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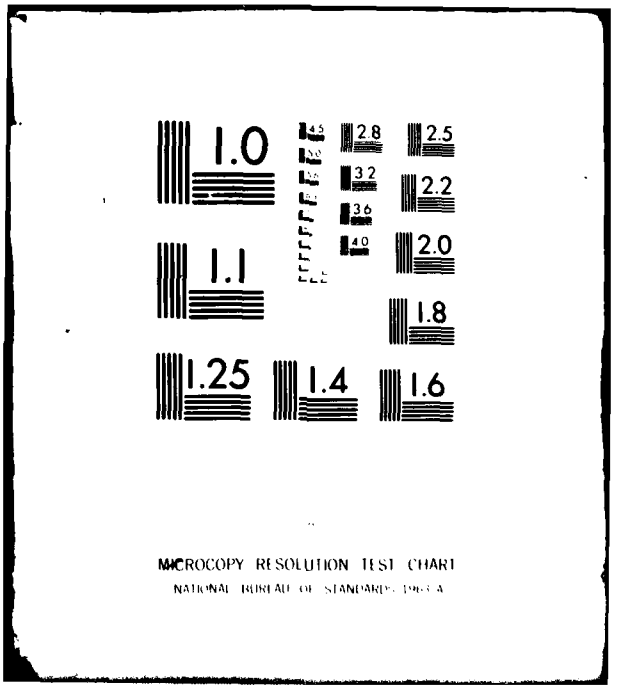
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NATIONAL BUREAU OF STANDARDS 1963-A

VOLUME III

Supporting Data FY 1981

Budget Estimate

Submitted to CONGRESS January 1980

Descriptive Summaries Of The

RESEARCH DEVELOPMENT TEST & EVALUATION

Army Appropriation FY 1981 (U)

DEPARTMENT OF THE ARMY DEPUTY CHIEF OF STAFF
FOR RESEARCH DEVELOPMENT AND ACQUISITION
RDTE PROGRAMS AND BUDGET DIVISION

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VOLUME III

DESCRIPTIVE SUMMARIES FOR PROGRAM ELEMENTS

OF THE

RESEARCH, DEVELOPMENT, TEST AND EVALUATION, ARMY PROGRAM

FY 1981, ~~(U)~~ Volume III

(11) JANUARY 1980

(12) 497

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

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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 1981 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 1981. Descriptive Summaries for projects within the program elements to be financed during FY 1981 for $5.0 million or more appear 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 1981. A Test and Evaluation Section is provided for all major weapon systems.

There are seventeen 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 1979, FY 1980, FY 1981, and FY 1982 data in this Program Element Listing with data shown in the Program Element Listing dated January 1979 will reveal significant differences. Many of the differences are attributable to the following factors:

a. Restructuring of the FY 1979 and FY 1980 programs for comparability to the FY 1981 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) Further extension of the Single Program Element Funding Concept.

(3) Restructuring of Exploratory Development personnel RDTE programs.

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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DEFENSEWIDE MISSION SUPPORT (Continued)

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.01.A
Title: Communications Engineering Development
DOD Mission Area: #256 - Tactical Communications
Budget Activity: #4 - Tactical Programs

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	4732	5243	4823	22783	Continuing	Not Applicable
	QUANTITIES						*
D451	Army Support of Joint Tactical Information Distribution System (JTIDS)	0	0	0	11077	23686	34763
DD487	Tactical Multichannel Communications	2307	3283	2593	8680	Continuing	Not Applicable
D488	Tactical Net Radio Communications	2425	1960	2230	3026	Continuing	Not Applicable

*Quantity of Diversified Items.

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program provides engineering development for Army Tactical Communications equipments except those developed under Program Element (PE) 3.31.42.A, Satellite Communications Ground Environment, PE 2.80.10.A., Joint Tactical Communications Program (TRI-TAC), and PE 6.37.46.A., and Single Channel Ground and Airborne Radio Subsystem (SINCGARS-V). These types of items include cable/wire systems, telephone/data/record traffic terminals, data distribution equipments/systems, equipment shelters, antenna configurations, multichannel radio/multiplier/technical control assemblages, antenna masts, radio couplers, and ancillary equipments that increases the reliability, extends the useful life, and/or promotes interoperability in the current inventory. This program also provides the technical support for the development of National and International Military Communications System Technical Standards. The equipments developed under this program are needed to provide tactical commanders with reliable, secure, efficient communications equipment, and ancillary items to insure command and control of tactical forces on a highly mobile, rapidly changing modern battlefield. Goals are to

Program Element: 6.47.01.A
DOD Mission Area: 7256 - Tactical Communications

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

achieve greater reliability, increased mobility, and reduced life cycle costs thru employing state-of-the-art technology, reduced weight, and power consumption, simplified installation and displacement, and reduced operator and maintenance personnel requirements.

C. (U) BASIS FOR FY 1981 RDTE REQUEST: Complete fabrication of the prototype models of the Teletypewriter Multiplexer Facility (AN/TSC-97) and initiate testing. Complete Fiber Optic Cable systems engineering, design and specification preparation contract; and prepare Engineering Development contract procurement package. Continue development phase of Automatic Switchboard SB-3614 digitization product improvement to improve interoperability with TRI-TAC developments and extend the SB-3614 service life. Continue monitoring Engineering Development contract on the Log Periodic Antenna used to enhance resistance to electronic countermeasures for forward deployed combat net radios. Complete Engineering Development contract and prepare for initial production on the Steerable Null Antenna Processor (SNAP) which will enhