIVITIES: All Services, the Defense Communications Agency, and the National Security Agency are participating in the development of AN/TTC-39 family of switches. Development efforts within the Army related to the program are conducted in Program Element 2.80.10.A under project D111 - Digital Group Multiplexers; D113 - Super High Frequency (SHF) Satellite Modulator-Demodulator (Modem); and D110 - Mobile Subscriber Equipment; D117 - Short Range Wideband Radio (SRWBR) Assemblages; and D119 - Modular Record Traffic Terminal (MRTT). In addition, there are a number of TRI-TAC Tasks assigned to the other Services related

to the AN/TTC-39. The Army program to monitor these other service efforts is project D114 - Other Service Assigned TRI-TAC Tasks. The TRI-TAC Office coordinates and provides overall management for all Service efforts and is funded by the Army under D104 per DOD Directive 5148.7. The Army's share (35%) of the TRI-TAC Joint Test Element is funded in project D178 (Joint Test Support) per DOD Instruction 5148.8. Project D116 - Facility Support Element funds the Army support to the TRI-TAC Joint Test Program with a baseline of current inventory equipment per DOD Instruction 5148.8. Centralized management by OSD thru the TRI-TAC Office insures that there is no duplication of effort in the related Army, other Service assigned and DoD Agency assigned TRI-TAC programs.

C. WORK PERFORMED BY: Project Manager, Multi-Service Communications System; US Army Communications Research and Development Command; and TRI-TAC Office; all of Fort Monmouth, NJ. Contractor is GTE-Sylvania, Needham Heights, MA.

D. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: Hardware development was initiated in FY 1972, when a first draft of the Automatic Communications Central Office, AN/TTC-39 specification was developed, a final Joint Service Specification was approved and two competitive prototype contracts for Advanced Development (Phase I) were awarded. Advanced Development of the AN/TTC-39 continued in 1973 during which time the competitive prototype contracts were monitored against the prototype model design plans submitted by the contractors. Data required for the Engineering Development (Phase II) contract to be awarded to the winner of Phase I was coordinated with the Services and agencies. The Coordinated Test Program was reviewed, and guidance for the Phase II proposal was developed. The Army was tasked to develop the Digital Group Multiplexer (DGM) family which is associated with the AN/TTC-39 switch. A Defense Systems Acquisition Review Council (DSARC) II was held on 11 April 1974 and Full Scale Development (FSD) was approved by the Deputy Secretary of Defense on 12 April 1974. A Cost Plus Incentive Fee (CPIF) contract was awarded to GTE Sylvania on 16 April 1974. The Preliminary Design Review of the Full Scale Development (FSD) was held in September 1974. In December 1974, the contractor announced a cost growth of $23 million which was subsequently negotiated to reflect a $19.1 million cost growth and a $4.1 million change in scope. Through a series of TRI-TAC approved trade-off proposals in May of 1975, the proposals were incorporated into the contract baseline at a not-to-exceed cost of $835 thousand. The resultant Engineering Change Proposals caused a two month slippage in milestones starting with the Final Design Review. During November 1975, there were indications that the contractor was falling behind schedule because of problems in the completion of specifications and development of circuit switch software. At the Final Design Review held December 1975, the contractor identified a schedule slippage of 3 1/2 months. In order to provide the contractor with some time to resolve software problems, as well as to better align Government testing of the AN/TTC-39 with the US Air Force developed Tactical Communications Control Facility (TCCF) Program, the TRI-TAC Office authorized a 3 1/2 month extension of the program. A Government study of the software problem concluded that there existed a potentially large slip in the program schedule. The contractor also confirmed a January 1976 Government conclusion that cost growth was occurring that was not being reported. During May 1976, the contractor submitted an estimate of $105.2M as the cost at completion against the schedule presented at the December 1975 Final Design Review. Government analysis of this estimate resulted in a conclusion that a breach of the Decision Coordinating Paper (DCP) #135 cost and schedule thresholds was to be anticipated. In June 1976, the Project Manager recommended a review of the development program by Defense Systems Acquisition Review

Council (DSARC) principals. The contractor's funding requirements submitted in May 1976 for FY 1977 and FY 1978 exceeded available program funding. During August 1976, the contractor was directed to implement a plan which minimized government exposure to further cost growth, pending a decision on the future of the development program. The directed action constrained the development effort through FY 1977 within a cumulative funding cap of $100.5 million. A Special DSARC was conducted on 2 November 1976 and approved program continuation on a revised cost and schedule baseline (16 month circuit switch extension). Revised program cost estimate based on a rapid RDTE estimate with a DOD directed revised life cycle cost estimate to be conducted during FY 1977. Contractual efforts in FY 1977 resulted in completion of development and start of Prototype Qualification Test (PQT) for the Message Switch (AN/TYC-39). Development effort continued on the Circuit Switch (AN/TTC-39) with two software Formal Qualification Tests (FQT) scheduled for FY 1977 successfully completed.

2. FY 1978 Program: Complete PQT and start Development Test and Evaluation/Initial Operational Test and Evaluation (DTE/IOTE) for the Message Switch (AN/TYC-39). Complete Circuit Switch (AN/TTC-39) design, fabrication and software FQTs followed by the start of Prototype Qualification Test (PQT).

3. FY 1979 Planned Program: Complete PQT and start DTE/IOTE for Circuit Switch. Decrease in funds in FY 1979 compared to FY 1978 due primarily to completion of circuit switch engineering, assembly and PQT. Start DTE/IOTE on the Circuit Switch (AN/TTC-39) and complete DTE/IOTE on the Message Switch (AN/TYC-39).

4. FY 1980 Planned Program: Complete DTE/IOTE on the AN/TTC-39 Circuit Switch, prepare for and conduct the Defense Systems Acquisition Review Council (DSARC) III production decision. Award initial production contract for the AN/TYC-39 Message Switch. Complete Type Classification action for the AN/TTC-39. Continue contractor support of AN/TTC-39 and AN/TYC-39 models in the TRI-TAC Joint Test Facility used to support joint test of other TRI-TAC development programs.

5. Program to Completion: Award initial production contract (FY 1982) for AN/TTC-39 Circuit Switch and remaining AN/TYC-39 Message Switches. Conduct Production Acceptance Test and Evaluation (PATE). Prepare for and field initial circuit and message switches to complete Initial Operational Capability (IOC).

6. Major Milestones:

	Date
Engineering-Development Contract Award.	Apr 74
Prototype Qualification Test (PQT).	
Start Message Switch/Circuit Switch	May 77/Mar 78
Complete Message Switch/Circuit Switch.	Apr 78/Nov 78

Project: #D222 — Title: Automatic Communications Central Office, AN/TTC-39
Program Element: #2.80.10.A — Title: Joint Tactical Communications (TRI-TAC) Program
DoD Mission Area: #443 - Tactical Communications — Budget Activity: #4 Tactical Programs

Milestones (cont)	Date
Development Test and Evaluation/ Initial Operation Test and Evaluation (DTE/IOTE)	
Start Message Switch/Circuit Switch	Jul 78/Feb 79
Complete Message Switch/Circuit Switch	May 79/Nov 79
Defense Systems Acquisition Review Council (DSARC) III AN/TYC-39 Message Switch Production Decision.	Oct 79
AN/TYC-39 Production Award	Nov 79
DSARC III AN/TTC-39 Production Decision	Sep 80
AN/TTC-39 Production Award	Oct 81
Initial Operational Capability (IOC).	Jun 82

*Alternative C, Revised Decision Coordinating Paper (DCP) #135, Approved 14 January 1977.

7. Resources ($ in thousands):

	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
RDTE, A:						
Funds	22342	36510	28300	9700	1536	215800
Quantities**	0	7	9	0	0	16
Other Procurement, Army						
Funds	0	0	0	27900	269200	297100
Quantities***	0	0	0	12	120	132

** Engineering Development Models.
*** Total Army Quantity of 132 represents 95-AN/TTC-39 (300 Line), 9-AN/TTC-39 (600 Line) and 28-AN/TYC-39 Message Switches.

Project: #D222
Program Element: #2.80.10.A
DoD Mission Area: #443 - Tactical Communications

Title: Automatic Communications Central Office AN/TTC-39
Title: Joint Tactical Communications Program (TRI-TAC)
Budget Activity: #4 - Tactical Programs

E. Test and Evaluation Data:

1. Development Test and Evaluation: The contractor for the AN/TTC-39 family of modular, secure, digital, processor controlled, automatic circuit (AN/TTC-39) and message (AN/TYC-39) switches is GTE Sylvania, Needham Heights, MA. A combined Development Test and Evaluation and Initial Operational Test and Evaluation (DTE/IOTE) is scheduled on the AN/TYC-39 Message Switch for July 1978 thru May 1979 at Fort Huachuca, AZ. A combined DTE/IOTE on the AN/TTC-39 Circuit Switch is scheduled for February 1979 thru November 1979. It is expected that the Engineering Development equipment to be tested will be essentially the same as the production models although the circuit switch modularity may vary according to specific employment of production equipment. A revised TRI-TAC Test and Evaluation Master Plan (TEMP) was prepared by the Director, TRI-TAC office, and was submitted to the Office of the Secretary of Defense on 4 May 1977.

2. Operational Test and Evaluation: No operational tests have been conducted on the AN/TTC-39 family of switches. A combined DTE/IOTE is scheduled on the AN/TYC-39 Message Switch for July 1978 thru May 1979 and the AN/TTC-39 Circuit Switch combined DTE/IOTE is scheduled for February 1979 thru November 1979. Initial Operational Test and Evaluation (IOTE) on the AN/TTC-39 and AN/TYC-39 is scheduled to be accomplished prior to production contract awards. It is expected that the Engineering Development equipment to be tested will be essentially the same as the production models although the circuit switch modularity may vary according to specific employment of production equipment. IOTE for the AN/TTC-39 family of switches will be conducted by the US Army Operational Test and Evaluation Agency (OTEA) with support of the TRI-TAC Joint Test Organization at Fort Huachuca, AZ. Test will use military personnel from the appropriate elements of a Command Operations Signal Battalion, a Corps Area Signal Battalion, and a Radio and Cable Battalion. Contractor support will continue during testing. One of the major objectives during operational testing is to provide information to assess the reliability, availability, and maintainability (RAM) and the operational impact of RAM performance.

3. System Characteristics:

	Objective	Demonstrated Performance 1/
AN/TTC-39 Circuit Switch (600 Line)/(300 Line)		
Inherent Availability	.9999/.999	
Mean Time Between Failure	2500/250 hours	
Mean Time to Repair	15 minutes	
Simultaneous Conferences	6/4	
Maximum Conferees per Conference	20	
Alternate Routing	Up to 5	
Standby Battery Power	15 minutes	
Terminations per Module	150	

Project: #D222 — Title: Automatic Communications Central Office AN/TTC-39
Program Element: #2.80.10.A — Title: Joint Tactical Communications Program (TRI-TAC)
DoD Mission Area: #443 - Tactical Communications — Budget Activity: #4 - Tactical Programs

	Objective	Demonstrated Performance 1/
Maximum Weight per Shelter	7000 lbs	
AN/TYC-39 Message Switch (50 Line)		
Inherent Availability	.9999	
Mean Time Between Failure	2500 hours	
Mean Time to Repair	15 minutes	
Reference Storage	10 days	
Journal Storage	30 days	
Standby Battery Power	15 minutes	
Message Processing Time	2 seconds	
Throughput Characters per Second	9000	
Bit Error Rate per Consecutive Bits	1 per 10^{10}	
Maximum Weight per Shelter	7000 lbs	

1/ Testing is scheduled to begin in July 1978. No performance characteristics have been tested to date.

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.13.A
Title: Combat Feeding, Clothing, and Equipment
DoD Mission Area: #534 - Medical & Life Support
Budget Activity: #5 - Intelligence & Communications

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	4951	5203	1385	3080	Continuing	Not Applicable
	Quantities						Not Applicable
DL40	Clothing and Equipment	389	397	512	2030	Continuing	Not Applicable
DL42	Personnel Armor System	568	388	250	150	Continuing	Not Applicable
DL47	Wholesomeness Testing of Irradiated Foods	3831	4210	273	100	Continuing	Not Applicable
D548	Military Subsistence Systems	163	208	350	800	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Success on the battlefield is directedly related to the individual soldier's effectiveness and survivability. This program plans for the correction and improvement of that part of the combat support system which provides for the basic needs of the individual on the battlefield: food, clothing, shelter, chemical, biological and ballistic protection. It also includes the development and improvement of special items of individual clothing and equipment required for operations in extremes of terrain and climate, e.g., mountain climbing, snow, and surface swimming gear; the improvement of field food service equipment, fabric field shelters, field service equipment, field printing equipment and conduct of wholesomeness testing of irradiated foods. Also provides for the evaluation of domestic and foreign food service equipment for effectiveness in military food system requirements to avoid development requirements. This program also includes Navy, Air Force and Marine Corps food service requirements as part of the DOD Food Research, Development, Testing and Engineering (RDT&Eng) Program managed by the Army for all the Services and Defense Logistics Agency (DLA).

C. BASIS FOR FY 1979 RDTE REQUEST: This and other related program elements (PEs) provides for correction of known deficiences in items of individual clothing and equipment and allows the completion of items previously started in related PEs. The improvements planned under this program will incorporate the latest developments in material and equipment design and is expected to significantly increase individual combat efficiency under the diverse geographical and climatological battlefield conditions expected in future areas of operations. Food service developments in this and related PEs provide for more efficient (and cost effective) provision of this vital element of life support systems for all the Services under conditions of peacetime training, emergency deployment and combat.

Program Element: #6.47.13.A
DoD Mission Area: #534 - Medical & Life Support

Title: Combat Feeding, Clothing, and Equipment
Budget Activity: #5 - Intelligence & Communications

D. OTHER APPROPRIATION FUNDS: ($ in thousands)

	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
Other Procurement, Army						
Mobile Field Kitchen	2300	0	7000	23400	43500	76200

E. DETAILED BACKGROUND AND DESCRIPTION: This program provides for the development of individual combat protective clothing and equipment to increase combat efficiency and provide protection for the combat soldier against battlefield hazards and the natural environment. It also includes the development of operational rations and food service equipment; wholesomeness feeding of irradiated foods; and develops improved field shelters. There are four projects within this program element (PE) which directly affect the soldier's safety, effectiveness, comfort, and survivability.

F. RELATED ACTIVITIES: Each of the military Services performs work to develop their Service-peculiar items of clothing and equipment; however, close coordination is maintained, and many of the items developed under this program are used by all other military Services. Department of Defense Directive 1338.10-M assigns the Army overall responsibility for the Department of Defense (DOD) Food Research, Development, Testing and Engineering (RDT&Eng) Program, which includes specific efforts to respond to DOD and other Services requirements. Work in clothing and equipment is also performed in 6.27.23.A, Clothing, Equipment, and Packaging Technology, and in Project D669, Clothing and Equipment in 6.37.26.A, Combat Support Equipment. Work in food is conducted in Project AH52, Research in Support Equipment of Individual Soldier in 6.11.02.A, Defense Research Sciences, in 6.27.24.A, Food Technology, and in Project D610, Food Advance Development in 6.37.47.A, Soldier Support/Survivability.

G. WORK PERFORMED BY: The US Army Natick Research and Development Command at Natick, MA, performs the majority of in-house efforts. The US Army Medical Research and Development Command administers the wholesomeness feeding test contract for irradiated chicken with Ralston/Purina, St. Louis, MO. Additional potential contractors for other elements of this PE are Digital Equipment Corporation, Maynard, MA, and E. I. DuPont, Wilmington, DE. Other Government facilities involved are US Army Human Engineering and Chemical Systems Laboratories, Aberdeen Proving Ground, MD; US Army Test and Evaluation Command, Aberdeen Proving Ground, MD; and US Army Cold Regions Test Center, Fort Greely, AL. Estimated value of contracts is $1,750 thousand.

Program Element: #6.47.13.A
DoD Mission Area: #534 - Medical & Life Support

Title: Combat Feeding, Clothing, and Equipment
Budget Activity: #5 - Intelligence & Communications

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: A large number of items of clothing, equipment, operational rations, subsistence items, recipes and food service equipment in use today were developed under this program element (PE) and adopted as standard. In FY 1977, type classification action was taken on a lightweight overshoe, surface swimming equipment, and mountain crampons. Engineering development (ED) was initiated on rifle ammunition carrier and combat vehicle crewman (CVC) hot weather uniform. Operational Test (OT) II on Personnel Armor Systems for Ground Troops (PASGT) (infantry helmet and personnel body armor) was completed; developmental test (DT) on PASGT progressed on schedule. Wholesomeness testing of irradiated chicken meat was initiated. Field kitchen and food service sanitation system was developed and adopted by US Marine Corps. Army adopted same sanitation system for field. Several items of commercial food service equipment were evaluated and recommendations on their potential for use in DOD food systems were made to the DOD Food Facilities Equipment Planning Board.

2. FY 1978 Program: Complete DT II/OT II and type classify chemical warfare agent protective evaluation bag for wounded individuals. Award contract for procurement of mountain ski boot test items for DT II; conduct physiological and thermographic studies on CVC hot weather uniform and procure items for DT II. Procure commercial cold weather sleeping bags for aircraft emergency use. Complete PASGT DT II and ballistic firing of test items. Continue test of irradiated chicken, and consider retesting of irradiated beef. Evaluate selected foreign and domestic food service equipment for possible DOD food system use; continue improvements to Army and US Marine Corps field food service equipment.

3. FY 1979 Planned Program: Initiate ED on body armor for explosive ordnance demolition units. Continue ED on PASGT. Complete ED on CVC hot weather uniform and cold weather sleeping bags for aircraft emergency use. Continue wholesomeness testing of irradiated chicken and if appropriate initiate contracts for retesting of beef (major contractor for beef, ham and pork was declared in default in September 1977). Evaluate selected foreign food service equipment for possible use. Continue improvement of Army and Marine Corps field food service equipment; and evaluate commercial food service equipment selected by the DOD Food Service Equipment and Facilities Planning Board for possible use in DOD dining facilities.

4. FY 1980 Planned Program: Initiate ED on cold/dry weather uniform, winter flying gloves, battle dress uniform and combat boot for combat vehicle crewman. Procure POL handwear for DT II/OT II. Continue ED of body armor for explosive ordnance demolition (EOD) units. Complete ED of PASGT. Initiate ED on transportable helicopter enclosure (THE), a family of modular general purpose field tentage, and chart/overlay copier. Continue wholesomeness testing of irradiated meats. Prepare petition for clearance of chicken meat by Food & Drug Administration (FDA) for unlimited human consumption. Continue to evaluate new food service equipment for DOD. Continue improvements to Army and Marine Corps field food service equipment.

5. Program to Completion: This is a continuing program.

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.15.A
DoD Mission Area: #533 - Training Device Development

Title: Non-Systems Training Devices (NSTD) Engineering
Budget Activity: #5 - Intelligence and Communications

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1977 Actual	FY 1978 Estimated	FY 1979 Estimated	FY 1980 Estimated	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	7698	8192	10006	12916	Continuing	Not Applicable
D237	NSTD Artillery/Air Defense/ Engineer	1143	726	2550	1800	Continuing	Not Applicable
D239	NSTD Infantry	4877	2898	1350	1550	Continuing	Not Applicable
D241	NSTD Combined Arms	943	3244	2820	4800	Continuing	Not Applicable
D572	NSTD Armor/Anti-Armor	35	439	2436	3766	Continuing	Not Applicable
D573	Army Support Naval Training Equipment Center (NTEC)	700	794	850	1000	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The Army has a long-term, continuing need to provide cost effective training. The concept of using actual equipment and live ammunition for all training has become obsolete due to escalating costs and diminishing resources. As a viable alternative this program provides for the design, development and testing of training devices and simulators, not related to specific Army systems, which will provide optimum training for both operating and maintenance personnel. The major thrust of this program is geared towards development of training simulation devices that provide cost effective training and increased proficiency. The return on investment within this area is significant - most developed simulators pay for themselves within the first year of this operation. The Army utilizes the resources of the Naval Training Equipment Center (NTEC) under a joint Service Agreement.

C. BASIS FOR FY 1979 RDTE REQUEST: Complete Development Test II/Operational Test II (DT II/OT II) tests for the Infantry Remoted Target System (IRETS), the Marksmanship Gunnery Laser Device (MAGLAD), and the Mine Casualty Producing Simulator (MICAPS) programs. Initiate engineering development (ED) effort for the Armor Remoted Target System (ARETS), the Tank Weapons Gunnery Simulator System (TWGSS), the Diagnostic Rifle Marksmanship Simulator (DRIMS), Air-to-Ground Engagement Simulator (AGES), and a variety of maintenance training devices (all programs will have progressed into the ED phase from prior Exploratory and Advanced Development efforts. Continue major development effort for the Command Group Training Simulator System (CGTSS).

Program Element: #6.47.15.A
DoD Mission Area: #533 - Training Device Development

Title: Non-Systems Training Devices (NSTD) Engineering
Budget Activity: #5 - Intelligence and Communications

D. OTHER APPROPRIATION FUNDS: ($ in thousands)

	FY 1977 Actual	FY 1978 Estimated	FY 1979 Estimated	FY 1980 Estimated	Additional to Completion	Total Estimated Costs
Other Procurement, Army	$12,300	$12,600	$32,800	$50,700	Continuing	Not Applicable
Quantities *						
Military Construction	0	0	0	0	Continuing	Not Applicable

* It is not feasible to list the quantities because of the diversity of type and quantity of the different training devices.

E. DETAILED BACKGROUND AND DESCRIPTION: The objectives of this program are to design, develop and test training devices which will provide optimal training for both operating and maintenance personnel. The program provides for engineering development effort on a continuing basis for training devices/simulators which are not related to specific Army systems. The major thrust of this program is geared toward developing training simulation devices that provide cost effective training and increased proficiency for both individual and crew/unit environments. The Army utilizes the resources of the Naval Training Equipment Center (NTEC) in accordance with a joint agreement. This program element provides the Army's proportionate share of NTEC operations cost. This arrangement makes available all NTEC resources for Army use, including personnel, extensive simulation facilities, and laboratories in areas such as physical sciences, electronics, visual simulation, computer, and human factors.

F. RELATED ACTIVITIES: Close coordination is maintained with other Services through Training and Personnel Technology Conferences, Topical Reviews, Joint Service Technical Coordinating Group - Simulators and Training Devices, joint program developments, joint use of NTEC, and worldwide staffing of Training Device Requirements. Related Program Elements (PE) are 6.27.27.A, Non-Systems Training Devices Technology; 6.37.38.A, Non-Systems Training Devices Development; 6.42.17.A, Synthetic Flight Training Systems; 6.42.27.F, Flight Simulator Development; 6.47.03.N, Training Devices Prototype Development. Projects contained in this program element have progressed to engineering development from related advanced development (PE 6.37.38.A) and exploratory development (PE 6.27.27.A) programs.

G. WORK PERFORMED BY: Primary contractors: Xerox Electro-Optical Systems, Inc., Pasadena, California; Sperry Rand Corp., Huntsville, Alabama; International Laser Systems Inc., Orlando, Florida; ABA Electromechanical Systems, Inc., Pinellas Park, Florida; Detroit Bullet Trap Corp; Schaumburg, Illinois. The above list of contractors and potential bidders is not complete

and many other contractors may respond when actual bids are released. A total of $5.7M is programmed for competitive bid contracts. In-house activities are performed by the Project Manager for Training Devices (PM TRADE), Orlando, Florida; various US Army Development and Readiness Command (DARCOM) Laboratories; and the Naval Training Equipment Center (NTEC), Orlando, Florida.

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: Completed development of the M31 Artillery Trainer, the Artillery Direct Fire Trainer, the Combined Arms Tactical Training Simulator, the Miniature Moving Target, the .22 Caliber Rimfire Adapter for the M16 Rifle and the Caliber .50 Subcaliber training devices for the 90mm and 105mm Tank Main Guns. All of the above have been fielded and are currently in production. Completed major engineering development effort for the Multiple Integrated Laser Engagement System (MILES) and the Observed Fire Trainer. Initiated development effort of Blank Firing Adapters for Machine Guns and Anti-Tank Weapons Signature Simulators to support tactical training. Terminated development effort for the Command and Control Training Vehicle - testing of program alternatives proved to be unacceptable and not cost effective.

2. FY 1978 Program: Complete development, testing and type classification of the various components of the Multiple Integrated Laser Engagement System (MILES), which will provide the Army the capability to conduct realistic tactical engagement training. Program is scheduled for production during FY 1979. Complete testing and type classify the Observed Fire Trainer and proceed into production during the 3QFY. Complete development, testing and type classify the various Blank Firing Adapters for Machine Guns and Weapons Effects Simulators for the various anti-tank weapons (TOW/DRAGON/VIPER). Initiate engineering development effort for the Infantry Remoted Target System (IRETS), the Marksmanship Gunnery Laser Device (MAGLAD) Mine Casualty Producing Simulator (MICAPS), Radiac Trainer and the Command Group Training Support System (these programs have progressed to engineering development from related exploratory and advanced development programs).

3. FY 1979 Planned Program: Complete engineering development, testing and type classify the Infantry Remoted Target System to provide the Army with an integrated system of threat oriented targets that will realistically support various marksmanship training exercises conducted with small arms; the Marksmanship Gunnery Laser Device to provide the Army with a realistic and cost effective means of conducting marksmanship training with the M16 Rifle without using live ammunition or extensive range facilities; the Mine Casualty Producing Simulator and the Radiac Trainer. Continue major engineering development effort for the Command Group Training Simulator System to provide realistic and cost effective training to commanders and their staffs. Initiate engineering development for the Air-to-Ground Engagement Simulator and Air Defense Engagement Simulator. These simulators will be compatible with the Multiple Integrated Laser Engagement System (MILES) and will be incorporated into the overall Combined Arms Tactical Engagement Simulation program. Initiate engineering development for the Tank Weapons Gunnery Simulator System for

precision gunnery training and for a variety of maintenance training simulators which will provide realistic and cost effective training for high maintenance/labor intensive equipment. The FY 1979 funding increases will be applied to the new initiatives discussed above, and thus capitalize on the successful research and development initiated during FY 1976/1977 in related exploratory and advanced development programs.

4. FY 1980 Planned Program: Complete engineering development of the Air-to-Ground Engagement Simulator, the Air Defense Engagement Simulator, and the Command Group Training Simulator System. Continue development of the maintenance trainers and the Tank Weapons Gunnery Training Simulator System initiated during FY 1979. Initiate development for the Engineer Equipment Simulator and threat weapon system simulators.

5. Program to Completion: This is a continuing program.

(CASE 228-77)

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.26.A
DoD Mission Area: #532 - Global Military Environmental Support

Title: Meteorological Equipment and Systems
Budget Activity: #5 - Intelligence and Communications

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	242	184	3209	6223	Continuing	Not Applicable
	Quantities						2
D511	Meteorological Equipment and Systems	242	184	3209	6223	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The objective of this program is to develop equipment and systems to provide meteorological data essential to the planning and conduct of Army combat operations. This program will specifically address present deficiencies of the Army's ability to rapidly acquire atmospheric temperature, density and winds for effective correction of artillery fire and for nuclear fallout predictions. Also, the US Army requires a mobile supercooled fog dissipation means. When the visibility on or near the ground is restricted due to a supercooled fog, the Army must have a capability of locally improving visibility so as to permit air and ground operations such as the landing and takeoff of an aircraft at Army airfields or at locations where air assault, air evacuation or air resupply is necessary.

C. BASIS FOR FY 1979 RDTE REQUEST: The Field Artillery urgently requires a highly mobile, lightweight, near real time meteorological data acquisition system to support the forward area artillery. The artillery must have timely meteorological data to enable the fire direction center to calculate artillery impact points. Lack of this data can cause errors up to 500 meters as the wind and air density change. The Artillery School requested the development of such a system be expedited. The current meteorological data acquisition system (AN/GMD-1) is becoming increasingly difficult and costly to maintain. Furthermore, it does not possess the required mobility, automation, and meteorological data measurement reaction time required to adequately support present and developmental artillery systems. The Field Army Meteorological Acquisition System which will begin engineering development in FY 1979 will satisfy the above urgent need.

Program Element: #6.47.26.A
DoD Mission Area: #532 - Global Military Environmental Support

Title: Meteorological Equipment and Systems
Budget Activity: #5 - Intelligence and Communications

D. OTHER APPROPRIATION FUNDS: Not applicable.

E. DETAILED BACKGROUND AND DESCRIPTION: The basic goal of this program is the development of equipment and systems to provide observations and other data of the atmosphere required for effective planning and conduct of Army combat operations. These data are of particular significance for artillery ballistic computations, sound ranging, nuclear fallout predictions and supercooled fog dissipation. The equipment includes: (1) the Cold Fog/Cloud Modification System which will provide a capability for dissipating supercooled fog at Army airfields, plus extending possibilities for operations otherwise grounded by fog; (2) the Field Artillery Meteorological Acquisition System will be lightweight, highly mobile and provide the artillery with a means of gathering critical meteorological ballistic data in a timely manner. The Field Artillery School has requested the development of the Field Artillery Meteorological Acquisition System (FAMAS) be expedited to meet an urgent need for support of forward area artillery. An expedited schedule has been prepared and approved which includes Integrated Technical and Documentation Training.

F. RELATED ACTIVITIES: Program Elements (PEs) 6.11.02.A, Project B53A, Atmospheric Sciences, 6.21.11.A, Atmospheric Investigations, and 6.37.41.A, Project D158, Meteorological Equipments. Coordination of requirements for development of meteorological equipment is effected through the US Army Training and Doctrine Command (TRADOC), and US Air Force Weather Service Meteorological Equipment Coordination Committee. As a result of the work of the committee, equipment is being developed to meet both Army and Air Force requirements. Coordination on meteorological equipment development with NATO allies is accomplished through participation in Panel XII (Meteorology), NATO Army Armaments Group. Several NATO nations have expressed an interest in purchasing items of US equipment currently under development. Coordination with the National Weather Service and nonmilitary organizations developing meteorological equipment for civilian use is accomplished through participation in the Interdepartment Committee for Applied Meteorological Research (ICAMR), and the Annual Symposium on Meteorological Observations and Instrumentation, sponsored by the American Meteorological Society.

G. WORK PERFORMED BY: This program is the responsibility of the US Army Atmospheric Science Laboratory, White Sands Missile Range, NM, with 50 percent of the work performed by the Combat Surveillance and Target Acquisition Laboratory, Fort Monmouth, NJ. The engineering development contract is scheduled to be let 3QFY78.

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: The Meteorological Balloon, ML-537, Balloon Inflation and Launching Device, ML-595, and the Meter Volume, Hydrogen-Helium were developed, type classified, and procured for field use. The Meteorological Measuring Set, AN/TMQ-22, was developed and type classified as standard equipment. Service testing of the Mobile Weather Radar, AN/TPS-41, was completed and Development Acceptance In-Process Review Package was prepared. A user demonstration was successfully conducted on the Cold Fog Dissipator, AN/TMQ-27. Engineering development models of the AN/TMQ-27 were fabricated and a special In-Process Review conducted.

Program Element: #6.47.26.A
DoD Mission Area: #532 - Global Military Environmental Support

Title: Meteorological Equipment and Systems
Budget Activity: #5 - Intelligence and Communications

2. FY 1978 Program: The Development Test (DT) II test plan for the Cold Fog Dissipator, AN/TMQ-27, will be completed and Development Test/Operational Test (DT/OT) II will be conducted. Development Validation In-Process Review (DEVA-IPR) and type classification action will be completed.

3. FY 1979 Planned Program: Based on the expedited schedule, the advanced development (AD) contract for models of Field Army Meteorological Acquisition System (FAMAS) will be converted to an engineering development (ED) contract. The contract will be modified to include Integrated Technical Documentation and Training requirements. The technological feasibility has been established by a prototype exploratory model which has been fabricated utilizing commercial items. The development of this system presents a low risk. The funding for FY 1979 is significantly increased to procure ED models of FAMAS and expedite the fielding of this system to meet an urgent need of the Field Artillery. The ED contract will be monitored and DT/OT II plans will be prepared and coordinated.

4. FY 1980 Planned Program: The contract for ED models will be conducted. Acceptance tests will be conducted by the contractor. DT/OT II will be conducted and final report received. A DEVA-IPR will be prepared and staffed.

5. Program to Completion: This is a continuing program.

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.58.02.A
DoD Mission Area: #630 - International Cooperative Research and Development

Title: International Cooperative Research and Development
Budget Activity: #5 - Intelligence and Communications

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	456	581	600	600	Continuing	Not Applicable
M798	International Cooperative Research and Development	456	581	600	600	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Encompasses the exchange of R&D technology with selected allies in order to reduce the incidence of duplicative efforts and costs. Media of exchange include bilateral data exchange agreements and multinational forums such as the North Atlantic Treaty Organization (NATO) and the American, British, Canadian and Australian (ABCA) Standardization Program.

C. BASIS FOR FY 1979 RDTE REQUEST: This program supports travel, US share of costs of the NATO Industrial Advisory Group (NIAG), and other minor costs associated with international exchange of technology and cooperative research and development projects. US portion of shared costs of cooperative projects is borne by applicable Research, Development, Test, and Evaluation (RDTE) program elements.

D. OTHER APPROPRIATION FUNDS: Not Applicable

E. DETAILED BACKGROUND AND DESCRIPTION: The objective of this program is to exchange research and development technology with selected allies in order to reduce the incidence of duplicative efforts, thereby lowering costs. Through these exchanges, cooperative research and development projects are identified, negotiated and pursued. Cooperative projects reduce costs to each participant and promote standardization and interoperability of equipment. Exchange of technology and negotiation of cooperative projects occur through the media of bilateral data exchange agreements and multinational forums such as North Atlantic Treaty Organization (NATO) and the American, British, Canadian, Australian (ABCA) Standardization Program.

Program Element: #6.58.02.A
DoD Mission Area: #630 - International Cooperative Research and Development

Title: International Cooperative Research and Development
Budget Activity: #5 - Intelligence and Communications

F. RELATED ACTIVITIES: This activity is related to all Army research and development programs in that part of the analysis leading to a development decision is investigation and evaluation of all comparable NATO systems so as to increase the incidence of NATO standardization or interoperability. This program provides the base data which identifies NATO equipments which should be evaluated.

G. WORK PERFORMED BY: International meetings and forums are attended by Army military and civilian personnel from those agencies having research and development responsibility in a given discipline.

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: Exchange of information under this program resulted in; negotiated agreements with Germany, France and Great Britain for tests of their air defense systems which resulted in the US Roland Program; an arrangement with Germany for participation of the LEOPARD 2 in the US tank selection program and the establishment of an agreement for subsystem commonality initiatives in fuel, ammunition, guns, tracks, engines, transmission, and fire control systems between the XM1 and LEOPARD 2 tanks; adaption of the MAG-58 Armor Machine Gun by the US along with Belgium, Canada, Great Britain and the Netherlands; establishing multinational requirements for a future family of gap crossing equipment and coordinated US Army participation in NATO research and development activities.

2. FY 1978 Program: US participation in the North Atlantic Treaty Organization (NATO) will emphasize the need for standardization and interoperability of defense equipment. Bilaterally the US will work with Great Britain to develop remotely piloted vehicles, with Germany to develop air defense and rocket artillery support systems, with Great Britain and Germany to develop 120MM tank guns, with Germany, Italy and Great Britain to standardize 155MM Ammunition, and as opportunities are surfaced, negotiate cooperative agreements with other allied nations. Additionally structured information exchange programs will continue on a bilateral and multilateral basis.

3. FY 1979 Planned Program: Programs initiated in FY 1978 will be carried on to completion. As identified through information exchange media, new cooperative programs will be initiated. Increased Congressional emphasis on NATO Rationalization and Standardization has accelerated US efforts to identify and capitalize on cooperative opportunities. This increased activity coupled with the growth in cost of travel and temporary duty dictates an increased funding level.

4. FY 1980 Planned Program: Participation in established bilateral and multilateral forums will continue consistent with US policy. The need for increased NATO standardization and interoperability of defense equipment will be stressed. It is anticipated that as the North Atlantic Council defines a specific plan for NATO standardization and interoperability, the cooperative development programs will significantly increase.

Program Element: #6.58.02.A
DoD Mission Area: #630 - International Cooperative Research and Development

Title: International Cooperative Research and Development
Budget Activity: #5 - Intelligence and Communications

5. Program to Completion: As Department of Defense, Congressional and NATO policies on NATO standardization develop, this program will be reoriented to assure compliance with such policies. It is expected that a growing awareness and concern for increased combat efficiency in NATO will create a requirement for increased US involvement with commensurate increased costs.

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #3.10.22.A
DoD Mission Area: #511 - General Defense Intelligence Program

Title: Scientific and Technical Intelligence
Budget Activity: #5 - Intelligence and Communications

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT						
D381	Scientific/Technical Intelligence						

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The US Army Missile Intelligence Agency (MIA), Redstone Arsenal, Alabama, is the Department of Defense (DoD) Executive Agent for the production of intelligence on certain types of foreign weapons systems to include anti-tank missiles, surface-to-air missiles, short-range ballistic missiles and anti-ballistic missiles. The task of determining the capabilities and limitations of these weapons is extremely complex and highly dependent on the requirement to have an effective analog-to-digital interface. This is necessary because much of the raw intelligence to be analyzed is in analog format, e.g., telemetry, and the ultimate simulation and modeling is accomplished on a digital computer. The MIA process involves inputting the raw analog data into an analog computer, analyzing and refining it, and then transferring the results into a digital computer for simulation and modeling. Funds are required to further develop, refine and enhance this interface. When completed, this analog/digital interface will significantly improve the data throughput, expand analytical capabilities, expedite analysis, and provide for more timely and accurate threat projections from a larger segment of collected data than can currently be processed. Improved and enhanced operations facilitated by this development will materially increase the quantity and quality of data available for timely analysis which can be performed at MIA in order to better support the US research and development process. Data on foreign weapon systems characteristics and capabilities are provided as the base for timely development of improved or superior US weapons to counter the threat and avoid technological surpise. This data also contributes to the development and implementation to tactics to better counter or overcome the threat from potential enemy weapons, forces and tactics.

C. BASIS FOR FY 1979 RDTE REQUEST: Continue development support begun in FY 78. FY 79 funding will provide for further development of analog-digital interface relating to analysis of foreign missile modeling and simulation applications, in the data source areas of

Program Element: #3.10.22.A
DoD Mission Area: #511 - General Defense Intelligence Program

Title: Scientific and Technical Intelligence
Budget Activity: #5 - Intelligence and Communications

Major Milestones:	Date
a. Applied Dynamics-4 Analog Computer and Systems Research Laboratories Signal Processor interface to Control Data Corporation 6000 series system	
b. Expanded Scientific and Technical software capabilities	
c. Implementation of Interactive graphics systems for enhanced analysis of data	

D. OTHER APPROPRIATION FUNDS: Not Applicable.

E. DETAILED BACKGROUND AND DESCRIPTION: Analog/digital data analysis applications were previously developed and operated on a Control Data Corporation (CDC) 3300 computer system. The applications expanded to a level requiring large scale computer support, which necessitated the development of new interfaces and modification of existing applications to run on the CDC 6000 series system. The contract effort will provide follow-on support to this system integration action by providing for the development of advanced data analysis software to include graphics applications.

F. RELATED ACTIVITIES: Defense Intelligence Agency (DIA) sponsors projects requiring improved support of Scientific and Technical (S&T) activities. They have expanded access to their data bases by other members of the intelligence community as well as to weapons design and development activities in order to provide improved counter weapon design. To this end, the US Army Missile Intelligence Agency (MIA) is being provided an AN/CYQ-21(V) computer as part of the Army System for the Standard Intelligence Support Terminals (ASSIST) project which will provide the requisite national level file access through the ASSIST switch in the Army Operations Center, and data management capability which will complement and support analog/digital data analysis efforts.

G. WORK PERFORMED BY: IN-house efforts have been accomplished by Missile Intelligence Agency, Huntsville, AL. FY 1978 and FY 1979 effort will be accomplished by competitive bid. Contractor is unknown at present.

Program Element: #3.10.22.A
DoD Mission Area: #511 - General Defense Intelligence Program

Title: Scientific and Technical Intelligence
Budget Activity: #5 - Intelligence and Communications

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: In-house efforts resulted in a fabricated interface system that proves feasibility, but lacks the throughput capacity to process most of the required data formats.

2. FY 1978 Program: The FY 1978 program will initiate the improvement of the Missile Intelligence Agency's (MIA) scientific automatic data processing equipment by enhancing the capabilities of the in-house developed system. Required software modules will be implemented to facilitate correlation, analysis and graphic display of sensor data for the intelligence analysts.

3. FY 1979 Planned Program: Complete software efforts, and initiate research and development of an interactive graphics system (hardware and software) for analysis of data available through

4. FY 1980 Planned Program: Complete interactive graphics systems developed in FY79. Program is expected to move from research and development environment to intelligence production support in FY80.

5. Program to Completion: Complete RDTE development by end of FY80.

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #3.31.42.A
Title: Satellite Communications Ground Environment
DoD Mission Area: #521 - Satellite Communications
Budget Activity: #5 - Intelligence and Communications

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	8274	8680	7697	20002	Continuing	Not Applicable
D253	Defense Satellite Communications Systems-Defense Communications Systems (DSCS-DCS)(Phase II)	4322	5000	3663	10502	Continuing	Not Applicable
D450	Satellite Communications	760	485	0	1300	Continuing	Not Applicable
D456	Tactical Satellite Communications (TACSATCOM)	3192	3195	4043	8200	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program includes the development of strategic and tactical satellite communications ground terminals. The Army develops ground terminals for all Services/Agencies and the Air Force develops and launches the satellite systems. Navy develops those systems unique to Navy requirements. Existing communications facilities that are required to support the strategic and tactical command and control requirements of the National Command Authority and tactical commanders as well as the Defense Communications System (DCS) do not have the capability nor survivability that is needed. The capability to exercise command and control during all types of situations, especially in hostile environment, does not presently exist. Efforts under this program will provide developments that will allow tactical commanders to operate in a highly mobile combat environment without line of sight restrictions and provide protection against jamming. Also, conversion to a secure, anti jam, digital mode of operation for the DCS will be undertaken.

C. BASIS FOR FY 1979 RDTE REQUEST: Project D253-DSCS: Funding is required to provide the necessary degree of Worldwide Military Command and Control System (WWMCCS) responsiveness, survivability, and flexibility. Funding will also provide initial engineering development of a Burst Error Coder/Decoder and a WWMCCS conference controller function to be used in connection with the AN/USC-28, Spread Spectum Multiple Access (SSMA) Modem, to provide an anti-jam capability during stress periods. Actions will continue toward providing an improved SSMA anti-jam capability during the DSCS III time frame with the testing of the Pseudo Noise/Time Division Multiple Access Engineering Development Models. Project D456-TACSATCOM: Engineering development of the Network/Control Modem

will continue along with the start of advanced development of a Low Power/Peak Power Amplifier in order to provide an economical and efficient anti-jam tactical capability in support of the Ground Mobile Forces (GMF). Actions will also continue in the engineering development of a Tactical Satellite Signal Processor (TSSP), an Orderwire Box, and an Elastic Buffer required for interface of the tactical satellite terminals with the TRI-TAC Switch.

Major Milestones:

Tactical Satellite Communications:		DATE
AN/TSQ-118	Development Acceptance In-Process Review (DEVA IPR) Super High Frequency (SHF) Communications Control Facility	Mar 77
AN/MSC-64/65	Award Production Contract-Ultra High Freq (UHF) Terminal	Jun 78
AN/PSC-1	Complete Development Test/Operational Testing II-Ultra High Freq (UHF) Manpack	Jul 78
AN/PSC-1	DEVA IPR - UHF Manpack	Sep 78
AN/PSC-1	Award Prod Contract-UHF Manpack	Nov 78
AN/TSC-85/93	Award Full Prod Contract-SHF Terminal	Jun 79
DEFENSE SATELLITE COMMUNICATIONS SYSTEM		
AN/USC-28	Type Classify Award Production Contract	Mar 78
G/T-34 Antenna	Award Production Contract	Jun 78
G/T-26 Antenna	Award Production Contract	Dec 77

D. OTHER APPROPRIATION FUNDS: ($ in thousands)

	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
Other Procurement, Army Funds	113700	64700	108000	160300	Continuing	Not Applicable

Program Element: #3.31.42.A
DoD Mission Area: #521 - Satellite Communications

Title: Satellite Communications Ground Environment
Budget Activity: #5 - Intelligence and Communications

Quantities*

*Large number of diverse items

E. DETAILED BACKGROUND AND DESCRIPTION: This program includes the development of strategic and tactical ground terminals for use with satellite communications systems. The two major projects included in this program element are: The Defense Satellite Communications System (DSCS) Phase II and the Tactical Satellite Communications Systems (TACSATCOM). Ground terminals for all of the Services are developed within these projects. Some of the efforts to advance those technological areas necessary to improve the ground environment of the DSCS program, and to develop satellite communications equipments suitable for TACSATCOM and other satellite applications, are conducted in a third, and smaller project, Satellite Communications.

F. RELATED ACTIVITIES: Management of the Army TACSATCOM program is vested in the Project Manager, Satellite Communications, Fort Monmouth, NJ. The Army is responsible for ground terminal development for all Services. The Defense Communications Agency (DCA) is the program manager for the DSCS. In the DSCS, the Army is responsible for development of the ground environment. The Air Force is responsible for the development and launching of the satellites and the Navy for the development of shipboard terminals.

G. WORK PERFORMED BY: The US Army Satellite Communications Agency, Fort Monmouth, NJ. Contractors include: Aeronutronics-Ford, Palo Alto, CA; Raytheon Company, Sudbury, MA; Manavox Research Labs, Torrance, CA; RCA, Camden, NJ; Linkabit Corporation, San Diego, CA; Harris Corporation, Melbourne, FL; Martil-Marietta Corporation, Orlando, FL; Electronic Communications, Inc., St. Peterburg, FL; and Cincinnati Electronics, Cincinnati, OH. Seven additional contracts (RDTE) costing $1.0 millions are awarded under this program element.

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: The Phase I Defense Satellite Communications System (DSCS) became operational in July 1967 and was composed of 26 satellites, 16 Heavy Terminals, and 13 Medium Terminals. In FY 1969, the capability was developed and made operational for transmission of high resolution photographic data. In FY 1970, a contract was awarded for Engineering Development of a Heavy Terminal, followed in FY 1972 by an Engineering Development contract for Time Division Multiple Access (TDMA) and in FY 1973 for Engineering Development of the AN/USC-28 Spread Spectrum equipment and the Light Terminal. In FY 1974 and Engineering Development contract was awarded for Quadra-Phase Shift Keying (QPSK) equipment. The Heavy Terminal, Light Ter-

minal, Time Division Multiple Access (TDMA), and ZPSK developments were completed by FY 1975. The QPSK equipment is a major element in a Digital Communications Subsystems under fabrication by Tobyhanna Army depot in support of the Heavy Terminal (AN/FSC-78) which is in production. The TDMA equipment became the basis for development of Pseudo Noise/Time Division Multiple Access (PN/TDMA) equipment, the contract for which was awarded in FY 1976. PN/TDMA is the focal point for the Defense Satellite Communications Systems (DSCS) of the 1980's. Developments were initiated in FY 1975 for G/T 34 and T/T 26 antennas for use with the Medium and Light Terminals and were completed in FY 1976 and FY 1977 respectively. Development of the Spread Spectrum Multiple Access, (AN/USC-28) was completed in FY 77. The Design Approaches for Burst Error correction equipment and Low Rate Multiplexer were also completed. Tactical Satellite Communications System (TACSATCOM): As a result of a Joint-Service Program, the Army and the Air Force contracted for advanced development models of ground and airborne terminals in the Ultra High Frequency (UHF) and Super High Frequency (SHF) spectrums. Test results proved the feasibility of using satellite communications to meet tactical requirements. A system development plan was prepared and an In-Process Review held in August 1971. In December 1972, and Engineering Development contract was awarded to RCA Corporation, Camden, NJ for SHF ground terminals in ¼ ton trailer and 1¼ ton truck mounted shelter terminals. In FY 1974, the RCA SHF small terminal contract was expanded to include an Engineering Development model of an SHF Communications Control Facility. Engineering Development contracts were awarded for UHF Antennas to Harris Corporation, Melbourne, FL; TACSAT Signal Processor (TSSP) to Martin Marietta Corporation, Orlando, FL; and UHF Manpack transceiver to Cincinnati Electronics, Cincinnati, OH. An Advanced Development contract was awarded for a Control/Network Terminal Modem with Harris Corporation, Melborne, FL. Contracts completed include: SHF terminals, UHF antenna; SHF Communications Control Facility. In 1976 the *SHF Satellite Communication Terminals were type classified STANDARD* and contracts were awarded for a Low-Rate-Initial-Production (LRIP) of SHF terminals and for feasibility models of a Digital Message Device for use with UHF terminals. In FY 1977 contractual efforts were completed on Manpack Transceivers, Anti-Jam/Control Modems, and Digital Message Device. The Communication Control Facility (AN/TSQ-118) was type classified STANDARD. Satellite Communications: In the Satellite Communications project in FY 1974, a contract was awarded for the Millimeter Wave Antenna. In FY 1975, the Millimeter Wave Antenna contract was completed. Investigations were initiated on the Peak Power Amplifier and Ground Mobile Forces Satellite System. Initiated testing of Airborne Transceiver. In FY 1976, continued Millimeter Wave and Airborne terminal developments and awarded contracts for Peak Pulse Power Amplifier and Dual Modems. In FY 197T, continued Millimeter Wave, Peak Pulse Power Amplifier, and Dual Modem development. In FY 1977 initiated contractual development efforts in low costs antenna tracking system, surface acoustic wave bandpass filters, 40 Megabits per second coders, and an Alternate Frequency Investigation.

2. FY 1978 Program: Defense Satellite Communications Systems (DSCS): Complete development of the PN/TDMA and Pilot Control equipment. Initiate the engineering development effort of the Control Orderwire Subsystem (Initial Polling Orderwire Modem), the AN/USC-28 beacon entry requirement for Worldwide Military Command and Control System and the Advanced Development (AD) **Contract for the Multiple Beam Torus Antenna,** Small Recoverable Terminal, Low Rate Multiplexer, and Burst Error correction equipment. Award a validation and verification contract to assess current AN/USC-28 software and associated documentation and to assist US Army Satellite Communications Agency (USASATCOMA), with the management of the software aspects of the AN/USC-28

program. TACSATCOM: Continue LRIP contracts for Multichannel SHF terminals. Award ED contract for the AJ/Control Modem. Award AD contract for Single Channel SHF terminal. Continue ED effort to upgrade the TRI-MODEM. Complete Development Test II/Operational Test II on the Manpack, AN/PSC-1. The AN/PSC-1 will be Type Classified STANDARD. Satellite Communications: Initiate 30GH$_z$ Transmitter Development Effort and continue effort for low cost Antenna Tracking System. Start the investigation of Brandwidth Efficient Modems.

3. FY 1979 Planned Program: Defense Satellite Communications System (DSCS): Engineering Development contracts for the Burst Error Coder and the Worldwide Military Command and Control Systems (WWMCCS), Conference Comptroller functions for the AN/USC-28, Spread Spectrum Multiple Access Modem, will be initiated. Engineering Development of the PN/TDMA will continue with the initiation of a test effort and award of a validation and verification contract to assist in evaluation of the software package. TACSATCOM: Development of an Anti-Jam/Control Modem and a Single Channel SHF Terminal will be continued. Advanced Development of a Low Power/Peak Power amplifier will be initiated along with an Engineering Development (ED), contract for a TACSAT Signal Processor (TSSP), Orderwire, and Elastic Buffer required for interface of tactical terminals with the TRI-TAC Switch.

4. FY 1980 Planned Program: Defense Satellite Communications System (DSCS): Complete the Engineering Development effort for the Burst Error Coder. Continue the development of the PN/TDMA equipment. Also, continue the validation and verification assistance for the PN/TDMA software. Initiate Engineering Development contracts for the Real Time Adaptive Control, Low Rate Multiplexer, Multiple Beam Torus Antenna and the Small Recoverable Terminal. TACSATCOM: Complete the ED contract for the AJ/Control Modem and initiate development/operational testing. Continue development efforts for a Low Power/Peak Power Amplifier and Single Channel command and control terminals. Continue Phased Array Antenna development effort. Continue ED contract efforts for TSSP, Orderwire and Elastic Buffer. Satellite Communications: Investigate feasibility of a small transportable terminal that operates at K band. Initiate development of a solid state low noise K band frequency amplifier. Investigate the feasibility of unattended earth terminal operation.

5. Program to Completion: This is a continuing program.

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #3.34.01.A
Title: Communications Security Equipment
DoD Mission Area: #522 - Communications Security
Budget Activity: #5 - Intelligence and Communications

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT					Continuing	Not Applicable
	Quantities						Not Applicable
D491	Communications Security Equipment and Techniques					Continuing	Not Applicable
D901	Signal Security Activities					Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program is principally structured to develop Communications Security techniques and equipment, and to provide system engineering support to Army materiel developers in the integration and installation of Communications Security in communications and command and control systems. Also Signal Security guidance is provided to Army research and development programs. Resources in this program are required to provide the expertise and ancillary devices required to ensure that the Communications Security equipment, developed by the National Security Agency, will provide the Army an operational capability necessary to protect classified information being processed by communications-electronics equipment.

C. BASIS FOR FY 1979 RDTE REQUEST: Requested funds provide for exploratory development of a handset security device for tactical applications; advanced development of a device to provide security for several radios using only one Communications Security device; and advanced development of a cost effective receive-only Communications Security device for auxilliary receivers.

Major Milestones	Date

Program Element: #3.34.01.A
DoD Mission Area: #522 - Communications Security

Title: Communications Security Equipment
Budget Activity: #5 - Intelligence and Communications

D. OTHER APPROPRIATION FUNDS:($ in thousands)

Other Procurement, Army	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
Funds	[ ]	[ ]	[ ]	[ ]	Continuing	Not Applicable
Quantities	*	*	*	*	Continuing	Not Applicable

* Large quantities of diversified items.

E. DETAILED BACKGROUND AND DESCRIPTION: This continuing program supports Army, and upon request by the National Security Agency (NSA), supports Joint Service Communications Security requirements. Primary exploratory development (ED) efforts include studies of voice and data security techniques required to satisfy Army requirements. Primary ED efforts are:

into communications and automatic data processing systems

F. RELATED ACTIVITIES: All Communications Security research, development, test and evaluation is the responsibility of the NSA under Department of Defense Directive C-5200.5, and this program represents those efforts delegated to the Army by the NSA. Program Element 6.47.01.A (Communications Engineering Development) is related to this effort. The program is coordinated with the NSA at regular intervals, and with the other Services and non-Department of Defense agencies

G. WORK PERFORMED BY: Developing agencies - US Army Communications Research and Development Command, and Project Manager, Single Channel Ground and Airborne Radio System, both of Fort Monmouth, NJ; Tobyhanna Army Depot, Tobyhanna, PA. Contractors include - Magnavox Corporation, Fort Wayne, IN; General Atronics Corporation, Philadelphia, PA; Watkins Johnson Corporation, Gaithersburg, MD; Digital Equipment Corporation, Maynard, MA; Bendix Corporation, Baltimore, MD; Harris Corporation, Melbourne, FL; Atlantic Research, Alexandria, VA.

Program Element: #3.34.01.A
DoD Mission Area: #522 - Communications Security

Title: Communications Security Equipment
Budget Activity: #5 - Intelligence and Communications

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: Major hardware developments included:

2. FY 1978 Program:

3. FY 1979 Planned Program:

4. FY 1980 Planned Program:

Program Element: #3.34.01.A
DoD Mission Area: #522 - Communications Security

Title: Communications Security Equipment
Budget Activity: #5 - Intelligence and Communications

5. Program to Completion: This is a continuing program.

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.33.15.A
DoD Mission Area: #622 - Aerial Targets

Title: Target Missiles
Budget Activity: #6 - Programwide Management and Support

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT					Continuing	Not Applicable
D238	Target Missiles					Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The objective of this element is to develop and evaluate targets and target ancillary equipment required in evaluating and testing air defense systems and in training air defense troops.

C. BASIS FOR FY 1979 RDTE REQUEST: The FY 1979 budget request supports efforts to develop Vector Miss Distance Indicator (VMDI) for evaluating missile performance of developmental air defense systems, radar and plume augmentors to provide realistic threat representations with subscale targets, drone aircraft and their ancillary equipment to provide total threat realism, a low altitude supersonic, economical test and evaluation target and a subscale subsonic target for both training and R&D applications.

D. OTHER APPROPRIATION FUNDS ($ in thousands):

	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
Missile Procurement, Army						
Funds	7500	7300	8000	8000	Continuing	Not Applicable
Quantities	Various Targets	Various Targets	Various Targets	Various Targets	Continuing	Not Applicable

E. DETAILED BACKGROUND AND DESCRIPTION: The objective is to develop and evaluate targets and target ancillary equipment required in evaluating and testing air defense systems and in training air defense troops. The target ancillary equipment includes scoring devices, infrared (IR) sources, radar augmentation, and electronic countermeasures (ECM). Research and development of proposed air defense systems and the testing of existing systems require target missiles that will fly trajectories and are capable of speeds that will fully exercise the capabilities of the air defense systems. Several

target missile systems have been used by the Army in recent years, but few have been able to match the advancing capabilities of either the current or projected enemy air threat. To meet the Army's needs for an effective target missile program, eight major developments have been pursued. First, the drone aircraft development included the tri-Service F-102 program with the Air Force as lead Service and the Army's F-86 program for the test and evaluation of the surface-to-air missile development programs: PATRIOT; STINGER; and the Short Range Air Defense Systems (SHORADS). A second development effort was a tri-Service effort for augmentation of existing targets to generate hot gaseous plumes to simulate threat engine signatures for the testing of STINGER and Improved CHAPARRAL. Third, development of a joint Service subsonic subscale target capable of meeting the present and future subsonic requirements for R&D and training in a cost effective manner. Fourth, participation in tri-Service radar augmentation devices for targets for missile guidance and warhead fuzing tests for PATRIOT. Fifth, tri-Service equipment to provide accurate vector miss distance data for weapon system tests. Sixth, development of a low altitude, supersonic, highly maneuverable target to satisfy a requirement for Short Range Air Defense Systems (SHORADS) test and evaluation. Seventh, a tri-Service development of a low cost supersonic target for R&D use in evaluating SHORADS type air defense missiles to complement existing, more costly, sophisticated targets. Eighth, development of a formation control system for formation flying target vehicles used by the Army.

F. RELATED ACTIVITIES: The Department of the Army maintains close liaison with both the Navy and the Air Force regarding target missile systems. Where possible, such as in the Droned Aircraft program of the US Air Force, the Army will take advantage of the results of other Service programs to meet Army requirements. Coordination of requirements and technical development is closely monitored to insure that all Services get maximum benefit from the development efforts. The major coordination body for this combination of Service efforts is the Joint Logistical Commander's Conference. The Army also maintains liaison with target development agencies in Australia, Canada and the United Kingdom through the Target Technical Cooperation (TTCP) Sub-group H, Aerial Target and Drone Working Group annual conferences.

G. WORK PERFORMED BY: The US Army Missile Research and Development Command, Huntsville, AL, is responsible for the target missile program. For the following programs, the associated contractors involved are: F-86 program, Flight Systems, Incorporated, Newport Beach, CA; hot gaseous plume program, Teledyne-Ryan Aeronautical, San Diego, CA, Hayes International, Birmingham, AL, and Atlantic Research Corporation, Alexandria, VA; miss distance measuring program, Cartwright Engineering, Fullerton, CA, New Technology Incorporated, Huntsville, AL, and Babcock Electronics, Costa Mesa, CA; radar augmentation, Hayes International Corporation, Leeds, AL; Formation Control, IBM Corporation, Huntsville, AL; low altitude maneuvering supersonic targets, Beach Aircraft Corporation, KS.

Program Element: #6.33.15.A
DoD Mission Area: #622 - Aerial Targets

Title: Target Missiles
Budget Activity: #6 - Programwide Management and Support

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: The FIREBEE/TOWBEE drone system has been the principal research and development product assurance and training program of interest over the past several years. Associated with the FIREBEE has been development of infrared (IR) and radio frequency (RF) augmentation, scoring devices and towed banners. The results of these efforts have provided the Army with fairly realistic and reliable targets for use in test, evaluation and training. In addition to the FIREBEE, work was concluded on the ROADRUNNER, CARDINAL, and the Mobile Target Tracking System (MTTS). In FY 1972 development was initiated and in FY 1973 completed on modifying the TALOS missile for the Low Altitude Supersonic Target (LAST) program. Two contracts were awarded for the development of prototype targets for the Variable Speed Training Target (VSTT) program. VSTT development continued with the fabrication of the competing candidate prototype and engineering design tests were conducted. Development Test (DT) II was initiated in FY 1974. Other programs initiated in FY 1974 were augmentation devices to generate hot gaseous plumes, control systems, and Vector Miss Distance Indicator (VMDI). In FY 1975, Variable Speed Training Target (VSTT) Development Test II was completed and a single contractor was selected to produce the target. Continuing programs included VMDI and plume augmentation. The formation control program was completed except for specific computer programing for multitarget flight profile requirements. The programs initiated included drone aircraft, maneuver kits and radar augmentation. In FY 1976, the VSTT program entered the production phase. DT III was completed in 1976. Other programs included VMDI, plume augmentation, drone aircraft, maneuver kits and radar augmentation. FY 197T programs included effort in developing VMDI, radar and plume augmentors, and drone aircraft and their ancillary equipment, and consideration of a high performance, economical test target were continued. The FY 1977 programs included VMDI, plume augmentation, drone aircraft, low altitude maneuvering target, high performance towed gun target, radar augmentation and the high performance, economical test and evaluation target.

2. FY 1978 Program: No RDTE program will be conducted due to deletion of all FY 1978 funds by Congress.

3. FY 1979 Planned Program: The Vector Miss Distance Indicator (VMDI), plume augmentation, low cost supersonic target, drone aircraft, radar augmentation, and high performance subsonic targets will continue. All are tri-Service efforts.

4. FY 1980 Planned Program: Development efforts in drone aircraft, low cost low altitude supersonic target, high performance subsonic target, infrared plume augmentation, VMDI and radar augmentation efforts are planned to continue.

5. Program to Completion: This is a continuing program.

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.37.18.A Title: Electronic Warfare Vulnerability/Susceptibility

DoD Mission Area: #624 - Other Test and Evaluation Support Budget Activity: #6 - Programwide Management and Support

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT					Continuing	Not Applicable
D190	Tri-Service Electro-Optic Weapons Vulnerability/ Susceptibility					Continuing	Not Applicable
D235	Missile Counter-Counter-Measure (CCM) Technology					Continuing	Not Applicable
D267	Missile Vulnerability/ Susceptibility					Continuing	Not Applicable
D626	Non-Missile Vulnerability/ Susceptibility					Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: All electronic/electro-optic dependent systems are susceptible to electronic countermeasures (ECM) to some degree. All electronic dependent systems need to be analyzed to determine susceptibilities, so electronic counter-countermeasures (ECCM) can be developed to lessen their susceptibility. Hostile systems must also be analyzed to determine their susceptibilities so the US can develop countermeasures to exploit their weaknesses. This program examines missile electronics, other electronic dependent systems, electro-optical systems and missile counter-countermeasures technology to discover our susceptibilities to enemy electronic warfare. Recommendations are made to the system developers on how to reduce or eliminate those weaknesses. The program consists of eighteen task areas: twelve for missile systems, four for other electronics dependent systems, one for tri-service electro-optics systems, and one for missile counter-countermeasures technology.

Program Element: #6.37.18.A Title: Electronic Warfare Vulnerability/Susceptibility
DoD Mission Area: #624 - Other Test and Evaluation Support Budget Activity: #6 - Programwide Management and Support

C. BASIS FOR FY 1979 RDTE REQUEST: Funds are required to continue testing US systems against electronic countermeasures. New items of equipment must be obtained to support realistic testing of PATRIOT and other air defense missile systems. Jammers must be fabricated to support operational/developmental testing of PATRIOT. Special Electromagnetic Interference (SEMI) work will continue to include missile measurements, jammer development, and missile field firing tests. Electronic Warfare test bed instrumentation for field evaluation of the Stand-Off Target Acquisition System (SOTAS), Single Channel Ground Airborne Radio System (SINCGARS), Counter Mortar/Counter Battery Radar Systems (AN/TPQ-36/37), Position Location Reporting System (PLRS), and other communications electronics systems will be accelerated. Tri-Service exploitation of foreign missile systems will continue. A missile counter-countermeasure technology program will be initiated.

D. OTHER APPROPRIATION FUNDS: None.

E. DETAILED BACKGROUND AND DESCRIPTION: The objectives of this program are to: determine the susceptibility to electronic countermeasures (ECM) of US Army missile systems and nonmissile communications and electronic equipments; determine the ECM vulnerability of enemy missiles representing a threat to the tactical commander; develop prototype electronic warfare systems to exploit the ECM vulnerability of enemy electronic systems; and provide to US Army developers, recommendations on electronic counter-countermeasures (ECCM) circuits and devices for both missiles and nonmissile electromagnetic systems that will reduce the vulnerability of US systems to enemy electronic warfare operations.

F. RELATED ACTIVITIES: Other related research and studies are performed by the Air Force and Navy. Air Force work is accomplished in Program Elements (PE) 6.37.50.F, Countermeasures Advanced Development; 6.37.18.F, Electronic Warfare Technology; 6.37.43.F, Electro-Optic Warfare. Navy Work is done in PE's 6.37.96.N, Airborne Electromagnetic and Optical Systems; 6.37.97.N, Surface Electromagnetic and Optical Systems; 2.45.73.N, Navy Cover and Deception Programs. Coordination is accomplished by exchange of technical reports, attendance at scientific meetings and conferences, joint development projects, and reviews conducted by the Office of the Secretary of Defense (Under Secretary of Defense for Research and Engineering). A joint Army, Navy, Air Force and Marine Corps project for electro-optically guided weapons countermeasure tests is being conducted under a program funded through FY 1979 by the Under Secretary of Defense for Research and Engineering. The Army is Executive Agent for this program.

Program Element: #6.37.18.A Title: Electronic Warfare Vulnerability/Susceptibility
DoD Mission Area: #624 - Other Test and Evaluation Support Budget Activity: #6 - Programwide Management and Support

G. WORKED PERFORMED BY: In-house research, development, exploitation, and missile system susceptibility analyses are conducted by the Office of Missile Electronic Warfare (OMEW), US Army Electronics Research and Development Command (ERADCOM), White Sands Missile Range (WSMR), New Mexico. In-house research, development, and nonmissile vulnerability electronic counter-countermeasure analyses are conducted by the Electronic Warfare Laboratory, US Army Electronics Research and Development Command, Fort Monmouth, New Jersey. In-house missile counter-countermeasure technology programs are conducted by the US Army Missile Research and Development Command, Huntsville, Alabama. Operational tests of laser designated weapons are conducted by the Office of the Test Director, Joint Electro-Optics Guided Weapons Countermeasures Test Program, WSMR, New Mexico. Major contractor support is provided by GTE, Sylvania, Mountain View, California; New Mexico State University, Las Cruces, New Mexico; Hughes Aircraft Company, Canoga Park, California: Flight Systems, Incorporated, Newport Beach, California; Logimetrics, Incorporated, Plainview, New York; Hazeltine Corporation, Greenlawn, New York; and Computer Science Corporation, Falls Church, Virginia. There are 11 additional contractors with a total dollar value of $1,493,000.

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: Electronics countermeasures (ECM) vulnerability studies were conducted on PERSHING, LANCE, NIKE-HERCULES, SHILLELAGH, DRAGON, TOW, Improved HAWK, REDEYE, PATRIOT and other Army missile systems. All radar fuzes used by Army missiles were investigated with respect to ECM vulnerability. Extensive testing was conducted on an infrared seeking antiaircraft missile system countermeasures device (HOT BRICK). A highly versatile infrared measurements facility was completed, and measurements of missiles and aircraft were initiated. PATRIOT air defense missile system electronic counter-measures (ECM) testing was initiated. PATRIOT studies in the areas of chaff, ECM indicators, coherent repeaters, ECM waveforms, and modulation characteristics were completed. Investigations of the Improved HAWK (IHAWK) air defense missile system product improvement program were initiated. A program to participate in US ROLAND air defense missile system testing was initiated. Infra-Red Countermeasures (IRCM) devices were tested. An ECM test of the solid state track link (SSTL) TOW anti-tank missile system was completed. Smoke/aerosol tests of electro-optically guided weapons, including beamriders, were performed. ECM investigations of the PERSHING II missile system were continued. A joint Army/Air Force test to evaluate the effectiveness of ECM test equipment against three radars on the F-111A aircraft was completed. The tri-Service ECM and field testing efforts on foreign missile systems were continued. A handbook on susceptibility data of [redacted] was completed. Fuze ECM investigations were continued on the PATRIOT missile and initiated on the US ROLAND missile. A new chaff deployment technique was developed and used in the weaponization of the 2.75" rocket chaff round. Investigations of missile systems were conducted in the Special Electromagnetic Interference (SEMI) task and a field firing program was designed. A vulnerability assessment effort for the Target Acquisition Designator System/Pilot Night Vision System (TADS/PNVS) and the Advanced

Attack Helicopter was initiated. In the area of electronic counter countermeasures (ECCM) for communications systems, fast frequency hopping (FFH) and steerable null antenna processing (SNAP) techniques originally developed and demonstrated in this program are now being incorporated into the Army's Single Channel Ground Air Radio System (SINCGARS) development program. A development program for electronic warfare (EW) threat instrumentation was started to provide a necessary jamming test bed for SINCGARS developmental/operational testing. A series of field tests were completed to determine feasibility of using SNAP ECCM technology on vehicular and airborne platforms. Development of an airborne SNAP unit was initiated. EW vulnerability analyses of PERSHING and PATRIOT missile systems communications were initiated. In the radar area, EW vulnerability investigations and field tests were completed on the FIREFINDER countermortar/counterbattery radars, the Stand-off Target Acquisition System (SOTAS), and the AN/APS-94 side-looking airborne radar (SLAR). An EW vulnerability assessment of Integrated Communications and Navigation System (ICNS) for Remotely Piloted Vehicles (RPV) was completed. Electronic Warfare (EW) vulnerability/electronic counter-countermeasure (ECCM) support was continued on the Position Location Reporting System (PLRS) program. Efforts were initiated to procure broad band jamming and sophisticated EW tests beds to support PLRS development/operational testing (DT/OT). EW vulnerability/ECCM support to Joint Tactical Information Distribution System (JTIDS) Class III terminal concept formulation effort was initiated.

2. FY 1978 Program: Vulnerability analyses of all current and proposed US antitank missile systems will continue. Tri-Service work on the exploitation of foreign missile systems will continue. Field investigations of current and proposed missile fuze systems will be performed. Vulnerability investigations of all current and proposed air defense missile systems will continue to include: complete PATRIOT Phase II and initiate Phase III test program, prepare for US ROLAND DT/OT tests, initiate STINGER missile Passive Optical Seeker Technique (POST) investigations, and the STINGER firing program. Project SEMI (Special Electromagnetic Interference) will examine three additional missile systems and a field firing program of ten missile systems will be initiated. Electronic Warfare (EW) vulnerability/electronic counter-countermeasures (ECCM) support to major communications-electronics (C-E) systems (e.g., communications, airborne avionics, tactical information distribution systems, and surveillance/target acquisition systems) will continue.

3. FY 1979 Planned Program: Tri-Service work in exploitation of foreign missiles, vulnerability investigations of current and proposed Army missiles and fuzes, and the Project SEMI (Special Electromagnetic Interference) will continue. Unique electronic warfare equipment will be procured to provide the necessary environment to evaluate missile system performance and give the missile project managers an independent assessment of their systems to include recommended fixes. All Army missile systems under development will be evaluated including PATRIOT, ROLAND, STINGER/POST, HELLFIRE, TOW, PERSHING II, IHAWK, DIVADS (Division Air Defense Gun System). Analysis of proposed systems will be conducted. Increased emphasis will be placed on instrumentation to accurately measure the complex EW environment produced by many simultaneous

airborne jammers. The missile electronic warfare technical data base required for the development of electronic warfare systems to protect the Field Army will be maintained and updated. EW vulnerability/ECCM support to major communications-electronics systems will continue. An increase in funds will accelerate development of EW test beds to evaluate performance of Single Channel Ground Air Radio System (SINCGARS). Position Locating Radar System (PLRS), FIREFINDER counterbattery/countermortar radar systems, Stand-Off Target Acquisition System (SOTAS), and provide for development of unique electronic warfare equipment for the vulnerability assessment of air defense systems. A missile counter-countermeasures program will be initiated. First activities in this new start will be fixes for weaknesses found in Project SEMI. Upgrading of the infra-red countermeasure (IRCM) facility will continue to provide a capability to evaluate STINGER/POST Air defense missile system. Design effort will continue on a facility to test seekers for surface targeted missiles, such as HELLFIRE. The EW threat to Army missile systems will be upgraded. The infra-red (IR) and ultra violet (UV) spectral measurements capability will be further improved and the IR/UV data base on Army missiles increased.

4. FY 1980 Planned Program: Developmental/operational test support for the PATRIOT air defense missile system will continue and other air defense missile system developmental tests will be initiated. Hardware to support other air defense missile systems will be fabricated, test instrumentation equipment will be obtained, Project SEMI studies will continue, and support to six other tasks (e.g., missile detection and tracking techniques, antitank missile systems, Army fuze investigations, ballistic and terminal homing missile systems, etc.) will continue. EW vulnerability/ECCM support to major communications-electronics systems will be accelerated. Better vulnerability analysis tools will be developed and applied, improved test beds will be developed, and communications-electronics ECCM techniques development programs will be pursued to counter improved hostile EW technology. EW threat projections will continue to guide activities. New air defense weapons such as Division Air Defense Gun System will gain increased emphasis. Product improvements of Army missile systems will be evaluated.

5. Program to Completion: This is a continuing program. Efforts will be directed toward assuring the functional survivability of electronic systems in an electronic countermeasure environment.

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D267
Program Element: #6.37.18.A
DoD Mission Area: #624 - Other Test and Evaluation Support

Title: Missile Vulnerability/Susceptibility
Title: Electronic Warfare Vulnerability/Susceptibility
Budget Activity: #6 - Programwide Management and Support

A. DETAILED BACKGROUND AND DESCRIPTION: All electronic/electro-optic dependent missile systems are vulnerable/susceptable to electronic countermeasures (ECM) to some degree. All friendly missiles need to be analyzed to determine those susceptibilities, so electronic counter-countermeasures (ECCM) can be developed to lessen their susceptibility/vulnerability. Hostile missile systems must also be analyzed to determine their susceptibilities so the US can develop countermeasures to exploit their weaknesses. The objective of this project is to determine the susceptibility to electronic countermeasures (ECM) of all US Army surface-to-surface and surface-to-air missile systems; determine the ECM vulnerability of enemy tactical missiles that are a threat to the tactical commander; develop prototype electronic warfare systems to exploit the ECM vulnerability of the enemy missile systems; and provide to US Army missile developers recommendations for electronic counter-countermeasures (ECCM) circuits and devices that will reduce the vulnerability of our missile systems to enemy electronic warfare operations.

B. RELATED ACTIVITIES: Other related research and studies are performed by the Air Force and Navy. Air Force work is accomplished in Program Element (P.E.) 6.37.50.F, Counter-Countermeasures Advanced Development; 6.37.18.F, Electronic Warfare Technology; 6.37.43.F, Electro-Optic Warfare. Navy work is found in PE's 6.37.96.N, Airborne Electromagnetic and Optical Systems; 6.37.97.N, Surface Electromagnetic and Optical Systems; 2.45.73.N, Navy Cover and Deception Programs. Coordination is accomplished by reviews conducted by the Office of the Secretary of Defense (Under Secretary of Defense for Research, and Engineering) through the exchange of technical reports and attendance at scientific meetings and conferences.

C. WORKED PERFORMED BY: In-house research, development, exploitation, and missile system susceptibility analyses are conducted by the Office of Missile Electronic Warfare (OMEW), a subordinate element of the US Army Electronics Research and Development Command (ERADCOM) at White Sands Missile Range (WSMR), NM. Major contractor support is provided by GTE, Sylvania, Mountain View, CA; New Mexico State University, Las Cruces, NM; Hughes Aircraft Company, Canoga Park, CA; Flight Systems, Incorporated, Newport Beach, CA; and Logimetrics, Incorporated, Plainview, NY. There are eight additional contractors with a total dollar value of $1,153,000.

D. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

Project: #D267
Program Element: #6.37.18.A
DoD Mission Area: #624 - Other Test and Evaluation Support

Title: Missile Vulnerability/Susceptibility
Title: Electronic Warfare Vulnerability/Susceptibility
Budget Activity: #6 - Programwide Management and Support

1. FY 1977 and Prior Accomplishments: Electronic countermeasures (ECM) vulnerability studies were conducted on PERSHING, LANCE, NIKE-HERCULES, SHILLELAGH, DRAGON, and TOW missile systems. All radar fuzes used by Army missiles were investigated in respect to ECM vulnerability. ECM vulnerability analyses of Improved HAWK (IHAWK), Improved NIKE-HERCULES, REDEYE, CHAPARRAL, and PATRIOT air defense missile systems were conducted. Extensive testing was conducted on an infrared seeking anti-aircraft missile system countermeasures device (HOT BRICK). Exploitations of the were conducted. A highly versatile infrared measurements facility was completed, and measurements of missiles and aircraft were initiated. Establishment of an unintentional radiation (RINT) measurement capability, development of an airborne infrared measurement capability, and development of a prototype ultraviolet spectrometer were initiated. PATRIOT Missile ECM testing was initiated. PATRIOT studies were completed. A program to participate in US ROLAND testing was initiated. Infrared countermeasure (IRCM) devices were received and tested, and plans were completed for the STINGER missile/IRCM firing program. An ECM test of the solid-state track link (SSTL) TOW Missile system was completed. ECM investigations were initiated on two exploratory development beamrider guidance systems. Smoke/aerosol tests of several electro-optically guided weapons, including the beamriders, were performed. ECM investigations of the PERSHING II missile system were continued. A joint test with the US Air Force to evaluate the effectiveness of ECM test equipment against the three radars on an F-111A aircraft was completed. The tri-Service ECM and field testing efforts on foreign missile systems were continued. A handbook was completed. Fuze ECM investigations were continued on the PATRIOT missile and initiated on the US ROLAND missile. A new chaff deployment technique was developed and used in the weaponization of the 2.75" rocket chaff round. A broadband, structurally sound radar absorbent material (RAM-S) was developed, and a scale missile model was fabricated from it for flight testing. A vulnerability assessment effort for the Target Acquisition Designator System/Pilot Night Vision System (TADS/PNVS) and the Advanced Attack Helicopter was indicated. Investigations of missile systems were conducted in the Special Electromagnetic Interference (SEMI) task, and a field firing program was designed.

2. FY 1978 Program: Vulnerability analyses of all current and proposed US antitank missile systems will continue. Tri-Service work on the exploitation of foreign missile systems will continue. Field investigations of current and proposed missile fuze systems will be performed. Vulnerability investigations of all current and proposed air defense missile systems will continue to include: completion of PATRIOT Phase II and initiation of Phase III test program, preparation for US ROLAND development test/operational test (DT/OT), initiation of the STINGER Passive Optical Seeker Technique (POST) investigations, and the STINGER firing program. Project SEMI will examine three additional missile systems and a field firing program of 10 missile systems will be initiated.

Project: #D267 Title: Missile Vulnerability/Susceptibility
Program Element: #6.37.18.A Title: Electronic Warfare Vulnerability/Susceptibility
DoD Mission Area: #624 - Other Test and Evaluation Support Budget Activity: #6 - Programwide Management and Support

3. FY 1979 Planned Program: Tri-Service work in exploitation of foreign missiles, vulnerability investigations of current and proposed Army missiles and fuzes, and the Special Electromagnetic Interference (SEMI) program will continue. Unique electronic warfare (EW) equipment will be procured to provide the necessary EW environment to evaluate missile system performance and give the missile project managers an independent assessment of their system to include recommended fixes. All Army missile systems under development and many proposed missile techniques will be evaluated for their performance in an EW environment. Among these systems are PATRIOT, ROLAND, STINGER/POST, HELLFIRE, TOW, COPPERHEAD, PERSHING II, Improved HAWK, DIVISION AIR DEFENSE GUN SYSTEM, beamrider techniques and carbon dioxide (CO_2) laser designator techniques. Increased emphasis will be placed on instrumentation to accurately measure the complex electronic warfare (EW) environment produced by simultaneous airborne jammers. Work will continue on upgrading the infrared countermeasures (IRCM) facility to provide a capability to evaluate STINGER/POST Missile systems. Design effort will continue for a facility to test seekers for surface target missiles. The EW threat to Army missile systems will be updated and re-examined for relevancy. The infrared (IR) and ultraviolet (UV) measurements capability will be further improved and the IR/UV data base on Army missiles will be increased. The missile electronic warfare technical data base required in the development of electronic warfare systems for the protection of the Field Army will be maintained and updated. Increased funding will provide for development of unique electronic warfare equipment required in vulnerability assessments of air defense missile systems.

4. FY 1980 Planned Program: Developmental/operational test support for the PATRIOT air defense missile system will continue and other air defense missile system developmental tests will be initiated. Hardware to support other air defense missile systems will be fabricated, test instrumentation equipment will be obtained, Project SEMI (Special Electromagnetic Interference) will continue, foreign missile and fuze evaluation will continue, and support to six other tasks (E.G., missile detection and tracking techniques, antitank missile systems, Army fuze investigations, ballistic, and terminal homing missile systems, etc.) will continue. Electronic warfare (EW) threat projections will continue to guide activities. New air defense weapons such as DIVADS (Division Air Defense Gun System) will gain increased emphasis. Product improvements of Army missile systems will be evaluated.

5. Program to Completion: This is a continuing program.

6. Major Milestones: Not applicable.

7. Resources ($ in thousands):

	FY 1977	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Costs
RDTE,A: Funds					Continuing	Not Applicable

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.51.01.A
DoD Mission Area: #610 - Technical Integration

Title: Studies and Analyses
Budget Activity: #6 - Programwide Management and Support

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	3800	3330	4460	4100	Continuing	Not Applicable
M710	Science, Technology, Systems and Equipment	840	678	600	700	Continuing	Not Applicable
M746	Manpower and Personnel	376	387	600	800	Continuing	Not Applicable
M747	Concepts and Plans	1199	968	500	500	Continuing	Not Applicable
M748	Operations and Force Structure	445	812	460	600	Continuing	Not Applicable
M749	Installations & Logistics	940	485	600	700	Continuing	Not Applicable
M786	International Security	0	0	400	400	Continuing	Not Applicable
M787	Intelligence	0	0	300	400	Continuing	Not Applicable
M789	Signal Intelligence/Electronic Warfare - NATO	0	0	1000	0	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program provides for the conduct of contract studies and analyses for the Department of Army Staff and Army Secretariat. These studies and analyses examine and investigate specifically defined problems of major concern to the Army within the categories of science, technology, systems and equipment; manpower and personnel; concepts and plans; operations and force structure; logistics; international security; and intelligence. This program supports the Army Study System mission, which is to provide a formal means, through contract and in-house efforts, for the Army Secretariat and Staff to examine critical problems resulting in planning, programing and budgeting decisions that affect the Army's overall national defense mission.

C. BASIS FOR FY 1979 RDTE REQUEST: The Army Staff and Army Secretariat annually identify problems which require the application of sophisticated analytical techniques and which, when solved, will make substantive contributions to Army planning, programing and decisionmaking. Planning guidance and goals issued by the Secretary of the Army lead to a definition of problems of the highest priority to the Army. Studies to solve these problems will be identified in the FY 1979 Army Study Program which will be approved by the Chief of Staff in August 1978.

Program Element: #6.51.01.A
DoD Mission Area: #610 - Technical Integration

Title: Studies and Analyses
Budget Activity: #6 - Programwide Management and Support

D. OTHER APPROPRIATION FUNDS: None.

E. DETAILED BACKGROUND AND DESCRIPTION: Studies and analyses funded by this program element deal with the critical examination and investigation of subjects within the defined categories. They require sophisticated analytical techniques to integrate a variety of factors. Results lead to conclusions or recommendations which make substantive contributions to Army planning, programing and decisionmaking. The studies and analyses, often computer-assisted, organize and evaluate data and information already available or which can be inferred or extrapolated from existing data. The results enable the decisionmaker to determine cost effectiveness of systems and programs, alternative organizations, and allocation of resources; and to develop tactics, doctrine, policy, strategy and procedures. Each study or analysis addresses a specifically defined problem of concern to the Army and is individually approved. For FY 78, two new categories of study effort, international security and intelligence, were added to the Army Study System. Beginning in FY 79, studies pertinent to those categories will be funded from specific project numbers.

F. RELATED ACTIVITIES: The US Army Training and Doctrine Command (TRADOC) Ft. Monroe, Virginia has a complementary program, Program Element 6.51.02.A, TRADOC Studies and Analyses. To preclude duplication of study effort, these programs are coordinated by the Office of the Chief of Staff of the Army. The Air Force and Navy have similar study programs. Coordination of interservice investigations is accomplished by the Under Secretary of Defense for Research & Engineering and is facilitated by Office of the Secretary of Defense-managed scientific information exchange services. Formal and informal coordination among Services is regularly and routinely accomplished. In matters of interservice interest, representatives of the Services involved and of the Office of the Secretary of Defense serve as members of study advisory groups formed to direct and monitor contractor performance. Interservice coordination is also furthered by representative attendance at the semi-annual Military Operations Research Symposium. The contract approval process requires a formal literature search to prevent duplication of study effort within the Army and the Department of Defense.

G. WORK PERFORMED BY: All work pursued within this program is accomplished by contract. The primary contractors are Braddock, Dunn and McDonald, McLean, Virginia; Martin Marietta, Orlanda, Florida; General Research Corporation, McLean, Virginia; Stanford Research Institute, Menlo Park, California; and Computer Science Corporation, Falls Church, Virginia. At least 25 other contractors will have received contracts amounting to $2,500,000 when the procurement process for 1977 is completed. The in-house developing organization responsible for the program is the US Army Research Institute, Alexandria, Virginia.

Program Element: #6.51.01.A
DoD Mission Area: #610 - Technical Integration

Title: Studies and Analyses
Budget Activity: #6 - Programwide Management and Support

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: During FY 1976, a simulation model was developed for use in examining the suppression of enemy air defense; the Office of Coordinator for Army Security Assistance was established within the Office of the Chief of Staff, Army; a system was developed whereby recruiters were stationed in areas of high recruitment potential; an appraisal of the impact of current religious programs in minority group people was completed; and an examination of the Army club management system was conducted to make the system more efficient. During FY 1977, an evaluation of the Army correction program identified a potential annual cost savings of $20 million, and the Tank Force Management Office, Office of the Chief of Staff, Army, was established to optimize combat potential of the Army's tank forces. New efforts initiated during FY 1977 for continuance into FY 1978 included an examination of strategic lessons learned in Vietnam; a study of US strategy in northeast Asia; and the role of general purpose forces in unrelated strategic reprisals. Major efforts being conducted with the Defense Nuclear Agency include a cost effectiveness analysis of the Pershing II missile system and a theater nuclear program synthesis.

2. FY 1978 Program: The FY 1978 program consists of approximately 118 new and continuing efforts. Significant new areas of interest are the role of the chaplain in social ministry and in the ministry related to psychogenic diseases; reserve recruiting and retention; an extensive study of actual nuclear force survivability and tactical nuclear forces synthesis; a reevaluation and analysis of reserve components; and the quantification of force readiness. Major past fiscal year efforts are continued into FY 1978. These studies focus on electromagnetic cover and deception; improved electronic command and control means; and an interservice effort on tactical radio frequency use in the 1980s.

3. FY 1979 Planned Program: The FY 1979 program will consist of studies addressing the use of military experience in operational testing; the Army force planning dates and assumptions for the 1980-85 time frame; a series of tactical nuclear force survivability efforts focusing on attrition, degradation of command, control and combat capability, physical security considerations, and tactical scenarios, and an examination of military personnel management and systems development. Continued efforts that are expected to be completed during this fiscal year include a study on integrated nuclear and conventional warfare simulation, and an effort concerning electromagnetic spectrum requirements for the future. A new category, Signal Intelligence/Electronic Warfare (SIGINT/EW) - NATO, was added in the FY 1979 program as part of a Department of Defense directed NATO initiative program. Studies in this category will analyze present and future NATO SIGINT/EW system assets to determine where interoperability of NATO systems will provide improvement in allied EW performance.

Program Element: #6.51.01.A
DoD Mission Area: #610 - Technical Integration

Title: Studies and Analyses
Budget Activity: #6 - Programwide Management and Support

4. FY 1980 Planned Program: The Secretary of the Army and the Chief of Staff, Army, will outline their goals and study planning guidance in FY 1979 to assist the Secretariat and the Army Staff in preparing the Army Study Program for FY 1980. In August 1979, the program will be submitted to the Chief of Staff for approval and returned to the Army Staff and field commands for implementation. The FY 1980 program is based on the need to conduct extensive analyses of Army planning and programing identified in FY 1978 and/or 1979. Further, major changes in national and world conditions over the next year will substantiate the need for appropriate reevaluation of the Army's role in pursuance of the defense mission.

5. Program to Completion: This is a continuing program.

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.51.02.A

Title: US Army Training and Doctrine Command (TRADOC) Studies and Analyses

DoD Mission Area: #610 - Technical Integration

Budget Activity: #6 - Programwide Management and Support

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	2425	2500	2600	3900	Continuing	Not Applicable
M980	Science, Technology, Systems and Equipment	334	500	250	300	Continuing	Not Applicable
M981	Concepts and Plans	777	700	400	500	Continuing	Not Applicable
M982	Operations and Force Structure	785	850	1000	1500	Continuing	Not Applicable
M983	Installations and Logistics	431	150	200	300	Continuing	Not Applicable
M988	Manpower and Personnel	98	300	600	500	Continuing	Not Applicable
M989	Intelligence	0	0	150	400	Continuing	Not Applicable
M992	Combined Arms Training Center	0	0	0	400	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program provides for the conduct of contract studies and analyses for the US Army Training and Doctrine Command (TRADOC). These studies and analyses critically examine and investigate specifically defined problems of major concern to TRADOC. TRADOC annually identifies those problems which require the application of sophisticated analytical techniques and which, when solved, will make substantive contributions to TRADOC planning, programing and decision making. Planning guidance issued by Headquarters, Department of the Army leads to prioritization of these problems. This program funds studies and analyses to attack high priority problems that can be addressed profitably with a reasonably sized effort which requires capabilities not available in-house.

C. BASIS FOR FY 1979 RDTE REQUEST: Individual contract efforts will focus on resources utilization; combat readiness of Active and Reserve Component forces; soldier quality, recruitment, training and retention; aerial surveillance and target acquisition concepts and capabilities; and improvements to force structure, design, weapons, tactics, doctrine, command and control, communications and logistics.

Program Element: #6.51.02.A Title: US Army Training and Doctrine Command (TRADOC) Studies and Analyses

DoD Mission Area: #610 - Technical Integration Budget Activity: #6 - Programwide Management and Support

D. OTHER APPROPRIATION FUNDS: Not Applicable

E. DETAILED BACKGROUND AND DESCRIPTION: The objective of this program is to provide for the conduct of contract studies and analyses for the US Army Training and Doctrine Command (TRADOC). These studies and analyses critically examine and investigate specifically defined problems of major concern to TRADOC. Sophisticated techniques are used to integrate and analyze a variety of factors. Results lead to conclusions or recommendations which are significantive contributions to TRADOC planning, programing, and decision making. Study contributions include assisting the understanding of: alternative organizations, tactics, doctrine, policies, and procedures; cost-effectiveness of programs; and allocation of resources. Unlike experimentally oriented research and development activities, studies and analyses organize and evaluate data and information already available or which can be inferred or extrapolated using data. Computer assistance is often used. Each study is individually evaluated as to its potential contribution with respect to the defined problem prior to approval of study initiation.

F. RELATED ACTIVITIES: A complementary study program is used by the Army Staff and Army Secretariat, under Program Element (PE) 6.51.01.A, Studies and Analyses. To preclude duplication of effort, these programs are coordinated by the Office of the Chief of Staff of the Army. Formal and informal coordination is regularly and routinely accomplished with US Navy and US Air Force. Interservice efforts are coordinated by the Office of the Under Secretary of Defense for Research and Engineering. Coordination is facilitated by Department of Defense information exchange services (e.g., Defense Documentation Center). Coordination is further effected through attendance at the semiannual Military Operations Research Symposium and the annual Army Operations Research Symposium. The contract study approval process requires a formal literature search to prevent duplication.

G. WORK PERFORMED BY: All work is done under contract. Primary contractors are: Braddock, Dunn and McDonald, Vienna, VA; Martin Marietta Corp., Orlando, FL; TRW Systems Inc., Huntsville, AL; Actuarial Research Corp., Falls Church, VA; Appli-Mation, Inc., Sunnyvale, CA; Vector Research, Inc., Lansing, MI. The TRADOC integrating centers (i.e., Combined Arms Combat Developments Activity, Personnel and Administration Combat Developments Activity, and Logistics Center) assist Headquarters, TRADOC in formulating the study and analysis program. The TRADOC Service Schools monitor the execution of the program by the contractors.

Program Element: #6.51.02.A

Title: US Army Training and Doctrine Command (TRADOC) Studies and Analyses

DoD Mission Area: #610 - Technical Integration

Budget Activity: #6 - Programwide Management and Support

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: Air Defense force requirements for US Army Divisions in the 1980-1990 time frame were evaluated. An improved manual system for tactical command and control was defined. Improvements were made in repair parts support for the Army which will result in increased readiness of equipment and units. A reoriented Tactical Operations System study provided a software tool for follow-on definition of the engineering development prototype software requirements (division level). The STINGER missile cost and operational effectiveness analysis determined the resources required and effectiveness of alternative weapon forces. A study defined aviation requirements for the combat structure of the Army in the 1977-1986 time period, evaluated effectiveness of current and future aircraft organizations and provided an analytical base for future decisions regarding aircraft requirements. Antiarmor weapons and their mixes and related tactics and training that will produce maximum effectiveness of the antiarmor system were evaluated. An analysis provided data required to make forecasts of training ammunition requirements, justify forecasts and explore alternatives to the use of blank ammunition.

2. FY 1978 Program: Cost and Training Effectiveness Analyses will address training at institutional and unit level to determine optimum training programs. Evaluations will be conducted of the threat force ability to understand incipient US operations and the effectiveness of alternative operational security strategies; cost and effectiveness of providing an electronic countermeasures capability against battlefield surveillance, target acquisition and mortar/artillery locating radars; effective number and mix of signal security resources required by the Army based on current and near term technological capabilities and the threat; and US ROLAND missile system effectiveness, costs and alternatives. PATRIOT Missile Firing Doctrine Analysis will validate firing doctrine requirements. The Retail Stockage Policy (Bulk Supplies) study will provide a comparative analysis of alternative bulk petroleum retail distribution systems.

3. FY 1979 Planned Program: The Mini-Emitter Location System Concept study will develop a tactical operational and organizational concept for the use of the system. The Logistics Simulation Models for Training logistics over-the-shore operations is scheduled to perform a feasibility study and develop a general methodology for incorporating on-line logistics in training of personnel. Air defense doctrine, tactics and techniques necessary to counter attempts by the enemy forces to suppress air defense sites will be developed. Existing and proposed tactical Signal Intelligence/Electronic Warfare systems configurations and the procedures and interfaces required at all echelons will be analyzed with the goal of promoting effective use of resources. Various vehicular/equipment configurations and methods that may be employed to increase the mobility, survivability and interchangeability of Signal Intelligence/Electronic Warfare equipments on the battlefield will be examined. Cost and Operational Effectiveness Analyses will be made of systems such as PATRIOT and STINGER. Cost and Training Effectiveness Analyses will be performed for systems such as VIPER light antitank assault weapon.

Program Element: #6.51.02.A

Title: US Army Training and Doctrine Command (TRADOC) Studies and Analyses

DoD Mission Area: #610 - Technical Integration

Budget Activity: #6 - Programwide Management and Support

4. FY 1980 Planned Program: The FY 1980 program will be oriented toward performing analyses which will assist in solving the priority problem areas for the Army as identified in the guidance provided by Headquarters Department of the Army. These studies will include analyses of organizations, doctrine, tactics, weapon systems, logistic support, personnel support and training aspects. An evaluation will be made of test of combined arms force-on-force tactical engagement simulation training to validate Army Training Evaluation Program requirements. This program will establish Army methodology for evaluating all future tactical engagement training.

5. Program to Completion: This is a continuing program.

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.52.01.A
Title: Aviation Engineering Flight Activity
DoD Mission Area: #621 - Major Ranges and Test Facilities
Budget Activity: #6 - Programwide Management and Support

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	3110	3001	3785	5362	Continuing	Not Applicable
D066	Aviation Engineering Flight Activity	3110	3001	3785	5362	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program provides the mission funds for the US Army Aviation Engineering Flight Activity (AEFA), located at Edwards Air Force Base, California. Included are funds for civilian employee wages and benefits, administrative TDY and travel, rents and utilities, contractual services including computer maintenance and housekeeping functions, supplies and materials to include aviator training requirements, and replacement of capital equipment. AEFA provides the only capability within the US Army to conduct the engineering flight tests required for preliminary aircraft evaluation and to support development and procurement of new aircraft systems and modifications to existing aircraft.

C. BASIS FOR FY 1979 RDTE REQUEST: FY 1979 funds are required to provide the continuing capability to support the planned development and product improvement program for Army aviation.

D. OTHER APPROPRIATION FUNDS: Not Applicable.

E. DETAILED BACKGROUND AND DESCRIPTION: The objective of this program element is to conduct airworthiness qualification flight testing of Army aircraft being developed or procured to include Development Testing I and II, to evaluate air vehicles incorporating advanced aerodynamic concepts with potential military application, and to determine airworthiness of proposed engineering change proposals or modifications to existing aircraft systems. Thirty to forty flight test projects are normally accomplished in each fiscal year. This element also provides funds for the conduct of an orientation course to prepare Army students for attendance at the US Naval Test Pilot School.

F. RELATED ACTIVITIES: This element provides flight test support to agencies such as the United States Forest Service and the National Aeronautics and Space Administration (NASA) on Joint NASA-ARMY projects, such as development of the XV-15 tilt rotor vehicle.

G. WORK PERFORMED BY: United States Army Aviation Engineering Flight Activity, Edwards Air Force Base, California.

Program Element: #6.52.01.A
DoD Mission Area: #621 - Major Ranges and Test Facilities

Title: Aviation Engineering Flight Activity
Budget Activity: #6 - Programwide Management and Support

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: During FY 1976 and FY 1977, the US Army Aviation Engineering Flight Activity conducted twenty test programs including the following: Utility Tactical Transport Aircraft System (UTTAS) Army Preliminary Evaluation and Government Competitive Test, the Advanced Attack Helicopter (AAH) Developmental Test I, and the Iranian 214A Helicopter Airworthiness & Flight Characteristics Test. In FY 1977, there were thirty-three projects assigned including UTTAS Artificial Icing, AH-1 Improved Main Rotor Blade Preliminary Evaluation and Airworthiness and Flight Characteristics Test, and Multi-Target Electronics Warfare System Performance, Airworthiness and Handling Qualities Test.

2. FY 1978 Program: FY 1978 funds will provide for the personnel, supplies, and materials, rentals, services and equipment required annually to maintain a capability for the US Army Aviation Engineering Flight Activity (AEFA) to perform assigned test programs in FY 1978. Major forecast test programs for FY 1978 include: UH-60A (BLACK HAWK) helicopter Airworthiness and Flight Characteristics Test, YAH-64 (AAH) Engineering Development Test I.

3. FY 1979 Planned Program: FY 1979 funds will provide for the personnel, supplies and materials, equipment, rentals and services required annually to maintain a capability for the Army Aviation Engineering Flight Activity to perform assigned test programs in FY 1979. Major forecast helicopter test programs for FY 1979 include UH-60A (BLACK HAWK) helicopter Production Verification Testing, YAH-64 (AAH) Engineering Development Test II and III, and YCH-47D Preliminary Airworthiness Evaluation. Increased funds in FY 79 are provided to permit maintenance of capital equipment and to provide the increased cost of contractual services.

4. FY 1980 Planned Program: FY 1980 funds will provide for the personnel, supplies, and materials, equipment rentals and services required annually for the maintenance of the capability to perform assigned test programs in FY 1980. Program funds are provided for replacement of portions of the Automatic Data Acquisition System. FY 1980 test program includes YAH-64 (AAH) Airworthiness and Flight Characteristics Test and follow-on testing on UH-60A (BLACK HAWK) helicopter.

5. Program to Completion: This is a continuing program.

FY 1979 RDT&E CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.53.01.A
DoD Mission Area: #621 - Major Ranges and Test Facilities

Title: Kwajalein Missile Range
Budget Activity: #6 - Program Wide Management and Support

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1977 Actual	FY 1978 Estimated	FY 1979 Estimated	FY 1980 Estimated	Additional to Completion	Total Estimated Costs
	TOTAL PROGRAM ELEMENT	82854	82239	87620	93800	Continuing	Not Applicable
D614	Kwajalein Missile Range	82854	82239	87620	93800	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program provides for the operation of the Kwajalein Missile Range (KMR), a National Range, whose principal effort is in support of strategic offensive and defensive ballistic missile test programs. The range, located about 4200 nautical miles southwest of Vandenberg Air Force Base, provides the impact area for Air Force and Navy ballistic missiles and is equipped with instrumentation to monitor performance and accuracy of the missiles as they reenter the earth's atmosphere. These missiles also provide targets for the testing of ballistic missile defense hardware and technology by the Army.

C. BASIS FOR FY 1979 RDT&E REQUEST: FY 79 funds are required for the continued operation of this National Range. During FY 79, Army, Air Force and National Aeronautics and Space Agency (NASA) all have substantial planned programs which will be supported significantly by KMR. The Army's Ballistic Missile Defense (BMD) Systems Technology program will launch four MINUTEMAN (MM) I and TITAN II targets into KMR. The BMD Advanced Technology Center's Designating Optical Tracker program will continue with the launch of one experimental missile from KMR. The Air Force will launch 15 MM II and MM III missiles into KMR for operational testing purposes. Also, the Air Force's Advanced Ballistic Reentry Systems program will launch six missiles, with experimental payloads, into KMR. Three other special test missiles or production verification missiles are planned by the Air Force. NASA will be supported by KMR tracking of orbiting vehicles in their Space Shuttle program and their High Energy Astronomy observatory program.

D. OTHER APPROPRIATION FUNDS: ($ in thousands)

	FY 1977 Actual	FY 1978 Estimated	FY 1979 Estimated	FY 1980 Estimated	Additional to Completion	Total Estimated Costs
Military Construction, Army	0	2603	10341	4297	Continuing	Not Applicable

Program Element: #6.53.01.A
DoD Mission Area: #621 - Major Ranges and Test Facilities

Title: Kwajalein Missile Range
Budget Activity: #6 - Program Wide Management and Support

E. DETAILED BACKGROUND AND DESCRIPTION: Kwajalein Missile Range (KMR) is a national missile range managed and operated by the Army for the purpose of strategic offensive missile, ballistic missile defense, and space defense testing. KMR utilizes eleven islands in the Kwajalein Atoll which is located some 2100 miles southwest of Honolulu. This isolated community of approximately 3200 people is under the direction of the Commander, KMR, with a small Army and civil service staff of approximately 50 personnel. The remaining operating personnel are predominantly civilian contractor personnel who fall into four general categories: logistic support, technical range support, construction, and the prime and subcontractors for the major range user programs. Principal range user programs with sizeable concentrations of equipment and personnel at KMR are the System Technology Program and the Advanced Technology Center (ATC) programs. The other major user is the Air Force which fires TITAN and MINUTEMAN missiles into the KMR area. Satellite objective surveillance, identification, and signature is provided for space program users.

F. RELATED ACTIVITIES: No other National Range duplicates KMR capabilities.

G. WORK PERFORMED BY: Global Associates, Oakland, CA; Kentron Hawaii, Ltd, Honolulu, HI; Lincoln Laboratory, Massachusetts Institute of Technology, Lexington, MA; Radio Corporation of America, Moorestown, NY; General Telephone Electronic Sylvania, Needham Heights, MA; two additonal contractors at a cost of $1,295,000. The KMR is managed by the Ballistic Missile Defense Systems Command, Huntsville, AL.

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 77 and Prior Accomplishments:

Kwajalein Missile Range was established as a National Range by Department of Defense (DoD) order on 1 July 1964 and placed under Army control. Earlier, Advanced Research Projects Agency had installed the ALTAIR, ALCOR and TRADEX radars in the Kwajalein Atoll to measure phenomena associated with Intercontinental Ballistic Missile (ICBM) reentry into the atmosphere. These radars and associated computers and data processors were transferred to KMR control in 1968 and designated the Kiernan Reentry Measurements Site (KREMS). The NIKE ZEUS program was under way with interceptor firings against ICBM targets in 1963. This program evolved into the SAFEGUARD Ballistic Missile Defense System which constructed a phased array radar and interceptor launch cells on Meck Island located in the Kwajalein Atoll. The SAFEGUARD System test program was successfuily concluded in 1975 and these facilities were mothballed. During the interim period since FY 65, additional instrumentation has been added to the range. Three additional radars, 2 MPS-36's and 1 TPQ-18, have been installed to increase the metric tracking and data collection capability. Ballistic cameras and optical trackers are located on seven islands; telemetry stations, spectral ballistic sites, impact location instrumentation are located on appropriate islands throughout the range. A range operation control center is located on Kwajalein Island and is supported by a communication center and an inter-range communication network. A central data processing facility is located on Kwajalein Island. Missile launch pads are maintained on Kwajalein and Roi Namur Islands. A submarine is available to facilitate underwater recovery of target vehicles impacting in the Kwajalein Atoll lagoon. KMR has supported the Army's Ballistic Missile Defense program, the Air Force's ICBM programs and the Navy's submarine launched missile programs as well as NASA programs involving orbiting vehicles.

Program Element: #6.53.01.A
DoD Mission Area: #621 - Major Ranges and Test Facilities

Title: Kwajalein Missile Range
Budget Activity: #6 - Program Wide Management and Support

2. FY 78 Program: During FY 78, Kwajalein Missile Range (KMR) will have 20 user programs in progress involving missile firings into KMR and missile firings from KMR. The number of missile firing missions is expected to increase by nine over FY 77 due primarily to rescheduling of several Air Force and Defense Nuclear Agency missions. Firing tests in the Army's Designating Optical Tracker (DOT) program will begin in FY 78. Air Force MINUTEMAN testing will remain at about the same level as FY 77. The FY 78 budget was reduced by $5.0M by the Congress which precluded all but a limited amount for needed Improvement and Modernization of range equipment.

3. FY 79 Planned Program: During FY 79, KMR will have 20 user programs in progress including new starts for the Army's Systems Technology Reentry Experiment Program (STREP) and Homing Overlay Experiment (HOE). New Air Force starts include the Advanced Maneuvering Reentry Vehicle (AMARV) Program and Advanced Ballistic Reentry Vehicle (ABRV) program. Both of these programs placed a more stressing requirement on KMR range instrumentation than any previous program. In addition, NASA's Space Shuttle Orbiting Flight Test program will begin in FY 79. Air Force MINUTEMAN firing schedules are expected to remain at the same level as FY 78. The planned FY 79 Improvement and Modernization program is over $4.0M at the budget level of $89.120M. Planned improvements include purchase of the fourth SUPERADOT (an optical tracker); modernization of the TPQ-18 C-band metric radar to improve performance, maintainability and allow installation in an available permanent building; replacement of obsolete, inadequately performing meteorological systems with equipment more able to meet current user needs; and update the satellite ground station to maintain compatibility with other Defense Communications Satellite stations with which KMR is required to communicate. The increased funding allows for inflationary increases, and improvement and modernization.

4. FY 80 Planned Program: The FY 80 program forecast currently is for 19 user programs to be in progress. These include the completion of the Army's Designating Optical Tracker Program and the System Technology Reentry Program started in FY 79 and the start of the Interceptor Technology Testbed firing program from KMR. Air Force programs to be completed in FY 1980 are the Advanced Maneuvering Reentry Vehicle and Advanced Ballistic Reentry Vehicle programs. Air Force MINUTEMAN firing programs are expected to continue. Preparations will be underway to conduct the Navy's TRIDENT firing program into 1981. The National Aeronautics and Space Agency Space Shuttle program will continue to require KMR support. An upgrading of the range safety system will begin in FY 80 and continue through FY 82.

5. Program to Completion: This is a continuing program.

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.57.02.A
Title: Support of Development Testing
DoD Mission Area: #621 - Major Ranges and Test Facilities
Budget Activity: #6 - Programwide Management and Support

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	15412	16452	20453	21624	Continuing	Not Applicable
D026	Test Design and Evaluation, US Army Materiel Systems Analysis Activity (AMSAA)	1957	2609	2798	2994	Continuing	Not Applicable
D127	Meteorological Support to RDTE Activities	3793	3651	4490	5000	Continuing	Not Applicable
D204	Field Smoke Assessment	0	0	435	0	Continuing	Not Applicable
D575	US Army Materiel Development and Readiness Command (DARCOM) Support of US Army Training and Doctrine Command Combined Army Test Activity	196	77	0	0	None	Not Applicable
D618	Aircraft Development Test Activity	5836	5362	5971	6358	Continuing	Not Applicable
D623	Instrumentation Development, US Army Test and Evaluation Command (TECOM)	1724	2461	4239	4742	Continuing	Not Applicable
D625	Test Methodology, TECOM	918	1566	2520	2530	Continuing	Not Applicable
D671	Surface-to-Air Missile Tactical Vulnerability	988	726	0	0	None	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Provides funding to subordinate activities of the US Army Materiel Development and Readiness Command (DARCOM) for indirect support of development test and evaluation other than test and evaluation conducted at DARCOM facilities included in the Major Range and Test Facility Base. The latter are funded by Program Element (PE) 6.58.04.A, Major Research and Development Test and Evaluation Facilities, DARCOM. The indirect support funded by this program consists of salaries, supplies, travel expenses, equipment, host/tenant costs, and services not directly associated with any particular test project. Development test and evaluation supports materiel acquisition program decisionmaking, specifically with regard to design risks, completeness of engineering development, and ability of the system to meet its specifications.

Program Element: #6.57.02.A Title: Support of Development Testing
DoD Mission Area: #621 - Major Ranges and Test Facilities Budget Activity: #6 - Programwide Management and Support

C. BASIS FOR FY 1979 RDTE REQUEST: Requested funds provide for continuation of projects to support Army development test and evaluation. Overall funding is increased over FY 1978 funding in order to provide for adequate development of instrumentation and test methodology, initiate a significant modernization of meteorological equipment, provide funds for a new project to develop methodology and instrumentation for assessing vulnerability of electro-optical items to smoke/obscurant countermeasures, and provide for cost growth due to inflation. Since FY 1975, austere funding levels in management and support category programs have affected this program element severely because it is one of the few elements that has some flexibility in the budget year (e.g., development of instrumentation and test methodology and modernization of meteorological and aircraft development test instrumentation).

D. OTHER APPROPRIATION FUNDS: Not Applicable.

E. DETAILED BACKGROUND AND DESCRIPTION: Six projects are funded under this program for FY 1979. The first project provides funds to the US Army Materiel Systems Analysis Activity (AMSAA) for independent design of development tests and for subsequent independent analyses and evaluations of these test results which contribute to decisions with respect to all major US Army Materiel Development and Readiness Command (DARCOM) materiel acquisitions and selected nonmajor acquisitions. AMSAA has been allocated 63 spaces for this purpose. Each test design is fully coordinated with the primary agencies involved in that materiel acquisition including US Army Test and Evaluation Command (TECOM), US Army Operational Test and Evaluation Agency (OTEA), the Project Manager and contractor. Consideration is given to test sample size, duration, costs and risks. AMSAA test design and evaluation efforts now encompass about 60 systems of which about 2/3 are nonmajor systems such as Family of Military Engineer Construction Equipment, VULCAN Air Defense Gun and Ground Laser Locator Designator. The second project provides for meteorological support services at White Sands Missile Range, 13 other permanent test sites, and various temporary sites. Data is provided on conditions near the earth's surface up to the high altitudes of missile flights and space vehicles, including measurements of solar radiation, refractive index, air density, soil moisture, air temperature and humidity, and wind. Complete weather services and the highly specialized meteorological data collection are provided before, during and after tests to range users, including Defense Nuclear Agency and National Aeronautics and Space Administration, and professional consultations regarding the data collected are also provided. Army participation in the Meteorological Rocket Network is provided by the operation of three rocket launching sites. This network provides upper air measurements between 30 and 100 kilometers. The third project is a new project that provides for the development of methodology and instrumentation to determine the vulnerability of electro-optical (EO) items to smoke/obscurant countermeasures with emphasis on laser-guided artillery projectiles, laser designators, infrared sensors, and other fire control and guidance devices. The project with the largest funding in this element is the Aircraft Development Test Activity (ADTA), Ft. Rucker, Alabama. ADTA conducts development tests of aircraft and components of aircraft and gathers data to aid in determining component service life, repair parts consumption and required inspection cycles. Almost 1/2 of ADTA funding is for an aircraft maintenance contract. The rest is primarily for salaries of civilian test personnel, host support, instrumentation and supplies. The fifth project provides for development of instrumentation that is unique to the testing of complex weapon systems at more than one TECOM test activity, and that is commensurate with technological advances in materiel developments and the need to operate more efficiently at lower manning levels. The sixth project provides

for the development and improvement of test methodology for all US Army Test and Evaluation Command (TECOM) test activities. This includes investigations aimed at improving test procedures and/or developing new test techniques to enable effective testing of the advanced technology systems to be developed and to reduce test manpower, costs and duration. Methodology efforts are extremely important as a prerequisite in determining what instrumentation needs to be developed. Two projects are no longer funded in FY 1979. Support of the US Army Training and Doctrine Command (TRADOC) Combined Arms Test Activity by US Army Materiel Development and Readiness Command (DARCOM), project D575, is to be reduced to a 2-man effort for FY 1979 and funded under Programwide Activities, Program Element (PE) 6.58.01.A. Surface-to-Air Missile Tactical Vulnerability, project D671, will also be eliminated in FY 1979 and the effort will be incorporated into a new project D235, Missile Counter-Countermeasure Technology, under PE 6.37.18.A, Electronic Warfare Vulnerability/Susceptibility.

F. RELATED ACTIVITIES: This program with its emphasis on testing is closely related to the varied Army materiel developing activities; development testing activities of the ranges and test facilities funded by PE 6.58.04.A, Major Research and Development Test and Evaluation Facilities, DARCOM; activities of the US Army Operational Test and Evaluation Agency (OTEA) funded by PE 6.57.12.A, Support User Test OTEA; testing activities of TRADOC funded by PE 6.57.07.A, Support User Test TRADOC; and similar test activities conducted by the other Services. Instrumentation and test methodology are developed under PE 6.57.02.A for the ranges and test facilities funded by PE 6.58.04.A as well as other development test facilities. The Army Staff directs close and continuous coordination between TRADOC agencies responsible for test and use of materiel items, development test activities, materiel developing agencies and OTEA to insure greatest possible effectiveness of Army testing activities and to avoid duplication of instrumentation development efforts. This PE, 6.57.02.A, is now restructured to support only development testing. It has been renamed accordingly. Project DV02, Test Boards, was moved under PE 6.57.07.A, Support User Testing, TRADOC, in FY 1977 since the test boards now primarily support operational testing and the boards have been transferred to TRADOC. Project M857, Explosives Safety Standards, was moved under PE 6.57.06.A, Materiel Systems Analysis in FY 1977 since it is not primarily concerned with support of Army development testing. This year, project M857 has been moved to a new program element, 6.58.05.A, DoD Munitions Effectiveness and Explosives Safety Standards. This year project D620, DoD Munitions Effectiveness, was moved from PE 6.57.02.A to PE 6.58.05.A. Project D066, Aviation Engineering Flight Activity, has been moved to a new program element, 6.52.01.A, Aviation Engineering Flight Activity, for FY 1979, because its primary emphasis is in support of engineering. During FY 1977 and prior years, techniques for the characterization of smokes in field environments and associated instrumentation were developed under project DE82, Flame, Smoke and Incendiary Materials, PE 6.36.27.A, Combat Support Munitions. This capability was demonstrated during tests at White Sands Missile Range in July 1977. The Office of the Secretary of Defense carefully reviews the management, operation and maintenance of all Department of Defense test facilities and planned testing programs to avoid unnecessary duplication of capabilities, to insure that the highest priority capabilities are established expeditiously and suitably maintained, and to insure integration of testing by the Services.

G. WORK PERFORMED BY: Approximately 90 percent of the effort is performed in-house by civilian and military personnel assigned to the US Army Materiel Development and Readiness Command. There is an aircraft maintenance contract with Hawthorne Aviation, Inc., (about $2.5 million) at the Aircraft Development Test Activity and numerous other smaller contracts.

Program Element: #6.57.02.A Title: Support of Development Testing
DoD Mission Area: #621 - Major Ranges and Test Facilities Budget Activities: #6 - Programwide Management and Support

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: In the mid-1970's, increased emphasis was placed on independent operational testing of developmental systems. An important step for this purpose was the transfer in FY 1976 of the Army's test boards from US Army Test and Evaluation Command (TECOM) to US Army Training and Doctrine Command (TRADOC). A related action was establishment in FY 1976 of a new project, D026, Test Design and Evaluation, AMSAA (US Army Materiel Systems Analysis Activity), to provide for design of development tests which contribute to decisions with respect to acquisition of major and selected nonmajor materiel systems and for evaluation of test results; both test design and evaluation to be conducted independently of the project manager. Reductions in funding guidance in FY 1975 were applied to most of the projects in this program element, with development of instrumentation and test methodology being sharply curtailed. FY 1976 funding permitted approximately the same overall level of effort as FY 1975, except for the addition of the new project to provide for independent test design and evaluation. FY 1977 funding provided for a level of effort approximately 15% lower, after providing for cost growth; development of instrumentation and test methodology were sharply reduced (e.g., test methodology was reduced by 66% from the FY 1976 level). Significant test design and evaluation effort was begun by US Army Materiel Systems Analysis Activity in FY 1976 and by FY 1977 was applied to all major materiel systems, such as ROLAND and PERSHING II missile systems. Based on FY1976/1977 efforts, significant reductions were made in test sample sizes and durations while retaining acceptable decision risks, resulting in savings estimated at 30 million dollars. Meteorological support was provided to an average of 600 RDTE projects each year at the 14 permanent test sites and at an average of 10 special sites. In FY 1977, 527 meteorological rockets were fired at three sites in the Meteorological Rocket Network. The Aircraft Development Test Activity conducted competitive evaluations of utility tactical transport aircraft and advanced attack helicopters. Developments and improvements of test instrumentation included: scoring radar for air defense tests, high precision laser tracker, projectile air burst and impact locating system, vehicle-sized electromagnetic interference test chamber, moving target systems for evaluation of infantry weapons, in-flight monitoring equipment, improved automation of data acquisition and processing, artillery and mortar hit scoring, range instrumentation command and control, improved triggering device for multiple-head X-ray, new generation radar velocimeter, noncooperative target laser ranging and tracking, laser ranging/video theodolites, graphic display interface, position location systems, and specialized equipment for test/measurement of aircraft armament, vehicles, sensors, infrared, static electricity, temperature, gyro-stabilized armored vehicle weapons, and antennas. Existing test procedures were documented and the test methodology program placed emphasis on automation of test information and data reduction, including use of automaticdata processing, simulation and math modeling to decrease test cost and improve reproducibility of test results. Methodology efforts have provided substantial benefits for very small investments. A considerable head start was achieved by the Army in determining test techniques and instrumentation requirements for high energy laser systems and in developing analytical techniques associated with testing, simulation and monitoring of software elements of computer-supported combat systems. The latter techniques were used for planning test and evaluation of the PATRIOT air defense missile system. Other significant advances were made in test techniques in the areas of electro-optics, smoke and camouflage, electromagnetics, shock and vibration, automotive cooling, avionics, infrared seekers, and analysis of electronic images; and a laser reflectance model was developed. Independent evaluations were made of the vulnerability of surface-to-air missiles to electronic warfare.

Program Element: #6.57.02.A Title: Support of Development Testing
DoD Mission Area: #621 - Major Ranges and Test Facilities Budget Activity: #6 - Programwide Management and Support

2. FY 1978 Program: The program provides for payment of salaries of Headquarters, US Army Test and Evaluation Command (TECOM) personnel involved in instrumentation and test methodology projects, financed by Program Element (PE) 6.58.01.A, Programwide Activities, in FY 1977 and prior years. Independent test design and evaluation effort will be expanded so that US Army Materiel Systems Analysis Activity (AMSAA) can address 60 systems, to include Advanced Attack Helicopter, Tactical Operations System, PATRIOT Air Defense Missile System, XM-1 Tank, and COPPERHEAD cannon-launched guided projectile. Meteorological support services continue to be provided to important Army projects to include high energy laser, electro-optical and smoke/aerosol programs and to demilitarization and detoxification activities. A new meteorological team is being established at Umatilla Army Depot, Hermiston, OR. The Aircraft Development Test Activity (ADTA) will continue to conduct development tests of aircraft systems and components, such as BLACKHAWK utility tactical transport aircraft system, radar jammer and Quad Laser Warning Receiver. Beginning in FY 1978, the ADTA project will also finance procurement of instrumentation formerly financed by PE 6.58.01.A, Programwide Activities, as "special purpose equipment." Instrumentation developments (project D623) include exploitation of solar energy to provide power to instruments at remote and inaccessible sites; physiological telemetry system for automated monitoring and recording of human physiological data; and improvements of capabilities for tests of air defense guns, smoke effectiveness, and laser designators. Test methodology efforts include updating of environmental test procedures, development of test procedures for laser seekers of terminal homing munitions, completion of methodology for testing software-driven systems, and initiation of new efforts in environmental quality control and simulation of a two-color seeker for guided missile systems.

3. FY 1979 Planned Program: Independent test design and evaluation effort will be continued at a level of effort sufficient to address 60 systems, to include heliborne fire-and-forget missile, single channel ground-to-air radio system, General Support Rocket System, lightweight company mortar system and advanced medium short-takeoff-and-landing transport. Meteorological services continue to be provided to about 600 RDTE projects. Highly specialized meteorological equipment urgently required for modernization and replacement of obsolete equipment will be procured; manual analog data collection will be replaced by automated digital data collection/reduction resulting in manpower/cost savings. Instrumentation will be procured to establish a capability for measuring smoke cloud characteristics, attenuation of electro-optical energy and meteorological and lighting conditions. The purpose of this program is to enable assessment of the effectiveness of smoke-generating systems and of electro-optic devices operating in a smoke environment. Simultaneous tests will be conducted at Dugway Proving Ground, Utah, on the effects of smoke clouds upon a large number of electro-optical devices, such as laser designators, thermal night sights, and laser guided projectiles. The Aircraft Development Test Activity will continue to support development tests of aircraft and components such as Advanced Attack Helicopter, CH-47 Modifications, and Heliborne Fire-and-Forget Missile. A number of instrumentation and test methodology developments have been deferred or delayed due to austere funding FY 1975 through FY 1978. Some of these developments are urgently required if the Army is to have adequate capability for development testing in the 1980's. FY 1979 funding for projects D623 and D625 has been programed at the lowest level that will provide such an adequate capability. A major effort will be made to complete developments started in prior years of a number of high priority test instruments, to include a real-time video theodolite that will eliminate much of the most labor intensive element

of obtaining cinetheodolite data, thus saving over $14,000 per hour of data collection; and a projectile dynamic measurement system to accurately measure the nutation, precession, yaw and spin of an artillery projectile in flight, thus enabling savings of millions of dollars by avoiding potential discovery of stability problems after completion of projectile development. A major portion of the development of an automated data acquisition and processing technology system will be completed. This effort provides for real-time analysis of varied test data and in-process review of test validity so that immediate corrective action can be taken. Avoiding the rescheduling and repetition of invalid tests will provide savings estimated at $600,000 per year. New efforts will be initiated, to include reducing dependence on optical miss-distance methods, improved utilization of microprocessor technology, and increased use of simulation. Test methodology efforts will include improvement of procedures for testing: lasers under extreme climates, night vision equipment, ultraviolet systems, and digital communications. A significant number of methodology efforts will be completed in FY 1979. These, as well as the programed instrumentation development efforts, must be accomplished to provide an adequate capability for development testing in the 1980's.

4. FY 1980 Planned Program: Overall funding is increased over the FY 1979 level in order to provide for an adequate Army capability to support development testing. A modest increase is included for independent test design and evaluation because increased emphasis on reducing test costs and duration, while maintaining or increasing test validity, requires expansion to 70 systems to which such effort is applied. Meteorological support services will continue at the same level of effort as in FY 1979. The Field Smoke Assessment program will be continued in FY 1980; however, funds are not programed as specific requirements for FY 1980 depend on an assessment of initial progress under this program and are not defined at this time. An increase in funding is programed for Aircraft Development Test Activity to permit substantial equipment modernization. Significant steps will be taken to improve test facility capabilities and efficiency through development of instrumentation (project D623) for improved target tracking and space position, advanced imaging techniques, test simulation and automation of test ranges. Test methodology efforts will continue in areas such as communications in a countermeasures environment and determining environmental pollution effects of testing.

5. Program to Completion: This is a continuing program.

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D618 Title: Aircraft Development Test Activity
Program Element: #6.57.02.A Title: Support of Development Testing
DoD Mission Area: #621 - Major Ranges and Test Facilities Budget Activity: #6 - Programwide Management and Support

A. DETAILED BACKGROUND AND DESCRIPTION: This project provides for the fixed and recurring costs incurred by the Aircraft Development Test Activity (ADTA) (formerly part of the Aviation Test Board), Fort Rucker, Alabama, a field element of the US Army Test and Evaluation Command (TECOM), during the conduct of development testing (DT) of Army aircraft acquisition programs. Fixed and recurring costs include an aircraft maintenance contract, salaries of civilian test personnel, host support, instrumentation and supplies. Development testing is conducted to demonstrate that design risks have been minimized, that the engineering development process is complete, and that the system will meet specifications; and to estimate the system's military utility. The technical performance, safety, reliability and maintainability characteristics are measured during DT. ADTA also gathers data to aid in determining component service life, repair parts consumption and required inspection cycles, and in developing quick change kits and modifications. Prior to FY 1976, Project D618 funded the six Army test boards which were then under TECOM. Five of the boards were transferred to the US Army Training and Doctrine Command (TRADOC) 1 July 1975, and were financed by a new project, DV02, Test Boards. Effective 1 July 1976, the operational testing (OT) activities of the sixth board, Aviation Test Board, were transferred to TRADOC under Project DV02. Most of the effort of the old Aviation Test Board consisted of development testing activities. Responsibility for these activities was assigned to the new Aircraft Development Test Activity, which remained under TECOM, and continued to be financed by Project D618.

B. RELATED ACTIVITIES: Close and continuous coordination exists with other aviation test and evaluation activities, TRADOC, materiel developers, and the US Army Operational Test and Evaluation Agency (OTEA) to insure optimum effectiveness of DT/OT. The Office of the Secretary of Defense reviews the management, operation, and maintenance of all Department of Defense test facilities and planned testing activities to avoid unnecessary duplication of capabilities, to insure that the highest priority capabilities are established expeditiously and suitably maintained, and to insure integration of testing by the Services. Prior to FY 1978, limited instrumentation development for Aircraft Development Test Activity (ADTA) was accomplished under Project D623, Instrumentation Development, TECOM, and some instrumentation procurement for ADTA was funded as special purpose equipment under Program Element (PE) 6.58.01.A, Programwide Activities. These are now accomplished under this project, D618.

C. WORK PERFORMED BY: Testing is performed by in-house military and civilian personnel. Aircraft maintenance (fixed and rotary) is performed on a contractual basis at a cost of about $2.5 million. Current contractual effort is performed by Hawthorne Aviation.

D. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: ADTA conducted engineering and service tests as well as other developmental tests on Army materiel. Examples of equipment tested prior to and during FY 1977 follow: Utility Tactical Transport Aircraft System (UTTAS), now BLACKHAWK; Crashworthy Fuel System and Closed Circuit Receiver Kit for OH-6; Absolute Altimeter, AN/APN-209; Improved COBRA Armament System; Iranian Helicopter, 214A; Product Improvements of T55-L11 and T53-L13 engines; Synthetic Flight Training System (UTTAS); Mine Dispenser, XM130; Infrared (IR) jammers; and Long Range Navigation (LORAN) Set, AN/ARN-114.

Project: #D618 Title: Aircraft Development Test Activity
Program Element: #6.57.02.A Title: Support of Development Testing
DoD Mission Area: #621 - Major Ranges and Test Facilities Budget Activity: #6 - Programwide Management and Support

2. FY 1978 Program: Examples of equipment planned for testing follow: BLACKHAWK; Infrared (IR) Suppressor Kits for UH-1, OV-1, AH-1; Radar Jammer, AN/ALQ-136; Missile Detector System, AN/ALQ-156; Quad Laser Warning Receiver; Radar Warning Receiver, AN/APR-39; Advanced Attack Helicopter (AAH); and Automatic Inspection, Diagnostic and Prognostic System. FY 1978 marks the beginning of development and procurement of instrumentation from Project D618 funds, to include a high frequency data acquisition system and data reduction equipment. FY 1978 funding provides for a level of effort below that of FY 1977 and prior years.

3. FY 1979 Planned Program: Equipments planned for testing include: BLACKHAWK utility helicopter; AAH advanced attack helicopter; CH-47 helicopter modifications; and laser guided heliborne missile (HELLFIRE). Test instrumentation improvement and modernization planned for this period will include photo/video equipment and completion of several prior years' improvements in order to enhance airborne data acquisition and analysis capabilities by replacement of obsolete and inefficient instrumentation and procurement of new instrumentation required to meet the demands of testing advanced aircraft systems. FY 1979 funding is increased over the FY 1978 level to provide for development and procurement of instrumentation from project D618 funds and to provide for cost growth.

4. FY 1980 Planned Program: Equipment planned for testing follows: BLACKHAWK utility helicopter; CH-47 helicopter modifications; and CX-4 Missile Detection System. During FY 1980, instrumentation improvement and modernization will continue prior fiscal year efforts, to include instrumentation test and calibration equipment, Mobile Data Reduction System and photo/video equipment.

5. Program to Completion: This is a continuing program.

6. Major Milestones: Not applicable.

7. Resources ($ in thousands):

	FY 1977	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Costs
RDTE,A: Funds	5836	5362	5971	6358	Continuing	Not Applicable

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.57.06.A
DoD Mission Area: #610 - Technical Integration

Title: Materiel Systems Analysis
Budget Activity: #6 - Programwide Management and Support

A. RESOURCES (PROJECT LISTING): ($ in thousands):

Project Number	Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	8557	8715	9700	11080	Continuing	Not Applicable
M541	US Army Materiel Systems Analysis Activity (AMSAA)	8557	8715	9700	11080	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Provide central independent technical capability in US Army Materiel Development and Readiness Command (DARCOM) for the conduct of major systems analyses and cost effectiveness evaluations and also provide similar support to US Army Training and Doctrine Command (TRADOC), US Army Operational Test and Evaluation Agency (OTEA), Headquarters Department of Army and Office Secretary of Defense. Serve as DARCOM lead activity for survivability as well as its center for reliability, availability and maintainability methodology. Conduct analyses on the reliability, availability and maintainability aspects of materiel systems. Maintain direct contact with Army materiel users in the field to ascertain requirements for improvements.

C. BASIS FOR FY 1979 RDTE REQUEST: Required to support a level of effort of approximately 331 manyears for systems analysis support of Army materiel programs.

D. OTHER APPROPRIATION FUNDS: Not Applicable.

E. DETAILED BACKGROUND AND DESCRIPTION: AMSAA is a sub-activity of DARCOM. Its primary objective is to conduct independent systems analyses and cost effectiveness evaluations of major materiel systems. This encompasses assessing the expected worth of and anticipated costs associated with existing and proposed Army materiel systems throughout their life cycle to provide a meaningful basis for major decisions concerning their design, development, acquisition, employment and deployment. Advanced Attack Helicopter, XM1 Tank, PATRIOT, Air Defense Missile System and BLACKHAWK Utility Tactical Transport Aircraft are examples of specific projects worked on by AMSAA. AMSAA serves as the DARCOM center for reliability, availability and maintainability (RAM) methodology and conducts analyses of the RAM aspects of materiel systems. AMSAA serves as the DARCOM lead activity for survivability and conducts survivability analyses of materiel systems. AMSAA also maintains direct contact with Army materiel users in the field to ascertain requirements for improvement of fielded materiel, to evaluate these requirements, and to seek timely solutions through application of current and emerging technology. AMSAA is located at Aberdeen Proving Ground, MD. Project M541 accounts for approximately 60% of AMSAA funding. It represents level-of-effort funding and 80% of the funds are used for

employee salaries. Problems addressed are in response to requests from a number of sources to include: Office Secretary of Defense, Headquarters Department of Army, Headquarters DARCOM and its subordinate commands, and other Department of Army agencies.

F. RELATED ACTIVITIES: AMSAA coordinates closely with DARCOM project managers and commodity managers to avoid duplication of effort and to take full advantage of information already available. A portion of AMSAA effort is for the other services or for tri-service activities sponsored by the Joint Logistics Commanders. The Office of the Under Secretary of Defense for Research and Engineering monitors AMSAA efforts to avoid duplication with other service efforts. AMSAA is the Army executive agent for the Joint Technical Coordinating Group for Munitions Effectiveness (JTCG/ME) which has the responsibility for managing the technical and fiscal aspects of the JTCG/ME program for the Steering Committee in coordination with Headquarters DARCOM as well as the military services. This involves systems analysis as well as testing in an effort to determine the effectiveness and performance of the operational weapons/munitions systems of all military services. JTCG/ME is financed by Project D620, DOD Munitions Effectiveness, which is in the new Program Element 6.58.05.A, DOD Munitions Effectiveness and Explosives Safety Standards, and was in Program Element 6.57.02.A, Support of Development Testing, prior to FY 1979. AMSAA also designs development tests to support decisions with respect to acquisition of major materiel systems and provides independent evaluations of the worth of these systems; this effort being financed by project D026, Test Design and Evaluation AMSAA, in PE 6.57.02.A. For FY 1978, Project M985, Concepts Evaluation of Materiel, was transferred from this PE to PE 6.57.07.A as part of a consolidation of US Army Training and Doctrine Command projects in support of user testing. Project M857, Explosives Safety Standards, was transferred to this PE from PE 6.57.02.A, Testing, for FY 1978, and is transferred to PE 6.58.05.A, DOD Munitions Effectiveness and Explosives Safety Standards, for FY 1979.

G. WORK PERFORMED BY: Approximately 5% of the effort is conducted under contract for AMSAA to support requirements where in-house expertise is not available, the rest being performed in-house by AMSAA personnel. Potential contractors cannot be identified at this time. No contracts will exceed one-half million dollars.

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: Recommended design changes to the M60A1E3 series tanks in support of the Project Manager. Determined the susceptibility of the Advanced Attack Helicopter (AAH) to attack by artillery and a methodology for assessing logistics. Studies of useful life of the 2½ ton truck indicated that optimum replacement life is 15 years as contrasted with the existing 12 year replacement life policy. This represented a potential cost savings of $100 million. HAWK Missile Battery Survivability, feasibility of employing anti-aircraft weapons for nuclear site defense, relative performance of 8" lightweight gun and 5" guns on Navy ships, tank armament, artillery-delivered mines and aircraft-delivered mines were evaluated. Other efforts included analyses of the impact of mobility and agility in combat; defense against high performance, maneuvering airborne targets; and use of a ballistic blanket for protection of antitank missile crew on M113. Major contributions were made in the area of smoke and its influence on the battlefield.

Program Element: #6.57.06.A
DoD Mission Area: #610 - Technical Integration

Title: Materiel Systems Analysis
Budget Activity: #6 - Programwide Management and Support

2. FY 1978 Program: Continue support of Army special studies and international panels relative to weapon effectiveness and requirements for interoperability. Operating and support cost methodologies will be developed to permit long term cost estimates to be made for systems. Improve methodology for evaluation of mixes of sensor systems and assess the military worth of counter-surveillance materiel and methods. Perform effectiveness analyses of Advanced Attack Helicopter weaponization and scout helicopter candidates. Analyze effectiveness of air defense systems in electronic/infrared countermeasures and adverse weather environments. Examine alternative designs of equipment in varying tactical employments. Continue analysis of combat service support survivability after initial enemy strikes. Analyze survivability of the STINGER, ROLAND and PATRIOT air defense missile systems. Analyze survivability of aircraft (AAH, AH-1 Series) attacked by high energy laser weapons. Emphasize applications of new technology to fielded equipment, provide guidance to developers of new equipment and assist in the formulation of all new requirements documents. Investigate workloads and test machine characteristics in order to recommend the mix of automatic test equipment best suited for direct support, general support, and depot shops. Improved feedback from the field of operational and support data will be emphasized to guide engineers and developers toward weapon systems with increased readiness potential. Expand emphasis from finding specific "fixes" of equipment and enhancing user satisfaction to include the broader goal of improving materiel readiness. Review advantages of proposed DRAGON anti-tank missile product improvements and various follow-on concepts, assist Supreme Headquarters Allied Powers, Europe task force regarding improvement of NATO anti-tank posture, and determine best alternative for NATO in a limited visibility battlefield environment. Design a test of close air support effectiveness in an electronic warfare environment. Complete evaluations pertaining to weapon systems such as VIPER, ROLAND, PATRIOT and VULCAN. AMSAA depends substantially on customer funding in FY 1978 because funding is 30% below the FY 1976 level in constant dollars.

3. FY 1979 Planned Program: Continued analysis and evaluation will be required for the general families of items such as helicopters, small arms, tank-antitank weapons, missiles, and communications equipment. Many of these will be carried over from the previous fiscal year since the developments evolve over a number of years. Tasks will include analyses of night operations, survivability, fire power, mine emplacement concepts, artillery optimization, utilization of missiles and various anti-armor techniques. Emphasis will be placed on reviewing major systems and alternatives and tradeoffs that might be considered in order to lower the cost of materiel procurement and system operations and support. There will also be emphasis on maximizing survivability, reliability, availability and maintainability of developed items. Specific projects include COPPERHEAD cannon-launched guided projectile, Digital Message Device, Ground Emplaced Mine Scattering System and Modulear Pack Mining System. Funding is increased 11% compared to FY 1978 funding to reduce AMSAA dependence on customer funds and to provide for cost growth due to inflation.

4. FY 1980 Planned Program: Continue independent systems analyses and cost-effectiveness evaluations of important developmental materiel systems with emphases in the same general areas as in FY 1979. Specific tasks will correspond with the status of important materiel acquisitions.

5. Program to Completion: This is a continuing program.

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.57.07.A

Title: Support User Test, US Army Training and Doctrine Command (TRADOC)

DoD Mission Area: #621 - Major Ranges and Test Facilities

Budget Activity: #6 - Programwide Management and Support

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	17300	14000	19991	22254	Continuing	Not Applicable
DV02	Test Boards	8072	8815	10080	10054	Continuing	Not Applicable
DV03	Initial Operational Test & Evaluation (IOTE)	3249	2761	4476	4000	Continuing	Not Applicable
M985	Concepts Evaluation of Materiel	1600	936	2000	2200	Continuing	Not Applicable
D986	Support Equipment	4379	1488	3435	6000	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The objective of this program is to conduct the operational test and evaluation of Army systems under development to support decisionmaking related to materiel acquisition programs. It consists of four projects: DV02, Test Boards, provides for the recurring costs of operating the TRADOC Test Boards; DV03, Initial Operational Test and Evaluation (IOTE), provides for the direct costs of operational tests of nonmajor developmental materiel prior to production; M985, Concepts Evaluation of Materiel, provides an economical test vehicle via quick reaction testing of materiel to determine Army needs; D986, Support Equipment, develops instrumentation for the seven TRADOC Test Boards, Combat Developments Experimentation Command (CDEC), and TRADOC Combined Arms Test Activity (TCATA).

C. BASIS FOR FY 1979 RDTE REQUEST: Requested funds provide for operational testing on assigned systems and for development of instrumentation, targets and simulators to enable efficient and effective operational testing.

D. OTHER APPROPRIATION FUNDS: Not Applicable.

E. DETAILED BACKGROUND AND DESCRIPTION: In FY 1977 and prior years, this program included project D952, TRADOC Combined Arms Test Activity, formerly Modern Army Selected Systems Test, Evaluation and Review (MASSTER), which provided for the development of instrumentation in support of user testing by TCATA. Project D952 was merged into Project D986, Support Equipment, starting in FY 1978. Project M985, Concepts Evaluation of Materiel, provides US Army Training and Doctrine Command commanders with a quick, simple process for resolving and solidifying combat development and training development thinking pertinent to potential new materiel requirements or improvements. This has proven far more cost effective than resolving such issues later in the materiel development cycle. Project D986, Support Equipment, provides for the development of instrumentation in support of user

testing by TRADOC. This project also provides for development of threat weapon simulators, tank targets and other targets used to establish a realistic environment for user testing. User testing is conducted primarily at the Test Boards, TRADOC Combined Arms Test Activity (TCATA) and the Combat Developments Experimentation Command (CDEC).

F. RELATED ACTIVITIES: The Army Staff directs close and continuous coordination between TRADOC agencies responsible for test and use of materiel items, development test activities, materiel developing agencies, and the US Army Operational Test and Evaluation Agency (OTEA) to insure greatest possible effectiveness of Army testing activities and to avoid duplication of instrumentation development efforts. The Office of the Under Secretary of Defense for Research and Engineering (OUSDRE) reviews planned testing and developments of support equipment to insure integration of testing by the Services, and to avoid duplicate developments of instrumentation. Threat simulator requirements are coordinated with the other Services through a USDRE-Chartered tri-Service committee. Full time liaison personnel are assigned by each of the Services to appropriate test activity headquarters of other Services. High level centralized management of resources for user testing is provided by the Test Schedule and Review Committee, whose principal product is the Army Five Year Test Program. The Five Year Test Program represents the Army's plan for Initial Operational Test and Evaluation (IOTE) of all materiel items and for testing in support of force development for the following five years. Its execution is supervised by US Army Operational Test and Evaluation Agency (OTEA). Operational tests of the acceptability of major and selected nonmajor developmental materiel items are conducted by OTEA under Program Element (PE) 6.57.12.A, Support User Test, OTEA. Project DV02, Test Boards, and project M985, Concepts Evaluation of Materiel, were transferred into this program from PE 6.57.02.A, Support Development Testing, and PE 6.57.06.A, Materiel Systems Analysis, respectively. The purpose for the transfer was to consolidate, into one PE, TRADOC RDTE activities in support of user testing. Operational testing activities formerly conducted by the US Army Security Agency using part of the funding in PE 6.57.01.A, Communications - Electronics Testing Activities, are funded under this program starting in FY 1979.

G. WORK PERFORMED BY: Initial Operational Test and Evaluation (IOTE) is primarily conducted in-house assisted by available local troop support. Instrumentation development is primarily contract effort. Contractors include: TRACOR, Inc., Austin, TX; General Dynamics Corp., San Diego, CA; General Electric, Syracuse, NY; International Laser Systems, Orlando, FL; and MILGO, Inc., Miami, FL. Some instrumentation development is performed in-house by Harry Diamond Labs, Adelphi, MD; Naval Postgraduate School, Monterey, CA; and the US Army Missile Research and Development Command, Redstone Arsenal, AL. Most Concepts Evaluation of Materiel efforts are small contracts to procure available materiel items; the remainder is for in-house support of the tests of these items. US Army Training and Doctrine Command Combined Arms Test Activity, Combat Developments Experimentation Command, and the Test Boards are staffed by military and civilian personnel.

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: A major effort was begun in FY 1973 to upgrade instrumentation at the Combat Developments Experimentation Center (CDEC) and TRADOC Combined Arms Test Activity (TCATA) (formerly Modern Army Selected Systems Test, Evaluation and Review (MASSTER)). Main emphasis was on development of integrated field instrumentation including central test

data processing, automatic data collection, (moving) target position location and weapons engagement scoring. Development was also begun of targets for a live firing range and of a family of threat weapon simulators. The mission of the Test Boards was revised and the Boards were transferred from US Army Test and Evaluation Command (TECOM) to TRADOC starting in FY 1976 in order to provide clearer separation of development testing and operational testing, and to provide the operational tester with unqualified independence of the developing agency. Starting in FY 1977, instrumentation was also developed (under project D986, Support Equipment) for the Test Boards with the aim of rebuilding and reorienting their instrumentation toward efficient and effective conduct of operational testing of developmental systems. RDTE funding was initiated in FY 1977 for conduct of Initial Operational Test and Evaluation (IOTE) by TRADOC. Sixty-two IOTEs were conducted prior to FY 1977 and funded by Operations and Maintenance, Army. TRADOC Concepts Evaluations were initiated in FY 1975; examples are helicopter night operations, airborne infantry survivability (e.g., free-fall parachute goggles), remotely piloted vehicles, mini-jammers, small-scale computers, laser alarms, hostile aircraft identification, camouflage for self-propelled artillery and early-warning communications. These efforts proved highly useful in resolving issues related to new or improved materiel system concepts.

2. FY 1978 Program: TRADOC is conducting a total of about 75 operational tests, to include: Tank Thermal Sight, Advanced Radar Warning Receiver, Battery Computer System, Laser Rifle Marksmanship Trainer, Multiple Target Electronic Warfare System (Rotary Wing), and Multiple Integrated Laser Engagement System.

3. FY 1979 Planned Program: Nearly 100 operational tests are planned for FY 1979 to include nine at the newly formed US Army Intelligence and Security Test Board. Examples of systems to be tested are Remotely Monitored Battlefield Sensor System and Automatic Ground Transportable Emitter Locater Identification System. Funds are increased substantially over FY 1978 to permit carrying out tests of developmental materiel scheduled for FY 1979 in accordance with developmental program schedules and the Department of the Army Five Year Test Program. These include tests slipped from FY 1978, due to austere FY 1978 funding, and tests of signal intelligence, electronic warfare and fixed-site communications equipment, funding for which was not formerly provided by this project. The level of effort in FY 1979 is approximately the same as the FY 1977 level of effort, additional funds being provided for the new TRADOC mission to test signal intelligence/electronic warfare equipment and for cost growth due to inflation. Instrumentation, targets, and simulators essential to effective operational testing of materiel systems in a realistic environment, to include threat, will be developed. This includes the Advanced Direct Fire Weapon Simulator at the Armor and Engineer Board, Range Scoring System at the Field Artillery Board, and the Remote Control Evasive Target System at the Infantry Board.

4. FY 1980 Planned Program: Continue to support operational testing by TRADOC. Examples of tests scheduled include: XM1 Unit Conduct of Fire Trainer and LEFOX GREY and CEFIRE TIGER electronic warfare systems. Several significant instrumentation developments will be completed, to include: Surface-to-Air Missile Scoring System at the TRADOC Combined Arms Test Activity (TCATA) and the Indirect Fire Projectile Impact Location System at the Infantry Board.

5. Program to Completion: This is a continuing program.

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #DV02 Title: Test Boards

Program Element: #6.57.07.A Title: Support User Test, US Army Training and Doctrine Command (TRADOC)

DoD Mission Area: #621 - Major Ranges and Test Facilities Budget Activity: #6 - Programwide Management and Support

A. DETAILED BACKGROUND AND DESCRIPTION: Prior to FY 1976, the fixed and recurring costs incurred by six test activities of the US Army Test and Evaluation Command (TECOM), were financed by project D618, now Aircraft Development Test Activity, under Program Element (PE) 6.57.02.A, now Support of Development Testing. These six test activities, or test boards, performed testing of developmental Army materiel prior to commitment to production with emphasis on service tests (i.e., on the soldier-materiel interface). Increased emphasis on independent operational testing led to a decision by the Army to transfer the boards to the US Army Training and Doctrine Command (TRADOC). The transfer is intended to provide the test agency with unqualified independence from the Army materiel developing agency. The transfer is also intended to provide clearer separation of development testing and operational testing. The term "operational testing" is now used to distinguish those tests of materiel conducted under conditions as close as possible to those encountered in actual field use with troops representative of those trained to employ the materiel. Operational testing is usually conducted by a test agency independent of the materiel developing agency. The term "development testing" is now used to distinguish tests of the acceptability of developmental materiel other than operational tests, prior to commitment to production. Development tests emphasize the measurement of technical performance, safety, reliability, and maintainability characteristics. Starting in FY 1976, the operational tests of developmental materiel by the TRADOC test boards are financed by this project, DV02. The Aviation Test Board, Fort Rucker, AL, was formed by TRADOC in Fall 1976 to conduct operational testing of aviation systems. Formerly, such testing was performed by a TECOM test activity, now called Aircraft Development Test Activity, funded by project D618 in PE 6.57.02.A, Support of Development Testing. Starting in FY 1979, a new Intelligence and Security Test Board, Fort Huachuca, AZ, is funded under this project to conduct operational testing of signal intelligence and electronic warfare equipment. In FY 1977 and prior years, such testing was performed by the US Army Security Agency Test and Evaluation Center. In FY 1978 and prior years, such testing was financed under PE 6.57.01.A, Communications-Electronics Testing Activities. There are now a total of seven TRADOC test boards. The other five are: US Army Airborne and Communications-Electronics Board, Fort Bragg, North Carolina; US Army Air Defense Board, Fort Bliss, Texas; US Army Armor and Engineer Board, Fort Knox, Kentucky; US Army Artillery Board, Fort Sill, Oklahoma; and US Army Infantry Board, Fort Benning, Georgia. Each board relies upon Temporary Duty personnel during the conduct of tests. The collocated combat arms center and school is the principle source of those personnel.

B. RELATED ACTIVITIES: Close and continuous coordination exists between the test boards, TRADOC agencies responsible for use of materiel items, TECOM, materiel developing agencies, and the US Army Operational Test and Evaluation Agency (OTEA) to insure optimum effectiveness of Army test activities. High level centralized management of resources for user testing is provided by the Test Schedule and Review Committee, whose principal product is the Army Five Year Test Program, the Army's plan for operational testing of all materiel items and for testing in support of force development for the following five years. OTEA supervises execution of the Five Year Test Program, which includes most of the test boards' programs. The Office of the Under Secretary of Defense for Research and Engineering reviews management, operation and maintenance of all Department of Defense test facilities

and planned testing to avoid unnecessary duplication of efforts/facilities to insure that highest priority capabilities are established expeditiously and suitably maintained, and to insure integration of testing by the Services. In addition to the operational testing activities funded by this project, TRADOC Test Boards also conduct force development testing and experimentation (FDTE) funded by the Operations and Maintenance, Army appropriation and conduct other tests in support of elements of TRADOC and other Army commands financed by the customer. FDTE is conducted to permit evaluation of new concepts of tactics, doctrine, organization and training. Two other activities also support user testing, the TRADOC Combined Army Test Activity (TCATA) (formerly Modern Army Selected Systems Test, Evaluation and Review (MASSTER)) and the Combat Developments Experimentation Center (CDEC). Operational tests of the acceptability of major and selected nonmajor developmental materiel are conducted by the US Army Operational Test and Evaluation Agency (OTEA) with funding provided under PE 6.57.12.A Support User Test, OTEA. In those instances when the test boards support OTEA operational tests, costs directly attributable to conduct of the tests are reimbursed by OTEA. Similarly, the direct costs of tests in support of TRADOC operational tests are reimbursed from project DV03, Initial Operational Test and Evaluation, under this program element, PE 6.57.07.A.

C. WORK PERFORMED BY: Testing is performed by in-house personnel (primarily from the collocated combat arms center and school). The salaries of civilian personnel assigned to the test boards are paid primarily from this project. A minor portion of project funds are spent for numerous small contracts for services such as machine rentals and maintenance, and for equipment and supplies attributable to support of operational tests of developmental materiel, but not identifiable with an individual test.

D. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: In FY 1975 and prior years, the Test Boards were under US Army Test and Evaluation Command (TECOM) and conducted engineering and service tests of Army developmental materiel. Funding was provided by project D618, Aircraft Development Test Activity, PE 6.57.02.A, Support of Development Testing. At the start of FY 1976, five boards were transferred from US Army Test and Evaluation Command (TECOM) to TRADOC. These boards conducted operational tests and evaluations as planned in the Five Year Test Program. At the start of FY 1977, a sixth board was formed by TRADOC, the Aviation Test Board, to assume responsibility for operational testing of aviation systems formerly performed by a TECOM test activity, now called the Aircraft Development Test Activity (project D618, Aircraft Development Test Activity, in PE 6.57.02.A, Support of Development Testing). At the end of FY 1977, a seventh board, the Intelligence and Security Test Board, was established to assume responsibility for operational testing of signal intelligence and electronic warfare equipment formerly performed by the US Army Test and Evaluation Center, as part of activities funded under PE 6.57.01.A, Communications-Electronics Testing Activities. Funding for this seventh board will be provided under PE 6.57.07.A starting in FY 1979.

Project: #DV02 Title: Test Boards

Program Element: #6.57.07.A Title: Support User Test, US Army Training and Doctrine Command (TRADOC)

DoD Mission Area: #621 - Major Ranges and Test Facilities Budget Activity: #6 - Programwide Management and Support

2. FY 1978 Program: TRADOC is conducting Initial Operational Test and Evaluation (IOTE) on about 75 materiel items. These include tests of: Tank Thermal Sight, Advanced Radar Warning Receiver, Battery Computer System, Laser Rifle Marksmanship Trainer, Multiple Target Electronic Warfare System (Rotary Wing), and Multiple Integrated Laser Engagement System. TRADOC will also assume responsibility for testing certain communications equipment (fixed site) formerly the responsibility of the US Army Communications Command.

3. FY 1979 Planned Program: Items planned for test and evaluation include: Remotely Monitored Battlefield Sensor System and Automatic Ground Transportable Emitter Locator Identification System.

4. FY 1980 Planned Program: This project will continue to provide for the operation of the TRADOC test boards.

5. Program to Completion: This is a continuing program.

6. Major Milestones: Not Applicable.

7. Resources ($ in thousands):

	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
RDTE,A	8072	8815	10080	10054	Continuing	Not Applicable

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.57.09.A
Title: Exploitation of Foreign Items
DoD Mission Area: #630 - International Cooperative R&D
Budget Activity: #6 - Programwide Management and Support

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	2502	945	1500	1500	Continuing	Not Applicable
D650	Exploitation of Foreign Items	2502	945	1500	1500	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This is a continuing program covering acquisition and evaluation of foreign materiel in support of RDTE projects, threat analysis, and technology exploitation. Results of the evaluation of foreign state-of-the-art provides independent analysis and test of foreign weapons, either in late stages of development or deployed. The program pursues the exploitation of foreign military and civilian technology in support of RDTE projects and threat analysis. Program title has been changed from Evaluation of Foreign Components to Exploitation of Foreign Items.

C. BASIS FOR FY 1979 RDTE REQUEST: _

D. OTHER APPROPRIATION FUNDS: Not Applicable.

E. DETAILED BACKGROUND AND DESCRIPTION: Evaluation and exploitation of foreign materiel is conducted to determine the state-of-the-art of foreign technology in support of exploratory research, advanced and engineering development and long range threat analysis. The Army must be prepared to exploit or defeat foreign materiel through a thorough knowledge of their capabilities characteristics and vulnerabilities. The program provides for exploitation of foreign weapons development. All

evaluation efforts are based on stated or perceived requirements of Army RDTE, intelligence forecast, force development or other requirements as appropriate. Results of evaluation are published in reports and disseminated to all interested parties throughout the Department of Defense.

F. RELATED ACTIVITIES: Scientific and technical information requests from intelligence production activities, and the development of operational testing of US hardware are related to evaluation efforts under this program. Simulation of Soviet air defense systems for threat data funded under other procurement appropriation, i.e., special equipment for user test. Exploitation evaluation is coordinated with Defense Intelligence Agency, all Services, and other interested agencies. Program Element 6.57.14.A Foreign Weapons Evaluation project evaluates firing materiel for possible US adoption to enhance NATO Standardization.

G. WORK PERFORMED BY: The actual evaluation of materiel is normally assigned to the commodity command or separete laboratory within the US Army Materiel Development and Readiness Command having developmental responsibility for counterpart US materiel. Other resources are tasked in a support role depending upon evaluation requirements and area of expertise. In the case of bi- or tri-Service evaluation, where the Army acts as the Executive Agency, the Army is responsible for implementing the evaluation to insure that the objectives and requirements of all Services and agencies are satisfied. The US Army Foreign Science and Technology Center, Charlottesville, Virginia has overall management responsibility for Project D650, Evaluation of Foreign Components.

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments:

Foreign weapons evaluation (NATO standardization) project was initiated in FY 1977. Seven systems were initially evaluated with one standardization project. Of the seven systems the Federal Republic of Germany (FRG) 10 ton M.A.N. truck and the Swedish BV 202/BV 206 oversnow vehicles have entered evaluation. The lease agreements have been negotiated with delivery of the vehicles beginning in CY 1978. A standardization agreement, STANAG 4113, for standardization of NATO crusher gages was ratified and implemented during FY 1977. The trials were conducted

in Meppen, Germany with the results scheduled for release early CY 1978. The trial will permit exchange of cannon pressure test results without major retest. An initial feasibility test on the UK-L16A2 mortar system was completed. As a result of this test further Developmental and Operational testing is planned in support of follow-on procurement.

2. FY 1978 Program: Exploitation of foreign materiel technology will continue.

3. FY 1979 Planned Program: Exploitation of foreign materiel technology will continue. Funding has been increased to support exploitation of the Soviet missile systems. Foreign Weapons Evaluation Project (D655) was moved to a separate program element PE 6.57.14.A.

4. FY 1980 Planned Program: Testing and evaluation of foreign weapon systems and components will continue. The exact quantities cannot be determined since the funding level in FY 1978 was reduced 50%, causing evaluation to be extended into another fiscal year. The FY 1980 program will be flexible so that as foreign weapons become available they will be exploited, tested, and evaluated in a timely manner. The program offers a high pay off for the dollar and it is planned to be expanded in FY 1980.

5. Program to Completion: This is a continuing program.

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.57.12 A

Title: Support User Test, US Army Operational Test & Evaluation Agency (OTEA)

DoD Mission Area: #621 - Major Ranges and Test Facilities

Budget Activity: #6 - Programwide Management and Support

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	6890	7501	7200	7755	Continuing	Not Applicable
MN01	US Army Operational Test & Evaluation Agency (OTEA) Support Equipment	650	0	0	455	Continuing	Not Applicable
M001	Initial Operational Test and Evaluation	6240	7501	7200	7300	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The objective of this program is to conduct Initial Operational Test and Evaluation (IOTE) of major and selected nonmajor materiel systems. (IOTE) refers to test and evaluation of the operational effectiveness and suitability of developmental materiel, conducted under conditions as close as possible to those encountered in actual field use with troops representative of those trained to employ the materiel, to assist in making important program decisions prior to commitment to production. Special mobile instrumentation and targets are developed under this program when required to permit conducting tests at sites that have advantages such as special terrain but that are not instrumented.

C. BASIS FOR FY 1979 RDTE REQUEST: Requested funds provide for conducting test and evaluation of the operational effectiveness and suitability of 18 major and selected nonmajor developmental/systems, such as PATRIOT air defense missile system, new Army main battle tank and improved light antitank/assault weapon.

D. OTHER APPROPRIATION FUNDS: Not Applicable.

E. DETAILED BACKGROUND AND DESCRIPTION: This program consists of two projects. Project M001, Initial Operational Test and Evaluation (IOTE), provides for the conduct of Initial Operational Test and Evaluation (IOTE) of selected major and nonmajor

Program Element: #6.57.12.A Title: Support User Test, US Army Operational Test & Evaluation Agency (OTEA)

DoD Mission Area: #621 - Major Ranges and Test Facilities Budget Activity: #6 - Programwide Management and Support

materiel systems. US Army Operational Test & Evaluation Agency (OTEA) actively participates in the conduct of tests and provides independent evaluations of a prospective system's military utility, operational effectiveness and suitability directly to the appropriate decision review. Project MN01, OTEA Support Equipment, provides for special mobile instrumentation and targets to support IOTE at locations other than instrumented ranges. This permits taking advantage of sites with special test terrain and operational environment, thus providing a more realistic test, and avoiding potential test delays at heavily scheduled permanent sites.

F. RELATED ACTIVITIES: Close and continuous coordination exists between the US Army Operational Test and Evaluation Agency (OTEA), development test activities, materiel developing agencies, and the US Army Training and Doctrine Command (TRADOC) agencies responsible for test and use of related materiel items, to insure optimum effectiveness of Army testing activities, and to avoid duplication of instrumentation development efforts. The Office of the Under Secretary of Defense for Research and Engineering (Test and Evaluation) reviews planned testing and developments of support equipment to insure integration of testing by the Services and to avoid duplication of instrumentation developments. Full time liaison personnel are assigned by each of the Services to appropriate test activity headquarters of the other Services. OTEA supervises the Army's Five Year Test Program which includes Initial Operational Test and Evaluation (IOTE) and Force Development Testing and Experimentation (FDTE) programs. IOTEs of most nonmajor developmental materiel items are conducted by TRADOC with funding provided under project DV03 in PE 6.57.07.A, Support User Test TRADOC. The fixed and recurring costs incurred in connection with IOTE by the TRADOC Test Boards are financed by project DV02, in PE 6.57.07.A. When the test boards or other test agencies support OTEA in the conduct of IOTE, direct test costs are reimbursed by OTEA with project M001 funds.

G. WORK PERFORMED BY: Primarily the work is performed by in-house personnel (civilian and military) assigned to OTEA and by personnel (civilian and military) assigned to the various Army installations where each test is conducted.

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: RDTE funding was initiated in FY 1976. The 19 tests performed in FY 1975 and prior years were financed by Operations and Maintenance Army (OMA) in accordance with Department of Defense funding practice at that time. Twenty-eight operational tests were conducted in FY 1976 and FY 1977 on such systems as the new Army main battle tank, lightweight company mortar system, mechanized infantry combat vehicle, utility tactical transport aircraft system, lightweight artillery systems, advanced attack helicopter, artillery locating radar, and air defense command and control systems.

Program Element: #6.57.12.A Title: Support User Test, US Army Operational Test & Evaluation Agency (OTEA)

DoD Mission Area: #621 - Major Ranges and Test Facilities Budget Activity: #6 - Programwide Management and Support

2. FY 1978 Program: US Army Operational Test & Evaluation Agency (OTEA) will participate in a total of 20 operational tests on such systems as NAVSTAR global positioning system, improved light antitank/assault weapon, cannon launched guided projectiles, new Army main battle tank, all-weather missile system, and family of military engineer construction equipment.

3. FY 1979 Planned Program: OTEA will participate in 18 operational tests on major and selected nonmajor developmental systems, to include PATRIOT air defense missile system, fighting vehicle system, automatic communications central office, general support rocket system, VIPER light antitank/assault weapon, squad automatic weapon, new Army main battle tank, COPPERHEAD cannon-launched guided projectile, heliborne laser guided missile, NAVSTAR global positioning system Army user equipment, automatic secure voice communications, and Defense Satellite Communications System.

4. FY 1980 Planned Program: OTEA will participate in a total of 19 operational tests on such systems as the tactical operations systems, division air defense gun, position locating and recording system, NAVSTAR global positioning system, remotely piloted vehicle, Army multipurpose missile system, cannon launched guided projectile, new Army main battle tank, and the family of military engineer construction equipment. Acquisition will be initiated of mobile combined arms test instrumentation; mobile position location, range timing and event recording system; artillery point-of-aim measurement system; and an impact determination system for simultaneous arrival of projectiles. These are required for tests of tanks, laser guided heliborne missile, artillery and mortars.

5. Program to Completion: This is a continuing program.

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #M001
Title: Initial Operational Test and Evaluation (IOTE)

Program Element: #6.57.12.A
Title: Support User Test, US Army Operational Test & Evaluation Agency (OTEA)

DoD Mission Area: #621 - Major Ranges and Test Facilities
Budget Activity: #6 - Programwide Management and Support

A. DETAILED BACKGROUND AND DESCRIPTION: This project provides for the conduct of Initial Operational Test and Evaluation (IOTE) by the US Army Operational Test and Evaluation Agency (OTEA). IOTE refers to tests of the acceptability of development materiel that are conducted under conditions similar to those encountered in actual field use with troops representative of those trained to employ the materiel, and that provide information to assist in making important decisions regarding the development program prior to commitment to production. OTEA plans and actively participates in the conduct of IOTE of major and selected nonmajor materiel systems. OTEA prepares an independent evaluation of a prospective system's military utility, operational effectiveness and suitability, and provides this evaluation to the appropriate materiel acquisition decision authority.

B. RELATED ACTIVITIES: Close and continuous coordination exists between OTEA, development test activities, materiel developing agencies, and the US Army Training and Doctrine Command (TRADOC) agencies responsible for test and use of related materiel items, to insure optimum effectiveness of Army testing activities. OTEA supervises the Army's Five Year Test Program which includes IOTE programs. IOTE of most nonmajor developmental materiel items are conducted by TRADOC with funding provided under Program Element (PE) 6.57.07.A, Support of User Testing, TRADOC. When test agencies support OTEA in the conduct of IOTE, costs incurred are reimbursed by OTEA with project M001 funds. The Office of the Under Secretary of Defense for Research and Engineering reviews planned testing to insure integration of testing by the Services. Full time liaison personnel are assigned by each of the Services to appropriate test activity headquarters of the other Services.

C. WORKED PERFORMED BY: Military and civil service personnel at OTEA and by personnel assigned to the facility at which the various tests are conducted.

D. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: RDTE funding was initiated in FY 1976. The 19 tests performed in FY 1975 and prior years were funded by the Operations and Maintenance Army appropriation in accordance with Department of Defense funding practice at that time. Twenty-eight operational tests were conducted in FY 1976 and FY 1977 on such systems as the new Army main battle tank, lightweight company mortar system, mechanized infantry combat vehicle, utility tactical transport aircraft system, lightweight artillery system, advanced attack helicopter, artillery locating radar, and air defense command and control systems.

Project: #M001 — Title: Initial Operational Test and Evaluation (IOTE)

Program Element: #6.57.12.A — Title: Support User Test, US Army Operational Test & Evaluation Agency (OTEA)

DoD Mission Area: #621 - Major Ranges and Test Facilities — Budget Activity: #6 - Programwide Management and Support

2. FY 1978 Program: US Army Operational Test and Evaluation Agency (OTEA) will participate in a total of 20 operational tests on such systems as NAVSTAR global positioning system, improved light antitank/assault weapon, cannon launched guided projectile, new Army main battle tank, manportable common thermal night sight, all-weather missile system, and family of military engineer construction equipment.

3. FY 1979 Planned Program: OTEA will participate in 18 operational tests on major and selected nonmajor developmental systems, to include PATRIOT air defense missile system, fighting vehicle system, heliborne laser guided missile, automatic communications central office, general support rocket system, VIPER light antitank/assault weapon, squad automatic weapon, new Army main battle tank, COPPERHEAD cannon-launched guided projectile, NAVSTAR global positioning system Army user equipment, automatic secure voice communications, and Defense Satellite Communications System.

4. FY 1980 Planned Program: OTEA will participate in a total of 19 operational tests on such systems as the tactical operations system, division air defense gun, position locating and recording system, NAVSTAR global positioning system, remotely piloted vehicle, Army multipurpose missile system, COPPERHEAD cannon-launched guided projectile, new Army main battle tank, and the family of military engineer construction equipment.

5. Program to Completion: This is a continuing program.

6. Major Milestones: Not applicable.

7. Resources ($ in thousands):

	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Cost
RDTE,A: Funds	6240	7501	7200	7300	Continuing	Not Applicable

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.57.14.A
Title: Foreign Weapons Evaluation
DoD Mission Area: #630 - International Cooperative R&D
Budget Activity: #6 - Programwide Management and Support

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	1026	944	2700	2700	Continuing	Not Applicable
D655	Foreign Weapons Evaluation	1026	944	2700	2700	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This is a continuing program covering acquisition and evaluation of foreign materiel in support of RDTE projects, rationalization, standardization, and interoperability of weapons and equipment within NATO. Results of the evaluation of foreign weapons provide independent analysis and test of foreign weapons, either in late stages of development or deployed, to assess their ability to meet approved or generally perceived Army ground forces requirements. The program (D655) provides for the acquisition and feasibility evaluation of weapon systems within NATO and other allied nations.

C. BASIS FOR FY 1979 RDTE REQUEST: The request for $2.7 million for Project D655 will support feasibility test and evaluation of foreign weapon systems that appear to meet Army ground forces requirements. It will provide for continuing evaluation of the German 10 Ton M.A.N. truck; Sweden's BV 202/BV 206 oversnow vehicles; United Kingdom's stick propellant for artillery propellants; Germany engineer construction equipment and some thirty other items of equipment. This project supports the major research and development efforts for the Army's NATO rationalization, standardization, and interoperability initiatives.

D. OTHER APPROPRIATION FUNDS: Not Applicable.

Program Element: #6.57.14.A
DoD Mission Area: #630 - International Cooperative R&D

Title: Foreign Weapons Evaluation
Budget Activity: #6 - Programwide Management and Support

E. DETAILED BACKGROUND AND DESCRIPTION: Evaluation and assessment of the military potential of materiel from allied countries for possible adoption by the US ground forces is accomplished through a three phase feasibility evaluation. Phase I identifies possible candidates, Phase II conducts a limited feasibility evaluation of characteristics and capabilities with Phase III a follow-on evaluation determined by Phase II results. It is estimated that about 50% of the items identified in Phase I will enter Phase II. The Army must be prepared to defeat foreign materiel through a thorough knowledge of their capabilities, characteristics, and vulnerabilities. The program provides for a cooperation in the foreign weapons development arena. All evaluation efforts are based on stated or perceived requirements of Army RDTE, force development or other requirements as appropriate. Results of evaluation are published in reports and disseminated to all interested parties throughout the Department of Defense. The project was funded in Program Element 6.57.09.A Evaluation of Foreign Components in FY 1977 and FY 1978.

F. RELATED ACTIVITIES: Scientific and technical information requests from intelligence production activities, and the development of operational testing of US hardware are related to evaluation efforts under this program. Simulation of Soviet air defense systems for threat data funded under other procurement appropriation, i.e., special equipment for user test. Program Element 6.57.09.A conducts evaluation of foreign items for exploitation and threat analysis.

G. WORK PERFORMED BY: The actual evaluation of materiel is normally assigned to the commodity command or separate laboratory within the US Army Materiel Development and Readiness Command having developmental responsiblity for counterpart US materiel. Other resources are tasked in a support role depending upon evaluation requirements and area of expertise. In the case of bi- or tri-Service evaluation, where the Army acts as the Executive Agency, the Army is responsible for implementing the evaluation to insure that the objectives and requirements of all Services and agencies are satisfied. The US Army Test and Evaluation Command, Aberdeen Proving Ground, Maryland has overall management responsiblity for this program.

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: Foreign weapons evaluation (NATO standardization) project was initiated in FY 1977. Seven systems were initially evaluated with one standardization project. Of the seven systems, the Federal Republic of Germany (FRG) 10 ton M.A.N. truck and the Swedish BV 202/BV 206 oversnow vehicles have entered evaluation. The lease agreements have been negotiated with delivery of the vehicles beginning in CY 1978. A standardization agreement, STANAG 4113, for standardization of NATO crusher gages was ratified and implemented during FY 1977. The trials were conducted

in Meppen, Germany with the results scheduled for release early CY 1978. The trials will permit exchange of cannon pressure test results without major retest. An initial feasibility test on the UK-L16A2 mortar system was completed. As a result of this test further Developmental and Operational testing is planned in support of follow-on procurement.

2. FY 1978 Program: Evaluation of foreign weapon systems that will enhance standardization within NATO will continue. Emphasis will be on completion of Phase II evaluation on the FRG 10 ton M.A.N. truck and the Swedish BV 202/BV 206 oversnow vehicle. Review 18 items of equipment to determine potential for evaluation and evaluate 14 items to determine potential for meeting stated or perceived requirements.

3. FY 1979 Planned Program: Evaluation of foreign weapons that will enhance standardization within NATO will continue. Evaluation of the FRG 10 ton M.A.N. truck will be completed. An estimated 9 items identified in FY 1978 will begin evaluation. Major effort will be directed toward artillery stick propellant in an effort to achieve maximum interoperability and interchangeability of artillery propelling charges. Mine detectors, tactical wheel vehicles and construction equipment will be evaluated. The request will support a limited number of new items to be identified for future evaluation. Funding has been increased to support an expanded program for NATO standardization.

4. FY 1980 Planned Program: Testing and evaluation of foreign weapon systems and components will continue. The exact quantities cannot be determined since the funding level in FY 1978 was reduced 50%, causing evaluation to be extended into another fiscal year. The FY 1980 program will be flexible so that as foreign weapons become available they will be exploited, tested, and evaluated in a timely manner. The program offers a high pay off for the dollar and it is planned to be expanded in FY 1980.

5. Program to Completion: This is a continuing program.

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.58.01.A
Title: Programwide Activities
DoD Mission Area: #641 - Other Management Support
Budget Activity: #6 - Programwide Management and Support

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	43064	44942	46380	66931	Continuing	Not Applicable
MM88-01	Command Headquarters Support	23470	27339	33851	34668	Continuing	Not Applicable
MM88-02	General Administrative Activities	7829	8426	5203	7091	Continuing	Not Applicable
MM88-03	Special Purpose and Automatic Data Processing (ADP) Equipment	10690	8458	6571	23389	Continuing	Not Applicable
MM88-04	Minor Construction	1075	719	755	1783	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This is a continuing logistical program required to support Army Management Headquarters Activities (AMHA) and Army RDTE programs at headquarters level. Requested resources finance civilian personnel (and related costs) performing logistical functions, equipment required to support RDTE projects, and minor construction projects which cannot be identified to specific projects financed by other RDTE program elements.

C. BASIS FOR FY 1979 RDTE REQUEST: Requested program supports continuing requirements including those additional costs resulting from the realignment of US Army Materiel Development and Readiness Command (DARCOM) activities in accordance with the Army Materiel Acquisition Review Committee (AMARC) recommendations. The AMARC implementation, which realigned DARCOM major subordinate headquarters into separate R&D and Readiness Commands, resulted in funding responsibility transfers from OMA to RDTE,A appropriation and within the RDTE,A appropriation program elements. These transfers supported facility and other base operations support activities for R&D command headquarters which were previously supported by OMA or prorated to R&D projects. Increased programing reflected for this activity does not result in increased personnel or funds for the overall Army appropriation. Rather, it reflects an improved method of programing, operating, and reporting the Army's RDTE efforts.

D. OTHER APPROPRIATION FUNDS: Not Applicable.

Program Element: #6.58.01.A
DoD Mission Area: #641 - Other Management Support

Title: Programwide Activities
Budget Activity: #6 - Programwide Management and Support

E. DETAILED BACKGROUND AND DESCRIPTION: This includes four general categories: (1) Logistical support activities at or associated with Research, Development, Test and Evaluation Commands; (2) Reimbursement to other appropriations or activities for operation and maintenance of facilities and real property occupied by R&D commands; (3) Procurement of special purpose equipment, and automatic data processing equipment; and (4) minor construction projects ($75K ceiling) which are not identifiable to single R&D projects. Category (1) supports US Army Medical R&D administration; logistical support at the US Army Materiel Development and Readiness Command (DARCOM) and subordinate headquarters; support of Standardization Groups in Australia, Canada, and the United Kingdom; and indicia mail service. Category (2) reimbursements are in support of utilities and maintenance provided to DARCOM by other appropriations or activities. Category (3) includes procurement and/or leasing of equipment. Category (4) provides payment for construction contracts required by laboratories in support of R&D efforts supporting more than one project.

F. RELATED ACTIVITIES: Command headquarters perform staff management functions related to work performed by RDTE laboratory and test facilities.

G. WORK PERFORMED BY: Subordinate commands and other activities of the US Army Materiel Development and Readiness Command (DARCOM) and the US Army Medical Research and Development command.

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: Supported logistical activities associated with formulation and execution of the Army RDTE program at DARCOM subordinate headquarters and USA Medical R&D command, operation of DARCOM Test and Evaluation Command and Standardization Groups, and other related activities. Supported prorated costs for base operations (facility) support for DARCOM command headquarters and R&D Directorates in DARCOM commodity commands. Overall responsibility for this support becomes an RDTE-funded function upon establishment of separate R&D commands in accordance with AMARC recommendations. Funds were also provided for procurement of special purpose and automatic data processing equipment needed by RDTE laboratories for support of overall R&D projects (items not identifiable to specific projects). Minor construction projects (less than $75,000) associated with equipment installation and Occupational Safety and Health Act (OSHA) requirements were also supported within this program.

2. FY 1978 Program: Continue support of essential logistical support functions associated with formulation and execution of the Army RDTE program (to include base operation/facility support for R&D commands).

3. FY 1979 and FY 1980 Planned Program: Continue logistical support to RDTE programs as described. Programmed funding increases represent required resources for finalization of the AMARC realignment of DARCOM. FY 79 is the first full year of operation for the newly organized R&D commands.

4. Program of Completion: This is a continuing program.

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #MM88-01 Title: Command Headquarters Support
Program Element: #6.58.01.A Title: Programwide Activities
DoD Mission Area: #641 - Other Management Support Budget Activity: #6 - Programwide Management and Support

A. DETAILED BACKGROUND AND DESCRIPTION: Resources programed in this task are required to fund logistic functions which directly support Research, Development, Test, and Evaluation commands. These functions include both facility and administrative base operations support reimbursed to other agencies by R&D commands and support of RDTE headquarters civilian personnel not identified as AMHA (Program Element (PE) 6.58.98). These personnel perform support functions, e.g., data processing, security, legal, clerical, and finance and accounting. The Army Materiel Acquisition Review Committee (AMARC) realignment of US Army Materiel Development and Readiness Command (DARCOM) subordinate headquarters into separate R&D and readiness commands required a shift of funding between the Operation and Maintenance, Army and the RDTE appropriations and between RDTE,A program elements. These funding transfers have been accommodated within the overall Army funding availability.

B. RELATED ACTIVITIES: Logistical functions funded in this project are in direct support of Army RDTE Management Headquarters activities (see Program Element 6.58.98.A, Management Headquarters (R&D)). Headquarters funded in this project perform staff management functions for work performed by RDTE laboratories and test facilities.

C. WORK PERFORMED BY: Activities assigned to DARCOM Command Headquarters, DARCOM subordinate RDTE commands, and US Army Medical R&D Headquarters.

D. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: Provided support for logistical functions associated with DARCOM Command Headquarters, R&D directorates at DARCOM commands, US Army Medical R&D Headquarters, and operation of the US Army Test and Evaluation Command.

2. FY 1978 Program: Continue support outlined above to include additional logistical support related to the establishment of separate R&D commands at DARCOM subordinate headquarters. This separation results from the reorganization of the US Army Materiel Development and Readiness Command based on the approved recommendation of the Army Materiel Acquisition Review Committee (AMARC). The AMARC functionally organized previous DARCOM commodity commands into separate Readiness and R&D Commands.

3. FY 1979 and FY 1980 Planned Programs: Resources have been programed for realignments resulting from (1) full implementation of the AMARC recommendations and (2) base operation support for these functions directly supporting R&D Command Headquarters. Base operation support for R&D Commands was previously financed by the Operation and Maintenance, Army (OMA) Appropriaton with costs recovered by assessing appropriate RDTE projects.

4. Program to Completion: This is a continuing program necessary for logistic support of essential management functions required for the accomplishment of the RDTE,A program.

5. Major Milestones: Not Applicable.

Project: #MM88-01
Program Element: #6.58.01.A
DoD Mission Area: #641 - Other Management Support

Title: Command Headquarters Support
Title: Programwide Activities
Budget Activity: #6 - Programwide Management and Support

6. Resources ($ in thousands):

	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Cost
RDTE,A: Funds	23470	27339	33851	34668	Continuing	Not Applicable
Armament R&D Command	2091	2200	2300	2300	Continuing	Not Applicable
Aviation R&D Command	1600	2549	2594	2700	Continuing	Not Applicable
Communications R&D Command	700	1602	1622	1700	Continuing	Not Applicable
Electronics R&D Command	600	1700	1785	1800	Continuing	Not Applicable
Missile R&D Command	600	1341	1387	1400	Continuing	Not Applicable
Tank Automotive R&D Command	1100	4200	4700	4900	Continuing	Not Applicable
Test & Evaluation Command	10200	11110	12542	12841	Continuing	Not Applicable
Natick Equipment R&D Command			3091	3100	Continuing	Not Applicable
Mobility Equipment R&D Command			1094	1100	Continuing	Not Applicable
DARCOM Headquarters	500	600	709	800	Continuing	Not Applicable
Development Center Moves	4000	0	0	0	0	Not Applicable
USA Medical R&D Command	2079	2037	2027	2027	Continuing	Not Applicable

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #MM88-02 Title: General Administrative Activities
Program Element: #6.58.01.A Title: Programwide Activities
DoD Mission Area: #641 - Other Management Support Budget Activity: #6 - Programwide Management and Support

A. DETAILED BACKGROUND AND DESCRIPTION: Provides resources for operation and management of selected general administrative activities where it is not practicable to identify such costs with specific RDTE projects. Included in these activities are Army Research Office located in Durham, NC; RDTE,A Liaison Offices; Patent Office Fees; Indicia Mail Service for RDTE official mailings; Army Research Institute technical and advisory services; travel performed by the Army Scientific Advisory Panel in connection with RDTE,A missions; Operation of Standardization Groups in Australia, Canada and United Kingdom; and Productivity Enhancement Program (PEP) - a capital investment program used to finance equipment items costing less than $100,000 which are self-amortizing within two years after being placed in operation.

B. RELATED ACTIVITIES: Not Applicable.

C. WORK PERFORMED BY: Offices, panels, groups, other supporting elements outlined in paragraph A above.

D. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: Supported operation and management of research and development activities and related support functions outlined above. Also supported one-time costs associated with Harry Diamond Laboratory relocation to Adelphi, MD.

2. FY 1978 Program: Continue operation and management of research and development activities and related support functions and fixed cost programs such as Patent Office fees, the Army portion of a Tri-Service/National Aeronautics and Space Administration program on Failure Rate Data, and the penalty mail program that reimburses the US Postal Service for RDTE official mailings. Minor programed increases cover salary increases where applicable, increased costs for indicia mail service, and fluctuating dollar value for support of Overseas Standardization Groups. Also includes final costs associated with the Harry Diamond Laboratory relocation to Adelphi, MD.

3. FY 1979 and FY 1980 Planned Programs: Continue operation and management of research and development activities and related support functions, except that the Productivity Enhancement Program (PEP) has been deferred to FY 1980 pending evaluation of the self-amortizing program.

4. Program to Completion: This is a continuing program.

5. Major Milestones: Not Applicable.

Project: #MM88-02 Title: General Administrative Activities
Program Element: #6.58.01.A Title: Programwide Activities
DoD Mission Area: #641 - Other Management Support Budget Activity: #6 - Programwide Management and Support

6. Resources ($ in thousands):

	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Cost
US Army Materiel Development & Readiness Command Activities (Army Research Office, Air Mobility R&D Complex and Liaison Offices)	5326	5729	3400	4114	Continuing	Not Applicable
Army Research Institute Technical & Advisory Service (includes travel of Army Scientific Advisory Panel)	355	400	410	410	Continuing	Not Applicable
Indicia Mail Service	500	531	590	625	Continuing	Not Applicable
Overseas Standardization Groups	665	766	803	1003	Continuing	Not Applicable
Productivity Enhancement Program	983	1000	0	939	Continuing	Not Applicable
TOTAL	7829	8426	5203	7091		

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FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #MM88-03
Program Element: #6.58.01.A
DoD Mission Area: #641 - Other Management Support

Title: Special Purpose and Automatic Data Processing Equipment
Title: Programwide Activities
Budget Activity: #6 - Programwide Management and Support

A. DETAILED BACKGROUND AND DESCRIPTION: This program finances the procurement, installation, and maintenance of scientific, technical, and other laboratory equipment unique to Research and Development missions not identified to a single RDTE project. Included in this program is the acquisition of Automatic Data Processing (ADP) and Special Purpose Equipment. Resources allow replacement or modification of equipment required to maintain and perpetuate "state-of-the-art" capabilities in RDTE scientific laboratories. Prior to programing, the requirements for new equipment are evaluated against such considerations as: (1) adequacy of existing equipment; (2) cost of modernization vs replacement; (3) availability of other laboratories inventory; and, (4) essentiality of equipment to mission. Foreign "state-of-the-art" capabilities and potential threats to present and future materiel or systems are also considered. This program is the only source for acquisition of multi-purpose scientific and technical RDTE laboratory equipment which supports more than one R&D project.

B. RELATED ACTIVITIES: Not Applicable.

C. WORK PERFORMED BY: RDTE Army laboratories and facilities of the US Army Materiel Development and Readiness Command, US Army Medical Research and Development Command, and Office, Chief of Engineers.

D. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: Provided funds for special purpose and automatic data processing (ADP) equipment as outlined in paragraph A above. In addition to normal recurring type items, FY 1977 funds supported an increment of the cost of ADP equipment system at the Ballistics Research Laboratory, Aberdeen, MD.

2. FY 1978 Program: FY 1978 programing supports fixed contract type costs (to include equipment maintenance and rentals, plus final increment of the ADP installation at Ballistic Research Laboratory) and minimal amounts for emergency automatic data processing and special purpose equipment requirements.

3. FY 1979 Planned Program: Continue support for minimum essential fixed type costs and emergency replacement of special purpose and automatic data processing equipment.

4. FY 1980 Planned Program: Based on current programing, full support will be furnished for the acquisition of essential new and replacement special purpose and automatic data processing equipment, including upgrading computer systems for Office, Chief of Engineers laboratories, required for the accomplishment of the RDTE program.

5. Program to Completion: This is a continuing program.

Project: #MM88-03
Program Element: #6.58.01.A
DoD Mission Area: #641 - Other Management Support

Title: Special Purpose and Automatic Data Processing Equipment
Title: Programwide Activities
Budget Activity: #6 - Programwide Management and Support

6. Major Milestones: Not applicable.

7. Resources ($ in thousands):

	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Cost
RDTE,A: Funds	10690	8458	6571	23389	Continuing	Not Applicable
US Army Materiel Development & Readiness Command Activities	9470	6951	4299	15100	Continuing	Not Applicable
Office, Chief of Engineers R&D Activities	400	457	572	6589	Continuing	Not Applicable
US Army Medical R&D Command Activities	820	1050	1700	1700	Continuing	Not Applicable

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.58.03.A
Title: Technical Information Activities
DoD Mission Area: #610 - Technical Integration
Budget Activity: #6 - Programwide Management and Support

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	3673	3426	4559	5600	Continuing	Not Applicable
MY11	Modernized Army Research & Development Information System (MARDIS) Support	0	314	469	500	Continuing	Not Applicable
MY29	Integrated Software	230	290	300	300	Continuing	Not Applicable
M367	Automated Engineering Document Preparation System	539	660	850	500	Continuing	Not Applicable
M720	Technical Information Functional Activities	1006	706	700	900	Continuing	Not Applicable
M728	Information Technology	586	480	830	1550	Continuing	Not Applicable
M729	Symposia-Conferences	410	387	450	450	Continuing	Not Applicable
M761	Technical Information Analysis Centers	850	492	760	1200	Continuing	Not Applicable
M903	Signals Intelligence/ Electronic Warfare Technical Information	52	97	200	200	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Encompasses management and support projects for the US Army Scientific and Technical Information Program and includes research, development, test and engineering in the computer science, information science and library science fields. Planning, execution, and efficiency of the research and development program benefit through improved accuracy, availability, and accessibility of scientific, technical, and management information.

C. BASIS FOR FY 1979 RDTE REQUEST: Develop and coordinate the Army integrated computer software program. Support computer and information science applications. Support Conference and Symposia Program for technical information exchange and Junior Science Activities. Automate access to Technical Information Centers. Provide operational support for Army Technical Information Analysis Centers and for the Government/Industry Data Exchange Program. Develop a system to provide a timely and accurate data base for research and development program management. Introduce new support to research and development through digital processing of analog information such as drawings and in centralized procurement of technical information resources. Improve information transfer and preclude unnecessary expenditure of other RDTE funds by making maximum use of existing knowledge.

Program Element: #6.58.03.A
DoD Mission Area: #610 - Technical Integration

Title: Technical Information Activities
Budget Activity: #6 - Programwide Management and Support

D. OTHER APPROPRIATION FUNDS: Not applicable.

E. DETAILED BACKGROUND AND DESCRIPTION: Objective is to improve scientific, technical and related management information activities required for the support of the Army RDTE Program, to include the derivation, acquisition, analysis, interpretation, storage, retrieval, processing, forwarding, dissemination, primary and secondary publishing, and use of all classes of technical and RDTE-related management information needed by Army scientists, engineers, R&D managers, the medical department and other technical professional personnel. Another objective is to improve the relevance, accuracy, timeliness and accessibility of technical information flowing to and from the Army. This involves automatic data processing, microforms, graphic and analog information forms, information store and forward techniques, continuing information access, economics of information stores, data banks and networks.

F. RELATED ACTIVITIES: The Army participates in inputs and outputs of the Defense Documentation Center and Federal Information Managers Forums, and maintains liaison with the National Commission on Libraries and Information Science. Regular liaison with all Department of Defense (DOD) and other government technical information representatives is maintained to assure that no duplication of effort exists and that maximum transfer of information occurs.

G. WORK PERFORMED BY: Battelle Memorial Institute, Columbus, OH; Oncelcor, Incorporated, Denver, CO; Applied Data Research, Vienna, VA; Duke University, Durham, NC; Planning Research Corporation, Huntsville, AL; and Dyna Corporation, Corona, CA. In-house developing agencies include: Office, Chief of Engineers, Washington, DC; The Surgeon General, Washington, DC; US Army Computer Systems Command, Fort Belvoir, VA; US Army Materiel Development and Readiness Command, Alexandria, VA; US Army Communications Command, Fort Huachuca, AZ; and US Army Research Institute, Washington, DC.

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: The following efforts were conducted: application of holography to data storage and retrieval systems; expansion of automated medical system techniques; testing of improved procedures for Army technical libraries and information centers; utilization of microforms and remote terminals for timely processing of information required for RDTE program management; software research to develop improved techniques for multicommand data systems, including system simulation and modeling, computer system evaluation, interactive programming, and regional data processing; automated engineering document preparation and data handling systems; establishment of automated chemical information center; Conference and Symposia Program for information exchange and Junior Science and Humanities Symposia and Science Fair Programs; remote computer terminals to provide direct access to Defense Documentation Center; automated procedures for technical information analysis centers; automated inter-library reference system; and development of computer-aided selection of materiels. Seven technical information analysis centers are now established, the latest being the Cold Regions Research and Engineering Technical Information Analysis Center. An eighth center, the Nondestructive Testing Information Analysis Center, was transferred from the Army to the Defense Logistics Agency.

Program Element: #6.58.03.A Title: Technical Information Activities
DoD Mission Area: #610 - Technical Integration Budget Activity: #6 - Programwide Management and Support

2. FY 1978 Program: Continue to develop a scientific and technical information (STINFO) program for the Army, integrating individual task efforts (e.g., converting dialogue and graphic information into digital format) into total program needs. Implement completed stages of such tasks as: development of a data base for automated preparation of documentation for procurement of nonstandard parts, chemical information system and selective dissemination of information. Continue: coordination of RDTE in computer software and centralization of computer program information; conference and symposia program for technical information exchange and support for youth science information activities; support for the Government/Industry Data Exchange Program; development of specialized bibliographies and glossaries and of techniques for computer handling of materials information; providing timely, accurate, computer-generated data for RDTE program management; efforts to automate information access to technical information centers; operational support for Army Technical Information Analysis Centers and trial operation of proposed centers; and development of technical information for the specialized needs of the Army intelligence community. A new project is established to operate and maintain the Modernized Army Research and Development Information System.

3. FY 1979 Planned Program: The funding level will be increased 33% over the FY 1978 level to provide for the following high priority requirements. Resources information for all levels of research and development management will continue to be improved by automation. The new Modernized Army Research and Development Information System (MARDIS) project MY11, will provide improved support of budget formulation, scheduling and apportionment processes in RDTE through processing of resources, performance and milestones data. By FY 1979, Research and Exploratory Development currently being pursued will result in a practical system for the digital storage of drawings. The increased funding shown for project M367 is required to initiate an effort to incorporate this new technology into the Automated Engineering Document Preparation System. Technical exchange activities in projects M728, M729, M761 and M903 will be expanded over FY 1978 which will allow new thrusts to be started. These will include additional technical information analysis centers, automation of signal intelligence information and additional scientific conferences.

4. FY 1980 Planned Program: Ongoing efforts will be continued. Emphasis will be directed to tasks which logically follow tasks previously completed (e.g., library exchange of information via computers and satellites; the integration of R&D programs designed to make computer software cheaper, faster to develop and more reliable and responsive.

5. Program to Completion: This is a continuing program.

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.58.04.A

Title: Major Research and Development Test and Evaluation Facilities, US Army Materiel Development and Readiness Command (DARCOM)

DoD Mission Area: #621 - Major Ranges and Test Facilities

Budget Activity: #6 - Programwide Management and Support

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	152630	159935	166008	185141	Continuing	Not Applicable
DE90	Yuma Proving Ground	16476	15671	19421	20511	Continuing	Not Applicable
DE91	Aberdeen Proving Ground	19295	19123	18953	20044	Continuing	Not Applicable
DE92	Dugway Proving Ground	11961	12527	10721	16587	Continuing	Not Applicable
DE93	White Sands Missile Range	90144	97892	100741	108379	Continuing	Not Applicable
DE94	Army Electronic Proving Ground	8766	8623	9961	12925	Continuing	Not Applicable
DE95	Cold Regions Test Center	3650	3700	3741	3955	Continuing	Not Applicable
DE96	Tropic Test Center	2338	2399	2470	2740	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The objective of this program is to maintain a capability for development testing (DT) of materiel systems at seven major US Army Test and Evaluation Command (TECOM) activities. These activities represent the lifeblood of an efficient Army research and development program and are neglected only by mortgaging the future of the entire RDTE,A program as well as causing possible serious disruptions in critical programs. Each of the seven test activities has established capabilities uniquely required to assure technical adequacy and quality of particular types of materiel under development or procurement, such as missiles or chemical warfare equipment. Another objective of this program is to preclude proliferation of specialized testing facilities to meet individual program test and evaluation requirements. This program provides for the recurring installation operating costs and for all costs of conducting tests not identifiable with a particular weapon system project, to include modernization of instrumentation to insure that test capabilities are commensurate with the state-of-the-art systems to be tested.

C. BASIS FOR FY 1979 RDTE REQUEST: Each facility will plan, conduct, and support engineering tests, check tests and initial production tests. The types of materiel to be tested are aircraft armament systems, tube artillery, artillery munitions, vehicles, chemical warfare and biological defense, missiles, communications equipment, high energy lasers and signal intelli-

gence/electronic warfare equipment. The support provided will include improvement and modernization of instrumentation to provide a test capability compatible with new weapons technology, to shorten test time and reduce cost through automation, and to replace uneconomical-to-repair equipment.

D. OTHER APPROPRIATION FUNDS: ($ in thousands)

	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
Other Procurement, Army	2807	3315	6934	10998	Continuing	Not Applicable
Military Construction, Army	7327	34315	208	12935	Continuing	Not Applicable

E. DETAILED BACKGROUND AND DESCRIPTION: This program consists of seven separate projects, each of which provides funding for a major development testing (DT) activity operated by the US Army Test and Evaluation Command (TECOM), a subordinate command of the US Army Materiel Development and Readiness Command (DARCOM). All seven of these projects support DT required annually and do not directly support a single item or weapon system. DT is conducted to support decision making related to materiel acquisition programs by demonstrating that design risks have been minimized, that the engineering development process is complete, and that the system will meet its specification. DT includes measurement of technical performance, safety, reliability and maintainability characteristics, which can only be accomplished with instrumentation commensurate with the capabilities of the materiel to be tested. DT also includes determining that natural environmental performance requirements have been met. The seven projects provide funding to four proving grounds, White Sands Missile Range (WSMR), and the Cold Regions and Tropic Test Centers for three broad task areas: improvement and modernization of test capabilities, base operations, and other costs in support of testing not directly attributable to an individual test. The four proving grounds and White Sands Missile Range now operate under a uniform Department of Defense funding policy that requires each facility to pay for the indirect costs of testing and that requires users of these facilities to pay for direct costs of testing. At the two test centers, the program finances all costs of testing and of operating and maintaining the centers. Prior to July 1976, the Cold Regions Test Center was known as the Arctic Test Center. The Tropic Test Center, Ft. Clayton, Canal Zone, is the only humid tropic environmental test facility of the Department of Defense (DOD). TECOM has a third natural environmental test facility located on Yuma Proving Ground, that conducts desert environmental tests. If specifically designed for an extreme environment, developmental items/systems are normally tested first under temperate zone conditions and then in environmental chambers located within the continental United States.

F. RELATED ACTIVITIES: These seven test facilities plus 19 other Army, Navy and Air Force test facilities make up the Department of Defense Major Range and Test Facility Base. Two other Army facilities are included in these 19: Kwajalein Missile Range, financed by P.E. 6.53.01.A and Jefferson Proving Ground, which is not financed by the RDTE appropriation.

Program Element: #6.58.04.A

Title: Major Research and Development Test and Evaluation Facilities, US Army Materiel Development and Readiness Command (DARCOM)

DoD Mission Area: #621 - Major Ranges and Test Facilities

Budget Activity: #6 - Programwide Management and Support

This program with its emphasis on testing is related to the activities of all the other Army test facilities, the commodity commands, and other military service facilities, as well as the US Army Operational Test and Evaluation Agency. Liaison personnel are assigned to assure that appropriate coordination takes place with these closely related activities. Further, the Office of the Under Secretary of Defense for Research and Engineering reviews management, operation and maintenance of all Department of Defense test facilities and planned testing activities to avoid unnecessary duplication of capabilities, to insure that highest priority capabilities are established expeditiously and suitably maintained, and to insure integration of testing by the Services.

G. WORK PERFORMED BY: The work is primarily performed by in-house personnel (civilian and military) assigned to the US Army Test and Evaluation Command. Approximately 30 million dollars of contractor efforts will also be supported during FY 1978. Contractors include Hawthorne Aviation, Charleston, SC; Don Brown Associates Melbourne, FL; Bell Aerospace Company, Tucson, AZ; Dynalectron, Albuqueque, NM; RCA, Moorestown, NJ; Physical Sciences Laboratory, New Mexico University, Las Cruces, NM; International Sensor Systems, Aurora, NE; IBM, Owego, NY; Lockheed Engineering Services Division, Houston, TX; and Vega Enterprises, El Paso, TX. Other government agencies that are involved include: US Army Research Office, Durham, NC; US Army Corps of Engineers, Albuqurque, NM; Lexington Army Depot, Lexington, KY; US Air Force Special Weapons Test Center, Kirkland and Holloman Air Force Bases, NM; National Bureau of Standards, Washington, DC; Navajo Army Depot, Flagstaff, AZ; and US Army Forces Command, Ft McPherson, GA.

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: Testing was carried out to support decision-making on important Army developmental systems. Examples are: M48 and M60 series tanks; XM-1 Tank; Mechanized Infantry Combat Vehicle; DRAGON medium antitank assault weapon; Armored Personnel Carrier; Improved HAWK, PATRIOT, ROLAND, LANCE, STINGER, and PERSHING Missile Systems; BLACKHAWK helicopter; CH-47 helicopter Mod; attack helicopters; CHAPARRAL air defense gun; COBRA helicopter armament; 105mm, 155mm and 8" howitzers; Mortar Locating Radar; Tactical Satellite Communications; Tactical Landing System; tactical fire direction system; Family of Military Engineer Construction Equipment; Lightweight Company Mortar; Platoon Early Warning System; Radar Signal Detector; Night Vision Goggles; Laser Designator; Chemical/Biological Protection Equipment and Shelters; chemical binary projectiles; smoke projectiles; and incendiary rockets. Testing was also carried out in support of joint service tests of equipment such as Tactical Wideband Secure Equipment; and in support of other government agencies, such as: Remotely Piloted Vehicles (Air Force), Insecticide Spray System (Forest Service), migration of hazardous substances through soil (Environmental Protection Agency), and TOMAHAWK Cruise Missile (Navy). Austere funding levels in FY 1976 and prior years forced delay of modernizing and replacing equipment with the result that occasional delays in testing have been unavoidable and that capabilities of the test facilities did not keep pace with the technology of the systems to be tested. Maintenance and repair of test facilities fell drastically behind; only critical repairs dictated by safety or legal requirements could be accomplished within funding provided, creating a huge backlog of long overdue essential maintenance and repair of facilities. In FY 1977, a limited

amount of test facility instrumentation modernization was carried out. Instrumentation improvement and modernization procurements are noted in the RDTE Congressional Descriptive Summaries for each proving ground or range. A standard range timing system was procured for the Cold Regions Test Center to correlate all event and ADP data during conduct of all tests. Photographic, chemical-petroleum, and human factors laboratory equipment and instrumentation; mobile instrumentation van improvements; and field range sensors and equipment were procured for the Tropic Test Center.

2. FY 1978 Program: Scheduled workload for FY 1978 at these test and evaluation facilities exceeds their overall test capability by 35%, inherently leading to delays. FY 1978 funding is increased only slightly from FY 1977 funding so that these facilities are required to absorb part of the pay and price increases they have experienced at the expense of their basic capabilities. In order to continue the modest instrumentation modernization made possible in FY 1977, to provide instrumentation for a new high energy laser system test facility at White Sands Missile Range, and to provide for cost growth, severe economic measures will be applied to other cost areas (e.g., personnel operations, contractor support, supplies and equipment, and maintenance and repair). The objective will be to provide the Army with the essential capability to test its more important systems; however, a continued decline in capability now causes occasional delays in testing, particularly of nonmajor materiel systems. There are four main reasons for the deteriorating situation at Army test and evaluation facilities. Civilian test manpower has been reduced each year. US Army Test and Evaluation Command (TECOM) now has 1/2 the number of civilian personnel that it had in 1962 when it was established; however, test workload has actually increased because the increased complexity of items being tested requires more data to provide acceptable risks. This has been accomplished through improved efficiency and increased productivity, but the yield in these areas each year is limited. Second, instrumentation modernization has been scaled down due to austere funding levels in prior years. This prevents the establishment of required capabilities and also limits productivity increases. Third, a Congressional moratorium has been applied to using contractor personnel to supplement the Army work force in actual conduct of research and development test and evaluation activities. Fourth, the prior years austere funding levels have created a huge backlog of urgently needed essential maintenance and repair of facilities which is affecting the efficient accomplishment of testing. Developmental systems and equipment being tested and planned instrumentation improvement and modernization procurements are noted in the RDTE Congressional Descriptive Summaries for each proving ground or range. Natural cold weather and humid tropic climatic tests are being conducted on equipment such as COPPERHEAD (Cannon Launched Guided Projectile), STINGER (Shoulder-fired air defense missile), TACFIRE (Tactical fire direction system), TOW and DRAGON (Antitank Assault Weapons), Mortar Locating Radar, Ultra High Frequency Manpack Satellite Communications Ground Terminal, Hand-Held Laser Rangefinder, 155mm Howitzer, Platoon Early Warning System, Surface Launched Unit Fuel-Air Explosive, Swedish Small Unit Support Vehicle, Family of Military Engineer Construction Equipment, Ground Emplaced Mine Scattering System, Chemical Agent Detector Kit, Lightweight Company Mortar System, Gas Turbine-Driven Generator Set, Personnel Armor System, Reverse Osmosis Water Purification Unit, Collapsible Fabric POL Tank, Squad Automatic Weapon, Tactical CS Rocket, and Smoke Warhead Rocket. Procurement of a Rapid Collection and Analysis of Data System will be initiated for the Cold Regions Test Center. Fault Isolation Instrumentation will be procured for the Tropic Test Center.

Program Element: #6.58.04.A

Title: Major Research and Development Test and Evaluation Facilities, US Army Materiel Development and Readiness Command (DARCOM)

DoD Mission Area: #621 - Major Ranges and Test Facilities

Budget Activity: #6 - Programwide Management and Support

3. FY 1979 Planned Program: FY 1979 funding is increased 4% compared to FY 1978, but most of this increase is for major instrumentation improvements to establish new capabilities for testing high energy lasers at White Sands Missile Range and for the testing of tactical signal intelligence/electronic warfare equipment at Electronic Proving Ground, Ft Huachuca, AZ. Projected workload will continue to greatly exceed test capability. These facilities will be required to absorb part of the annual pay and price increases at the expense of their basic capabilities so that testing delays will continue to occur. Improvement and modernization of the seven facilities will be continued at a level slightly below the FY 1978 level and will be designed to provide test capabilities compatible with new weapons technology. Examples of planned tests and modernization activities are noted in the RDTE Congressional Descriptive Summaries for each proving ground or range. Planned natural cold weather and humid tropic environmental tests include: XM1 Tank, ROLAND air defense missile system, BLACKHAWK utility helicopter, VINSON Wide-Band Secure Voice Device, and Regenerative Repeater. Improvements will be made in vehicle and ballistic test instrumentation at the Cold Regions Test Center and in range and laboratory analysis instrumentation at the Tropic Test Center.

4. FY 1980 Planned Program: The planned program provides for expansion in improvement and modernization of test facilities and for a significant reduction in the backlog of essential maintenance and repair. These will be designed to increase productivity and permit avoidance of test delays due to breakdowns of instrumentation and capital equipment. Workload is expected to exceed test capability by about 15%, a much healthier situation than prior years. A start will be made in re-establishing adequate inventory levels of essential repair parts for instrumentation and capital equipment and of other materials and supplies. Planned natural cold weather and humid tropic environmental tests include: Infantry Fighting Vehicle, Artillery Locating Radar, Remotely Monitored Battlefield Sensor System, and Biological Agent Alarm. A major increment will be added to complete the Rapid Collection and Analysis of Data System at the Cold Regions Test Center. A mini-computer system will be procured for the Tropic Test Center to begin automation of data collection.

5. Program to Completion: This is a continuing program.

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #DE90
Program Element: #6.58.04.A
DoD Mission Area: #621 - Major Ranges and Test Facilities

Title: Yuma Proving Ground
Title: Major Research and Development Test and Evaluation Facilities, US Army Material Development and Readiness Command
Budget Activity: #6 - Programwide Management and Support

A. DETAILED BACKGROUND AND DESCRIPTION: In April 1951, Yuma Test Station was established as a Class I installation under the Commanding General, Sixth US Army. In August 1962, concurrently with establishment of the US Army Test and Evaluation Command under the US Army Materiel Command, Yuma Test Station was designated a Class II Installation under the US Army Test and Evaluation Command. It was redesignated as Yuma Proving Ground in August 1963. Yuma Proving Ground is one of 26 major ranges of the Department of Defense Major Range and Test Facility Base under Department of Defense Directive 3200.11. The assigned mission is to plan, conduct, evaluate, report on, and support developmental and other tests. Yuma Proving Ground also provides personnel to support arctic environmental tests at the US Army Cold Regions Test Center, Fort Greely, Alaska, as directed by Headquarters, US Army Test and Evaluation Command. Land area comprises more than 1 million acres with restricted airspace ranging from surface to 80,000 feet. Major facilities include a 420,000 acre artillery firing range with 21 firing positions, maximum range capability to 74,000 meters and three fully instrumented impact areas; a 420,000 acre air-to-ground and ground-to-ground fully instrumented aircraft armament range; an instrumented air delivery test area of 1,000 acres containing separate drop zones for equipment, personnel and hazardous items; and a mobility test area comprising 76,000 acres which includes gravel, hill, sand, and rock courses, test slopes of varying grades, swimming and fording facilities and a two-mile dynamometer course. Yuma Proving Ground also conducts natural desert climatic tests. This project finances the costs of operating and maintaining the proving ground and those indirect costs for testing not reimbursed by users. It has three broad task areas: procurement of instrumentation, base operations and test support.

B. RELATED ACTIVITIES: Project DE90 is one of seven projects established in FY 1975 comprising PE 6.58.04.A. Four of the projects finance costs at White Sands Missile Range, NM; Army Electronic Proving Ground, Ft. Huachuca, AZ; Dugway Proving Ground, UT; and the Materiel Testing Directorate, Aberdeen Proving Ground, MD; These four installations, Yuma Proving Ground, and 13 other test and evaluation facilities operate under a uniform policy within the Department of Defense Major Range and Test Facility Base. Under this policy, these facilities finance all indirect testing costs with the users or test proponents at these facilities paying all direct testing costs. Yuma Proving Ground is also one of three Army installations responsible for natural environmental testing. The other two, the US Army Cold Regions Test Center, Fort Greely, AK, and the US Army Tropic Test Center in the Panama Canal Zone, are funded on a level-of-effort basis with testing services provided on a non-reimbursable basis.

Project: #DE90
Program Element: #6.58.04.A
DoD Mission Area: #621 - Major Ranges and Test Facilities

Title: Yuma Proving Ground
Title: Major Research and Development Test and Evaluation Facilities, US Army Material Development and Readiness Command
Budget Activity: #6 - Programwide Management and Support

C. WORK PERFORMED BY: Work is performed by Department of Army civilian and military personnel with associated contractual support. Telecommunications services are provided by the US Army Communications Command. Navajo Army Depot, Flagstaff, AZ, provides ammunition storage support. Contractors include IBM, Owego, NY; Don Brown Associates, Melbourne, FL; and University of New Mexico, Las Cruces, NM.

D. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: Tests of equipment and systems included: Improved COBRA Armament System, Rocket Assisted Projectile, improved conventional munitions and nuclear projectiles for 8" and 155mm weapons systems, AMATEX 20 explosive filler for artillery projectiles, desert tests of M60A1E3 tank and M88 recovery vehicle, tire retread program, personnel, equipment and supply drop systems for Army and Air Force, acceptance testing of 105mm tank cartridges and components, M113A1 Armored Personnel Carrier, 105mm Howitzer XM204, 155mm Howitzer XM198, 8" Howitzer M110A1, families of helicopter external slings and cargo carrying devices, upgraded 2.75" rocket system, Aircraft Mine Dispensing Subsystem-M56, Range Measurement System/Simulated Combat Operations Range Equipment Evaluation, anti-tank mines, and Laser Designator AN/PAQ-1. Yuma Proving Ground has developed a highly sophisticated range capability with real-time multi-target space position capability. Such instrumentation as precision laser trackers, graphic display network, multi-target trilateration position locating system, telemetry data processing, radar and optical tracking, high frequency data recording and video scoring all integrated into a computer controlled newwork, gives Yuma Proving Ground a unique capability for testing Army aircraft and artillery weapons.

2. FY 1978 Program: Scheduled workload exceeds capability for its performance by approximately 30%. Scheduled tests include: desert test of XM1 Tank; Projectile, 8" nuclear, XM753; Projectiles, 155mm, HE, M483 and M549; Cartridge, 105mm, HE, XM 710; Improved TOW vehicle; Family of Military Engineering Construction Equipment; GATOR Mine Dispensing System; Surface Launched Unit, Fuel Air Explosive (SLUFAE); Explosive Submunition for 2.75" Rocket; laser guided heliborne missile (HELLFIRE); and Global Positioning System (GPS) for Air Force. Instrumentation improvement and modernization include Digital Video Tracking System and Radiographic Inspection System.

Project: #DE90
Program Element: #6.58.04.A
DoD Mission Area: #621 - Major Ranges and Test Facilities

Title: Yuma Proving Ground
Title: Major Research and Development Test and Evaluation Facilities, US Army Material Development and Readiness Command
Budget Activity: #6 - Programwide Management and Support

3. FY 1979 Planned Program: Projected workload for FY 1979 is greater than the FY 1978 workload and exceeds capability by approximately 25%. Scheduled tests include: PATRIOT Missile Transportability; 8" Projectile, HE, XM 711; Fuze, M577; 155mm Mounts and Cannon; Random Time Delay Submunition for Improved Conventional Artillery Ammunition; Advanced Attack Helicopter; Truck, Cargo, High Mobility; Joint Service Platform and Free Fall Reserve Parachute. Instrumentation improvement and modernization will continue prior fiscal year efforts to modernize, update and automate existing data acquisition and analysis capabilities and to replace obsolete and inefficient equipment. This will include: Versatile Precision Tracking Mount for obtaining in-flight data on helicopter-launched missiles, Range Management Control System which will permit managing more than one test at a time at a central location, ammunition conditioning chambers capable of preconditioning ammunition components adequately to permit assessing safety and proper functioning, jumble and jolt test systems to provide an adequate capability to assess effects of rough handling, random vibration capability, capability to analyze toxic gases from weapons firing, radar chronographs to provide an adequate capability for measuring muzzle velocities without limiting tube elevation and traverse (like existing chronographs), and expansion of graphic display capability.

4. FY 1980 Planned Program: Capability shortfall for FY 1980 is forecast to be comparable to the FY 1979 level. Scheduled tests include: Infra-red Jammer for Helicopters; Remotely Monitored Battlefield Sensor System (REMBASS); and airdrops of lethal binary missile warhead. In FY 1980, Yuma Proving Ground will complete procurement of several improvements begun in prior years to include ammunition conditioning chambers and graphic display capability. In addition, there will be procurements of a mobile control communications system to increase safety at firing and armament ranges and to expand range communications capabilities and of a variety of replacement items to maintain and improve capability.

5. Program to Completion: This is a continuing program.

6. Major Milestones: Not Applicable.

7. Resources ($ in thousands):

	FY 1977	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Cost
RDTE,A: Funds	16476	15671	19421	20511	Continuing	Not Applicable

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #DE91
Program Element: #6.58.04.A
DoD Mission Area: #621 - Major Ranges and Test Facilities

Title: Aberdeen Proving Ground (Materiel Test Directorate)
Title: Major Research and Development Test and Evaluation Facilities, DARCOM
Budget Activity: #6 - Programwide Management and Support

A. DETAILED BACKGROUND AND DESCRIPTION: Aberdeen Proving Ground, Maryland, is an installation of the US Army Test and Evaluation Command (TECOM), which is a major subordinate command of the US Army Materiel Development and Readiness Command (DARCOM). The Materiel Test Directorate of Aberdeen Proving Ground has the assigned missions to conduct tests of weapon systems, rocket and missile systems, munitions and components, survey and target acquisition equipment, combat special and general purpose vehicle and ancillary automotive equipment, combat engineer equipment, and troop support equipment; to provide a radiative environment simulating the neutron output of a nuclear weapon using a fast burst nuclear reactor; and to conduct nuclear radiation survivability evaluations. With its 75,000 acres, half of which are under water, instrumented firing of weapons up to ranges of 34,000 meters is possible and a total of approximately 100 firing positions are available for testing different types of weapons and equipment. The Munson Test Area contains facilities to test and evaluate wheeled and tracked vehicles and their component systems and consists of dust, rock, hill, level, dynamometer, paved, Belgian block and gravel courses. Test slopes with grades from 10 to 60%, turning radii circles, and suspension and vibration test courses are also available. The project finances the costs of operating and maintaining the Materiel Test Directorate of Aberdeen Proving Ground and those indirect testing costs not reimbursed by users. It has three broad task areas: procurement of test instrumentation, base operations, and test support.

B. RELATED ACTIVITIES: Project DE91 is one of seven projects that comprise PE 6.58.04.A. Four of the other projects finance costs at Yuma Proving Ground, AZ; Dugway Proving Ground; UT; White Sands Missile Range, NM; and the Electronic Proving Ground, AZ. These five test facilities plus 13 other test and evaluation facilities of the Department of Defense operate under a uniform funding policy for test and evaluation services within the overall Major Range and Test Facility Base of the Department of Defense. The other two projects in this element are the two environmental test centers, Cold Regions and Tropic Test Centers, which are funded on a level-of-effort basis with testing services furnished on a non-reimbursable basis.

C. WORK PERFORMED BY: All effort prescribed herein is performed by the Department of the Army civilian and military workforce of Aberdeen Proving Ground together with some associated contractual support. Telecommunication services are provided by US Army Communications Command, Ft. Huachuca, AZ. Only a small portion (about $150,000) of the Materiel Test Directorate's work is done by contractors.

Project: #DE91 Title: Aberdeen Proving Ground (Materiel Test Directorate)
Program Element: #6.58.04.A Title: Major Research and Development Test and Evaluation Facilities, DARCOM
DoD Mission Area: #621 - Major Ranges and Test Facilities Budget Activity: #6 - Programwide Management and Support

D. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: Prior accomplishments include: testing of most current and recent Army tactical vehicles on the Munson and Perryman automotive test courses; sophisticated, highly instrumented, ballistic testing of Army weapons and the families of munitions fired from them; establishing electromagnetic interference instrumentation and generating capability to enable measuring electromagnetic compatibility or interference as part of vehicular, electronic or communications equipment testing; development of an automatic target scoring system for large and small caliber direct fire weapons test and evaluation; development of vehicle test instrumentation to measure vehicle performance and course severity. During FY 1977, the Materiel Testing Directorate completed 363 tests; 71 developmental, 111 production and post production, 49 product improvement and malfunction investigations, and 132 other. Testing projects included: XM1 Tank Armor System Protection; Aluminum Armor for M113A1 Vehicle Family; acceptance of aluminum and steel armor; simplified test equipment for internal combustion engines; XM1 Tank; product improved M60 Tanks; Mechanized Infantry Combat Vehicle (XM723); 105mm Tank Gun Cartridges M392A2 (armor piercing, discarding sabot), M393A1 (high explosive, plastic), M456A1E2 (high explosive anti-tank) and XM735E2 (armor piercing, stabilized, discarding sabot); 152mm cartridge M409A1E1; 105mm data base program for kinetic energy penetration performance; fire resistant hydraulic fluids; tank thermal sight for M60 tank; Navy Capital Ships Structure Program; high mobility vehicles; Truck M746 and Tractor M747 (heavy equipment transporter); Tripartite ammunition evaluation with Germany and Great Britain; 105mm gun (M68) for M60, M48A5, and XM1 tanks; 20mm gun M139; AMATEX-20 loaded artillery projectiles; joint Department of Defense/Department of Energy soft recovery test of 8-inch, M422, projectile; Fuzes M728 and M732; 105mm Howitzer XM204; 8-inch Howitzer M110E2; 155mm cannons, tube assemblies and mounts; Gun Low Altitude Air Defense System; ribbon bridge; 200 kw, 60hz generator set; multi-leg mooring system; light weight company mortar and ammunition. Instrumentation was procured for the automatic data analysis and processing technique (ADAPT) system, which when completed will accept input data from test instrumentation, analyze the data, compare it with expected values, store it, and reproduce it in report format. Aberdeen Proving Ground has increased its Flash X-ray capability and upgraded some radars to utilize a highly accurate digital format which can be fed directly into automatic data processing equipment.

2. FY 1978 Program: Scheduled test workload exceeds test capability by more than 50%, inherently leading to delays. Scheduled test projects include: Family of Military Engineer Construction Equipment; armor plate for M113A1 family of vehicles; tests of steel and aluminum armor plate; overhauled armored personnel carrier; XM1 Tank; product-improved M60 Tank; M809 series of trucks; Air Cushion Vehicle; M88E1 Recovery Vehicle; XM856 Tanker Semi-trailer; Fuze M739; 105mm guns and mounts; firing port weapon for Infantry Fighting Vehicle; Projectile 8-inch XM711; XM587E2 fuze; STINGER and PATRIOT missiles; Navy Capital Ships Structure Program; Hand Held Laser Range Finder; bridge pier and span set; and personnel armor system for general troops. A modest amount of instrumentation improvement and modernization will be accomplished to the extent permitted by austere funding and will include continued efforts for the ADAPT system, physical test and photogrammetric instrumentation, solid-state ballistics data acquisition systems, and noise pollution detection equipment.

Project: #DE91 — Title: Aberdeen Proving Ground (Materiel Test Directorate)

Program Element: #6.58.04.A — Title: Major Research and Development Test and Evaluation Facilities, DARCOM

DoD Mission Area: #621 - Major Ranges and Test Facilities — Budget Activity: #6 - Programwide Management and Support

3. FY 1979 Planned Program: Projected test workload will continue to greatly exceed capability so that delays in testing will continue to occur. Scheduled test projects include: Drivers Night Viewer AN/VVS-2; Universal Engineer Tractor; 105mm cartridges M494, XM622 and XM774; Turret Integrated Xenon Illuminator; tank thermal sight; XM1 Tank; 10-ton high mobility truck; blank firing adaptors for machine guns; 105mm howitzer training cartridge; 175mm projectile M437; 105mm screening smoke projectile; Fuze XM587; 8-inch M201 Cannon assembly; ROLAND air defense missile system; a variety of air conditioners; ribbon bridge; a variety of generator sets; lightweight boot; slurry explosive system; 4.2 inch cartridge M329A2; Squad Automatic Weapon; Lightweight Company Mortar System; Ground Vehicle Mine Dispensing System; and UK Mortar L16A2. The ADAPT project will be continued. Additional data input terminals will be installed at key test locations as well as a test data center which will provide real-time information for test control and near real-time analysis of data which will be used as input for decisions relating to the execution of tests.

4. FY 1980 Planned Program: Projected test workload will continue to greatly exceed capability. Scheduled test projects include: Family of Military Engineer Construction Equipment; simplified test equipment for internal combustion engine-powered materiel; XM1 Tank; surveying instrument, azimuth gyro; Mortar Locating Radar AN/TPQ-36; M78 fuze; Army radar gun air defense system; infantry combat boots; and components for Medical Unit, Self-contained, Transportable (MUST). Instrumentation will be acquired that will provide data in digital format from tests of vehicular fire control systems, air defense systems, marine systems, and other equipment, the data being transmitted in the pulse code modulation mode directly to the ADAPT system. A major effort will also be made to modernize data reduction and analysis capability in the labor-intensive areas of projectile lethality testing and small arms testing.

5. Program to Completion: This is a continuing program.

6. Major Milestones: Not Applicable

7. Resources ($ in thousands):

	FY 1977	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Cost
RDTE,A: Funds	19295	19123	18953	20044	Continuing	Not Applicable

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #DE92
Program Element: #6.58.04.A
DoD Mission Area: #621 - Major Ranges and Test Facilities

Title: Dugway Proving Ground
Title: Major Research and Development Test and Evaluation Facilities, US Army Materiel Development and Readiness Command
Budget Activity: #6 - Programwide Management and Support

A. DETAILED BACKGROUND AND DESCRIPTION: Dugway Proving Ground, Utah, is an installation of the US Army Test and Evaluation Command (TECOM), a major subordinate command of the US Army Materiel Development and Readiness Command (DARCOM). Dugway has a unique mission to plan, conduct, and report on tests that assess the military value of chemical weapons and chemical/biological defense systems and related procedures during and after exposure, as well as flame, incendiary and smoke munitions systems. They also conduct research, development, laboratory tests, field tests, and investigations necessary to support the assigned mission, including meteorology, ecology, epidemiology and test technology. Effective 1 July 1974, Dugway Proving Ground was designated a major test facility within the Department of Defense Major Range and Test Facility Base. It operates under a uniform DoD reimbursement policy for major ranges and test facilities wherein users of these facilities pay all direct test costs and the facility itself finances the indirect costs of testing and the costs of operating and maintaining the facility.

B. RELATED ACTIVITIES: Dugway Proving Ground is one of seven TECOM installations/activities in this program. Four of the others also operate under the uniform DoD funding policy. These are: White Sands Missile Range, NM; Yuma Proving Ground, AZ; US Army Electronic Proving Ground, Ft. Huachuca, AZ; and the Materiel Test Directorate at Aberdeen Proving Ground, MD. The other two projects in this program are the Cold Regions and Tropic Test Centers which are funded on a level-of-effort basis wherein testing is conducted for users on a nonreimbursable basis.

C. WORK PERFORMED BY: The testing and evaluation services are performed by assigned Department of the Army civilian and military personnel with associated contractual support. Contractors include: Hawthorne Aviation (Aircraft Maintenance), Charleston, SC; IBM (ADP Maintenance), Owego, NY; and Tri-State Maintenance (Janitorial), Salt Lake City, UT. Contractual support for FY 1979 including maintenance and repair of facilities is estimated at $2,500,000.

D. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: Accomplishments included testing of the: 155mm and eight-inch binary projectiles, chemical/biological protective equipment, such as clothing and masks; Drone Launch and Control System (USAF); Insecticide Spray System (US Forest Service), smoke projectiles, chemical/biological detectors, and 66mm incendiary rocket. Tests and/or range services were also provided USAF Drone Program. Studies and investigations covered the areas of baseline ecological surveys of demilitarization and manufacturing sites, development of diffusion models and concepts, foreign biological threats and target vulnerability assessments and migration of hazardous substances through the soil for Environmental Protection Agency. Major test instrumentation acquisitions included items such as: smoke field instrumentation for measuring quantity, quality, and obscuration characteristics of smoke munitions; range safety and control systems; film readers and calibration equipment; Defensive Test Chamber for conducting inclosed chemical challenge tests of protective systems; telemetry receivers; multiplexers and test data interface equipment.

Project: #DE92
Program Element: #6.58.04.A
DoD Mission Area: #621 - Major Ranges and Test Facilities

Title: Dugway Proving Ground
Title: Major Research and Development Test and Evaluation Facilities, US Army Materiel Development and Readiness Command
Budget Activity: #6 - Programwide Management and Support

2. FY 1978 Program: Scheduled test workload exceeds test capability by 65%, inherently leading to delays. Test projects include: biological agent alarm, protective masks, hard overpack for technical escort units, demilitarization of chemical/biological munitions and defensive chamber tests. Test and/or range services will be provided to US Air Force for tests of MC-1 Bomb and to US Navy for TOMAHAWK cruise missile. Acquisition of a modest amount of instrumentation to improve and modernize testing capability includes chemical, photographic, life sciences and calibration equipment.

3. FY 1979 Planned Program: Projected test workload will continue to greatly exceed capability so that delays in testing will continue to occur. Planned tests include: 155mm smoke projectile (XM803), 105mm incendiary cartridge (XM765), 66mm tactical CS rockets, and Big Eye (Navy). Dugway will conduct joint service tests of chemical/biological materiel and provide technical assessment of foreign biological threats.

4. FY 1980 Planned Program: Projected test workload will exceed test capability by about 20 to 25%. Planned tests include: Lethal Binary Warhead for LANCE missile and Detector kit for Waterborne Chemical Warfare Agents. Significant improvement and modernization of testing capability will be accomplished and will emphasize automation, enhancement of particulate and smoke testing capability and replacement of overage chemical, life sciences, photographic and calibration equipment. Funds will be provided for long-deferred maintenance and repair of the physical plant (e.g., plumbing, roads, exterior and interior painting of buildings, and parking lots. This will begin a program to avoid further deterioration of the facility which now is subject to costly breakdowns requiring emergency temporary repairs.

5. Program to Completion: This is a continuing program.

6. Major Milestones: Not Applicable

7. Resources ($ in thousands):

	FY 1977	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Cost
RDTE,A: Funds	11961	12527	10721	16587	Continuing	Not Applicable

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #DE93
Program Element: #6.58.04.A
DoD Mission Area: #621 - Major Ranges and Test Facilities

Title: White Sands Missile Range
Title: Major Research and Development Test and Evaluation Facilities, DARCOM
Budget Activity: #6 - Programwide Management and Support

A. DETAILED BACKGROUND AND DESCRIPTION: White Sands Missile Range (WSMR), New Mexico, is an installation of the US Army Test and Evaluation Command (TECOM), a major subordinate command of the US Army Materiel Development and Readiness Command (DARCOM), with the primary mission of supporting missile, aircraft, and space vehicle tests of various national programs which include the Defense Advanced Research Projects Agency (DARPA), the National Aeronautics and Space Administration (NASA), and the Department of Energy (DOE). To meet increasingly complex and stringent range user requirements, a modernization program was established in FY 1964 to insure that technological advances in range capabilities paralleled advances in weaponry. This range occupies a land area of about 40 miles wide and 100 miles long and supports 250 to 300 different projects annually. Missiles are fired from launch sites such as Green River, Utah, and impact on White Sands Missile Range, a distance of over 500 miles. Launch sites are available to test missiles, drones, space vehicles, and related technical components. Facilities for performing static tests of rocket motors are also available. A Nuclear Effects Facility is capable of testing the effects of radiation on materials at predetermined levels of nuclear blast or environment. A new mission to support high energy laser testing was recently assigned and a Tri-Service High Energy Laser System Test Facility is being established.

B. RELATED ACTIVITIES: Project DE93 is one of seven projects comprising PE 6.58.04.A. Four of these projects finance indirect costs of operating Yuma Proving Ground, Arizona; Materiel Test Directorate, Aberdeen Proving Ground, Maryland; Dugway Proving Ground, Utah; and the Army Electronic Proving Ground, Ft. Huachuca, Arizona. These four test facilities, WSMR, plus 13 other test and evaluation facilities of the Department of Defense operate under a uniform funding policy within the overall Major Range and Test Facility Base of the Department of Defense. White Sands Missile Range is also one of two national ranges managed by the Army, the other being Kwajalein Missile Range (KMR). There is close and continuous coordination between White Sands Missile Range, other national ranges, other service test and evaluation activities, and developing agencies to insure optimum support to all DOD programs and avoid duplication and inefficiency. The Cold Regions Test Center and Tropic Test Center, the remaining two facilities in the program, are funded on a level of effort basis wherein they perform testing services on a non-reimbursable basis.

C. WORK PERFORMED BY: Contract support to the mission of White Sands Missile Range will total approximately $22 million during FY 1978. Contractors include RCA, Moorestown, NJ; Physical Science Laboratory, New Mexico University, Las Cruces, NM; IBM, Owego, NY; Lockheed Engineering Services Division, Houston, TX; International Sensor Systems, Aurora, NE; Vega Enterprises, El Paso, TX; and Dynalectron Corporation, Albuquerque, NM. Government agencies providing support include US Army Communications Command, Ft. Huachuca, AZ; Defense Mapping Agency, Washington, DC; US Army Research Office, Durham, NC; Lexington Army Depot, Lexington, KY; US Air Force Special Weapons Test Center, Kirkland and Holloman Air Force Bases, NM; and Department of Commerce, National Bureau of Standards, Washington, DC.

Project: #DE93
Program Element: #6.58.04.A
DoD Mission Area: #621 - Major Ranges and Test Facilities

Title: White Sands Missile Range
Title: Major Research and Development Test and Evaluation Facilities, DARCOM
Budget Activity: #6 - Programwide Management and Support

D. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: Major test projects included PATRIOT, Improved HAWK, and US ROLAND Surface-to-Air Missiles; CHAPARRAL Air Defense Gun System; LANCE and PERSHING Surface-to-Surface Missiles; Short Range Attack Missile (SRAM); Tactical Fire Direction System (TACFIRE); STINGER Shoulder-Fired Air Defense Missile; and TOMAHAWK Cruise Missile (Navy). Major improvement and modernization procurement actions included equipment for the High Energy Laser System Test Facility, Drone Formation Control System, camera modernization, Hybrid Computer System, and Telemetry Acquisition and Tracking System.

2. FY 1978 Program: Scheduled test workload exceeds test capability by nearly 40%, inherently leading to test delays. Major test projects include PATRIOT and US ROLAND Surface-to-Air Missiles, STINGER Shoulder-Fired Air Defense Missile, COPPERHEAD Cannon-Launched Guided Projectile, General Support Rocket System, Army Tactical Data Systems, and Navy air weapons. A major segment of the FY 1978 program is for the procurement of instrumentation and equipment for the new Tri-Service High Energy Laser System Test Facility. Other improvement and modernization tasks include Distant Object Attitude Measurement System, mobile tracking mount modifications, Radio Frequency Generating Equipment, Tactical Electromagnetic Pulse Facility, Low Altitude Tracking System, Airborne Units for Drone Control, and cinetheodolite modernization.

3. FY 1979 Planned Program: WSMR will continue to operate the National Range and provide test and evaluation services in support of missile system programs and other materiel developers. Workload for FY 1979 is projected to exceed test capability by 40 percent so that delays in testing will continue to occur. Major test projects include Nuclear Weapons Effects Program, General Support Rocket System, PERSHING II Surface-to-Surface Missile, PATRIOT and US ROLAND Surface-to-Air Missiles, Tactical Fire Direction System, and Navy air weapons. FY 1979 funding is 3% greater than the FY 1978 level so that it will be necessary to absorb part of the actual increase in pay and prices at the expense of basic test capability. Increases in costs of commercial contracts are expected to be particularly large, as in the past year, because of factors peculiar to New Mexico and its implementation of the Fair Labor Standards Act. Instrumentation improvement and modernization procurements include a major procurement of additional equipment for the High Energy Laser System Test Facility, Phase I of the replacement of obsolete surveillance radars, modernization of range tracking radars, and remote control for versatile tracking mounts.

4. FY 1980 Planned Program: FY 1980 workload is projected to remain comparable to FY 1979 levels and will exceed test capability by more than 20%. Major test projects include Tactical Fire Direction System (TACFIRE), PATRIOT Surface-to-Air Missile, Short Range Attack Missile (SRAM), Aerial Targets, and Navy air weapons. Improvement and modernization of testing

Project: #DE93
Program Element: #6.58.04.A
DoD Mission Area: #621 - Major Ranges and Test Facilities

Title: White Sands Missile Range
Title: Major Research and Development Test and Evaluation Facilities, DARCOM
Budget Activity: #6 - Programwide Management and Support

capability will emphasize acquisition of instrumentation for the High Energy Laser System Test Facility and replacement of obsolete and outmoded range instrumentation with technologically improved items that will provide expanded coverage more efficiently and at less cost. A modest reduction is programed in the backlog of essential maintenance and repair of test facilities.

5. Program to Completion: This is a continuing program.

6. Major Milestones: Not Applicable.

7. Resources ($ in thousands):

	FY 1977	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Cost
RDTE,A: Funds	90144	97892	100741	108379	Continuing	Not Applicable

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #DE94
Program Element: #6.58.04.A
DoD Mission Area: #621 - Major Ranges and Test Facilities

Title: US Army Electronic Proving Ground
Title: Major Research and Development Test and Evaluation Facilities, US Army Material Development and Readiness Command
Budget Activity: #6 - Programwide Management and Support

A. DETAILED BACKGROUND AND DESCRIPTION: The US Army Electronic Proving Ground (EPG), Fort Huachuca, Arizona, is an installation of the US Army Test and Evaluation Command, a subordinate command of the US Army Materiel Development and Readiness Command (DARCOM). The primary mission of the proving ground is to plan, conduct, evaluate and report on and/or support developmental and other tests of Army communications, electronic, and electronic warfare systems and materiel. Responsibility for the development testing formerly performed by the US Army Security Agency Test and Evaluation Center (ASATEC) was transferred to EPG as a major mission on 1 October 1977. The new mission encompasses all the developmental testing of tactical electronic warfare and signal intelligence equipments. Testing support is also provided to the other military services. Other major missions include to plan, conduct and report on electromagnetic compatibility (EMC) and electronic countermeasure (ECM) test analysis and to operate and maintain two major test facilities: Electromagnetic Environmental Test Facility (EMETF) and System Test Facility. The proving ground was established in 1954 and since that time has become involved in the testing of such materiel as airborne surveillance systems, inertial navigation system devices, telephone switchboards, surveillance sensors, electro-optical devices, tactical transceivers, electronic warfare jamming, collection and direction finding systems, and radiological survey instruments; and in evaluation of the electromagnetic compatibility of all types of materiel. The natural quiet electromagnetic environment, the real estate, and the low annual rainfall of the area, together with the special facilities developed over the years, make this area ideal and the capability unique within the Department of Defense for carrying out its test and evaluation missions. The majority of this facility's work is conducted within its laboratories; on the System Test Facility, an outdoor electronic range; and in the Electromagnetic Environmental Test Facility, which is specially designed to create the intended electromagnetic environment, including Army systems and equipment, and which permits analysis of equipment in a simulated operational environment.

B. RELATED ACTIVITIES: Four other projects finance costs at White Sands Missile Range, NM; Yuma Proving Ground, AZ; Dugway Proving Ground, UT; and the Materiel Test Directorate of the US Army Aberdeen Proving Ground, MD. These four, EPG, and thirteen other DoD test and evaluation facilities operate under a uniform DoD funding policy that provides funding for indirect costs of test and evaluation to the facility and that requires test proponents (or users) to pay all direct test costs. Two other projects in this program are the Cold Regions Test Center and Tropic Test Center which are funded on a level-of-effort basis wherein testing services are provided on a non-reimbursable basis.

Project: #DE94
Program Element: #6.58.04.A
DoD Mission Area: #621 - Major Ranges and Test Facilities

Title: US Army Electronic Proving Ground
Title: Major Research and Development Test and Evaluation Facilities, US Army Material Development and Readiness Command
Budget Activity: #6 - Programwide Management and Support

C. WORK PERFORMED BY: Testing is performed by military and civil service personnel assigned to EPG with associated contractor support. Major contractor effort involves the operation and maintenance of the Electromagnetic Environmental Test Facility (EMETF) and the Systems Test Facility by Bell Aerospace Company, Tucson, AZ.

D. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: Test projects included Absolute Altimeter (AN/APN-209), Landing Control Center (AN/TSQ-71A), Tactical Landing Systen, Joint Service Test of Tactical Wideband Secure Equipment, Tactical Satellite Communications Equipment, Platoon Early Warning System, exploitation testing of electronic warfare equipment, Radar Detector (AN/APR-39), Beacon (AN/TRN-30), Night Vision Device (AN/PVS-2), Radio Sets (AN/GRC-103 and AN/GRC-122), Secure Voice Device (BANCROFT), Satellite Communications Ground Terminal (AN/MSC-39), Facsimile Equipment, and Tactical Narrow Band Secure Voice System. Tests conducted in the Electromagnetic Environmental Test Facility (EMETF) included Integrated Tactical Communications System, Sound Ranging Device, and Forward Area Alerting Radar. System Test Facility projects included support to the Air Force drone program, Remotely Piloted Vehicles, and OV-1D componentry. Instrumentation was procured to improve the capability for skin-tracking small airborne targets such as AQUILA drones at long range. Other intrumentation was procured to improve capabilities for development testing of absolute altimeters; weather balloons; recently introduced all-digital DoD communications equipment, including the Single Channel Ground-Air Radio System; and Remotely Monitored Battlefield Sensor System.

2. FY 1978 Program: Scheduled test workload greatly exceeds test capability. Major test projects include CEFLY LANCER and TRAILBLAZER electronic warfare systems, Tactical Communications Emitter Location and Identification System, support to Johnson Space Center, support to Electromagnetic Compatibility Analysis Center, Manpack Satellite Set (AN/PSC-1), AN/TTC-39 Circuit Switch (TRI-TAC), Alarm Detector (AN/PPS-5), and Radiac Set IM-185. A new capability for software test and evaluation is being established and will become operational. Instrumentation procurements also include an all purpose digital range radar that will improve range safety through automatic acquisition of airborne targets. Instrumentation for all-digital communications programs will provide test capability for higher frequency ranges, wider bandwidths and more diverse operating modes, than prior test programs required.

Project: #DE94
Program Element: #6.58.04.A
DoD Mission Area: #621 - Major Ranges and Test Facilities

Title: US Army Electronic Proving Ground
Title: Major Research and Development Test and Evaluation Facilities, US Army Materiel Development and Readiness Command
Budget Activity: #6 - Programwide Management and Support

3. FY 1979 Planned Program: Funding increase is for major instrumentation improvements to establish an adequate capability for testing of signal intelligence/electronic warfare equipment. Procurement will also be initiated of a mobile, high precision tracking radar that will provide total coverage to the test range. Projected test workload for FY 1979 will continue to greatly exceed resources causing some test delays. Major test projects include Single Channel Ground-to-Air Radio System, Remotely Monitored Battlefield Sensor System, Position Location Reporting System, Automatic Ground Transportable Emitter Location and Identification System (AN/TSQ-109), Family of Digital Group Multiplexers, and Quick Fix.

4. FY 1980 Planned Program: Test workload for FY 1980 is expected to be approximately the same as that for FY 1979. Major test projects include electromagnetic compatibility analyses of PATRIOT and ROLAND missile systems, Tri-Service Tactical Communications Program, Digital Transmission Evaluation Project and Facility Intrusion Device. System Test Facility, EMETF and software testing on various systems will continue. A major segment of the FY 1980 program is for the procurement of instrumentation to establish an adequate capability for testing electronic warfare equipment. Other instrumentation procurements include completion of the mobile tracking radar, closed circuit TV for unmanned aircraft tests, absolute altimeter standard, antenna measurement test instrumentation and infrared targets.

5. Program to Completion: This is a continuing program.

6. Major Milestones: Not Applicable

7. Resources ($ in thousands):

	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Cost
RDTE,A: Funds	8766	8623	9961	12925	Continuing	Not Applicable

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.58.05.A
DoD Mission Area: #621 - Major Ranges and Test Facilities

Title: DoD Munitions Effectiveness and Explosive Safety
Budget Activity: #6 - Programwide Management and Support

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	5377	4416	5036	7236	Continuing	Not Applicable
D620	DoD Munitions Effectiveness	4789	3907	4514	6714	Continuing	Not Applicable
M857	Explosive Safety Standards	588	509	522	522	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program consists of two projects each of which is structured to satisfy a specific need. Project D620 provides a coordinated Tri-Service mechanism for the collection and free exchange of technical data on the performance and effectiveness of all nuclear and non-nuclear munitions and weapons systems in a realistic operational environment. This project is primarily concerned with the determination of munitions effectiveness data and the publication of that data in Joint Munitions Effectiveness Manuals (JMEM) for surface-to-surface (SS), air-to-surface (AS) and anti-air (AA) munitions. These manuals, then, provide the Services a uniform basis for munitions and weapons planning and employment and assist in the determination of future munitions concepts and requirements. This project also supports DoD agencies in the determination of vulnerabilities/survivability of selected systems and relative effectiveness analysis of current and developmental systems. Project M857 supports explosion effects research and testing to quantify hazards in all DoD manufacturing, testing, maintenance, storage and disposal aspects of ammunition and explosives. Results of these efforts are essential to the development of quantity-distance standards and the design of cost effective, explosion resistant facilities.

C. BASIS FOR FY 1979 RDTE REQUEST: Project D620 (DoD Munitions Effectiveness) will support the continuation of effectiveness evaluations for air-to-surface, surface-to-surface, and anti-air munitions/weapons through updating delivery accuracy, target acquisition and weapon characteristics. These evaluations will be further enhanced by inclusion of weapons systems entering the inventory of the Services and by expanding the types of targets for which effectiveness data is tabulated. Special emphasis will be placed upon: vulnerability of complex targets, Red-on-Blue effectiveness evaluations, and the inclusion of smoke, illumination and target acquisition effects in the effectiveness evaluations of air-to-surface and surface-to-surface weapons/munitions. Project M857 (Explosive Safety Standards) will support the Department of Defense Explosive Safety Board in the conduct of ESKIMO VI test to prove the structure of large, flat-roofed missile magazines and portal-type magazines. Tests will also be conducted on the effects of stacks of fragmenting ammunition and on thermal effects on ammunition facilities.

D. OTHER APPROPRIATION FUNDS: Not Applicable.

Program Element: #6.58.05.A
DoD Mission Area: #621 - Major Ranges and Test Facilities

Title: DoD Munitions Effectiveness and Explosive Safety
Budget Activity: #6 - Programwide Management and Support

E. DETAILED BACKGROUND AND DESCRIPTION: Project D620 (DoD Munitions Effectiveness): The Joint Technical Coordinating Group, Munitions Effectiveness (JTCG/ME) was established by Joint Chiefs of Staff Directive in 1963 and manages the effort conducted under this project. The JTCG/ME responds to directives from the commanders of the Army Materiel Development and Readiness Command, Navy Materiel Command, Air Force Logistics Command, and Air Force Systems Command. Steering-committee membership includes representatives from the Army, Navy, Air Force, Marine Corps, and the Defense Intelligence Agency. Quarterly meetings are held to review, in detail, current and planned programs. The project further provides the basis for the definition of and recommendation for corrective action to the Joint Logistic Commanders of problem areas and/or knowledge gaps related to munitions and weapons effectiveness; serves as a focal point for Joint efforts to improve the data base and analytical methodology used in the determination and prediction of non-nuclear munitions and weapons effectiveness in a realistic operational environment; and, provides a means for the development, publication, and update of Joint Munitions Effectiveness Manuals (JMEM's) on a continuing basis. These manuals provide to the Services a uniform basis for munitions and weapons employment, planning and use, the determination of munitions and weapons requirements, and the evalution of new munitions and weapons concepts. Work in this project includes the preparation of JMEM's for air-to-surface, surface-to-surface, and anti-air munitions/weapons systems; investigations in aircraft attrition; and, supporting efforts in target vulnerability and survivability, selected systems effectiveness, and battle-damage assessment. Ad hoc tasks are undertaken as required to assist in the resolution of data deficiencies relative to existing munitions/weapons and their effectiveness. Project M856: Explosive Safety Standards, provides for full-scale testing and supporting analysis directed toward improvement of Tri-Service explosives and ammunition safety standards. The DoD Explosives Safety Board, which manages this project, assesses blast, fragment, thermal and toxic hazards to personnel and structures from potential accidental detonation of stored ammunition; develops design procedures for protective structure design and construction; and, establishes operating safety standards and quantity-distance tables. The Board also establishes design procedures and storage layout criteria for magazines and explosive handling/manufacturing facilities.

F. RELATED ACTIVITIES: This program is a consolidation of Project M857 (Armed Services Explosive Safety Board) and Project D620 (Ammunition Effectiveness Testing) from Program Element 6.57.02.A (Support of Development Test) to provide a single element concerned with testing and evaluation of ammunition effectiveness and safety.

G. WORK PERFORMED BY: Approximately 75 percent of Project D620 work is accomplished by the following in-house organizations. US Army Materiel Systems Analysis Activity, the Ballistic Research Laboratory and the Chemical Systems Laboratory at Aberdeen Proving Ground, MD; US Army Missile Research and Development Command, Redstone Arsenal, AL; US Army Armament Research and Development Command, Dover, NJ; US Army Armament Materiel Readiness Command, Rock Island, IL; Dugway Proving Ground, UT; The Air Force Armament Laboratory, Eglin Air Force Base, FL; Air Force Flight Dynamics Laboratory, Wright-Patterson Air Force Base, OH; Oklahoma City Air Logistics Center, Tinker Air Force Base, OK; Naval Research Laboratory, Washington, DC; Naval Surface Weapons Centers, at White Oak, MD, and Dahlgren, VA; Pacific Missile Test Center, Pt. Magu, CA; and the Naval Weapons Center, China Lake, CA. The project contractors are: Oklahoma State University at Eglin Air Force Base, FL and Stillwater, OK; Falcon Research and Development Inc at Denver, CO and Albuquerque, NM; Booze-Allen Applied Research, Inc, Bethesda, MD; Denver Research Institute, Denver, CO and the University of Maryland Institute for Emergency Medicine, Baltimore, MD.

Approximately 80 percent of project M857 work is accomplished by the following DoD organizations: Naval Weapons Center, China Lake, CA; Naval Surface Weapons Center, Dahlgren, VA; and US Army Ballistics Research Laboratories, Aberdeen Proving Ground, MD.

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: Project D620 (DOD Munitions Effectiveness) has produced the Joint Munitions Effectiveness Manuals on Air-to-Surface (JMEM/AS) and Surface-to-Surface (JMEM/SS) ammunitions in addition to other manuals addressing weapon accuracy, vulnerability, characteristics, and joint testing procedures. Realistic validation of analyses were obtained through comparisons with battle data obtained during Vietnam and mid-East conflicts. Studies on the vulnerability of US forces to chemical and biological attack and decontamination requirements in a chemical warfare environment were also completed. During FY 1977, JMEM manuals were updated and the Target Vulnerability manual was revised. Multiple fragment tests of various materials versus aircraft fuel cells were completed. Effort was initiated on effectiveness evaluations of the VULCAN, HAWK, and CHAPARRAL air defense systems. The vulnerability of various industrial targets was assessed for the Strategic Air Command (SAC). Vulnerability assessments were also conducted on nuclear materials production facilities, cargo handling seaports, the ZSU 23-4 and ZSU 57-2 air defense weapons, and on the FITTER, FENCER, FLOGGER and HIND A aircraft. Target descriptions of the SS-12, SA-8, and SA-9 missiles were completed. Extensive survivability assessments were accomplished. Project M857 (Explosive Safety Standards) conducted a series of explosive tests (ESKIMO) on full-scale, earth-covered ammunition magazines which have led to establishing criteria for more efficient use of storage areas while maintaining safety standards. These tests have also permitted evaluation of the explosion resistance of several different magazine designs and have identified construction economics and validated quantity-distance standards. Efforts have also included evaluation of unexploded ordnance detection techniques and equipment as well as development of guidance pertaining to clearance and release of former ammunition impact areas for other uses. A major project effort has been, and will continue to be, testing and analyses of the fragment distribution and velocity profiles of exploding stacks of munitions in order to improve current standards for fragment protection.

2. FY 1978 Program: Project D620 (DoD Munitions Effectiveness) will continue to update the effectiveness manuals through inclusion of the GBU 15, 12, 16, and 10 versus two new Soviet ships and through inclusion of the delivery accuracy of the Maverick, A-10, F-111, and A7E aircraft. Effectiveness manuals will be prepared or updated on the LANCE missile, M110 howitzer, VULCAN, HAWK, and CHAPARRAL air defense weapons. Effort on the examination of illumination effects will be completed and manuals published. A smoke effectiveness manual will also be published. The Surface-to-Surface manuals will be updated with guided projectile effectiveness data against stationary and moving point targets and will also include an additional Soviet ship target. Special emphasis will be placed upon the Red-on-Blue surface-to-surface, air-to-surface, and anti-air effectiveness evaluations. Project M857 (Explosive Safety Standards) will complete analysis of ESKIMO-V and continue model studies of earth-covered magazines. Development of a test plan for ESKIMO-VI to evaluate the explosion resistance of large, flat-roofed missile magazines and NATO portal-type magazines will also be accomplished. Continuation of tests on the progressive detonation of stacks of fragmenting munitions will be a major effort. Analysis of thermal effects on stored propellants and pyrotechnics will also be performed in order to characterize the hazards from radiation and firebrands.

Program Element: #6.58.05.A
DoD Mission Area: #621 - Major Ranges and Test Facilities

Title: DoD Munitions Effectiveness and Explosive Safety
Budget Activity: #6 - Programwide Management and Support

3. FY 1979 Planned Program: D620 (DoD Munitions Effectiveness) will continue to update the Joint Munitions Effectiveness Manuals for Air-to-Surface and Surface-to-Surface (JMEM/AS and JMEM/SS) with new information on delivery accuracy, target acquisition, weapons characteristics and smoke and illumination effects. The manuals will also expand on the type targets considered and the vulnerability/survivability of weapons systems and crew personnel. Support will continue on human survivability/vulnerability and medical work load problems. Analysis support for the Service staffs and the materiel development and user community will continue for major programs. Project M857 (Explosive Safety Standards) will conduct the ESKIMO-VI test and continue tests on stacks of fragmenting munitions. Thermal effects studies will be expanded and standard hazard classifications will be devised for joint use by the Military Departments. A new explosive resistant structures manual will be published.

4. FY 1980 Planned Program: Both projects will continue efforts toward the joint determination, publication, and use of enhanced and expanded munitions effectiveness data and explosive safety criteria. Project D620 will continue to conduct effectiveness analysis to support development decisions and establishment of new materiel requirements.

5. Program to Completion: This is a continuing program.

FY 1979 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.58.98.A
DoD Mission Area: #641 - Other Management Support

Title: Army Management Headquarters Activities
Budget Activity: #6 - Programwide Management and Support

A. RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1977 Actual	FY 1978 Estimate	FY 1979 Estimate	FY 1980 Estimate	Additional to Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	16290	16058	26879	26832	Continuing	Not Applicable
HH88	Army Management Headquarters Activities	16290	16058	26879	26832	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program supports those research and development (R&D) command elements that substantially perform: (1) policy and guidance development; (2) long range planning, programing, and budgeting; (3) management and distribution of resources; and (4) program performance review and evaluation. This is a new program element (PE) which was directed by Office, Secretary of Defense (OSD), for the purpose of uniformity in programing, reporting, and justifying Management Headquarters Activities. Resources reflected in this PE support civilian personnel performing listed functions and associated costs (personnel benefits, travel, operating supplies, and support) at US Army Materiel Development and Readiness Command (DARCOM) Headquarters, DARCOM subordinate R&D commands, and for Office, Chief of Engineers (OCE) R&D activities.

C. BASIS FOR FY 1979 RDTE REQUEST: Program request is based on authorized civilian personnel (salaries and related costs) performing Research Development Test and Evaluation (RDTE) management functions at DARCOM Headquarters, DARCOM subordinate R&D commands, and for OCE R&D activities. Requested program supports full implementation of the Army Materiel Acquisition Review Committee (AMARC) recommended realignment of DARCOM subordinate commands into separate R&D and Readiness commands. This realignment resulted in a shift of $7.5 million and associated spaces from the Operation and Maintenance, Army, appropriation to RDTE. This increase is reflected in the FY 1979 request. The remaining increase (approximately $3.4 million) is for annualization of the FY 1978 pay raises and for additional man-years required for initial full year of operation for realigned R&D commands.

D. OTHER APPROPRIATION FUNDS: Not applicable.

E. DETAILED BACKGROUND AND DESCRIPTION: This PE was established by OSD in accordance with Department of Defense (DOD) Directive 5100.73, Department of Defense Management Headquarters, dated 11 April 1975, which contained instructions to update the DOD system for identification and management of the number and size of DOD Management Headquarters Activities. DOD Directive (DODD) 5100.73 further identified the type of functions to be included in this PE. Paralleling this action, DARCOM subordinate headquarters were realigned into separate R&D and Readiness commands in accordance with AMARC recommendations. This

combination of changes resulted in a shift of resources between appropriations as well as between RDTE PEs. These resource adjustments result in increased requirements for FY 1979, which will be the first full year of operations under the new program element (PE). The requested increases in this PE are offset elsewhere in the overall Army funding posture. Following is a breakout by individual R&D commands as established by the Army Materiel Acquisition Review Committee (AMARC) Appropriations.

	FY 1977	FY 1978	FY 1979	FY 1980	Additional to Completion	Total Estimated Cost
Armament R&D Command	2300	2316	5938	5911	Continuing	Not Applicable
Aviation R&D Command	1200	1530	1581	1581	Continuing	Not Applicable
Communications R&D Command	1500	1558	3498	3498	Continuing	Not Applicable
Electronics R&D Command	2000	2037	3680	3660	Continuing	Not Applicable
Missile R&D Command	2100	2216	5380	5380	Continuing	Not Applicable
Tank Automotive R&D Command	1000	1847	1958	1958	Continuing	Not Applicable
DARCOM Headquarters	5700	4173	4315	4315	Continuing	Not Applicable
Office, Chief of Engineers	490	381	529	529	Continuing	Not Applicable
TOTAL	(16290)	(16058)	(26879)	(26832)	Continuing	Not Applicable

F. RELATED ACTIVITIES: Management headquarters perform planning, programing, management, and evaluation for work performed at research, development, test, and evaluation (RDTE) laboratories and test facilities.

G. WORK PERFORMED BY: US Army Materiel Development and Readiness Command (DARCOM), Alexandria, VA; DARCOM subordinate research and development (R&D) commands, and Office, Chief of Engineers (OCE) R&D activities.

H. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1977 and Prior Accomplishments: Provided resources incident to management-type functions performed by DARCOM Headquarters, R&D directorates in subordinate DARCOM commands, and for OCE R&D activities under PE 6.58.01, Programwide Activities. These estimated costs have been identified for comparative costs in this submission.

2. FY 1978 Program: Provides resources for support of RDTE management headquarters functions at DARCOM Headquarters, DARCOM subordinate R&D commands, and OCE. Resources programed are adequate for support of authorized civilian personnel, to include salaries and related expenses (benefits, travel, operating supplies, etc.).

Program Element: #6.58.98.A
DoD Mission Area: #641 - Other Management Support

Title: Army Management Headquarters Activities
Budget Activity: #6 - Programwide Management and Support

3. FY 1979 and 1980 Planned Program: Continue support of Research, Development, Test, and Evaluation (RDTE) management headquarters activities as realigned by AMARC implementation. Increased program results from appropriation transfers associated with establishment of separate R&D commands.

4. Program to Completion: This is a continuing program.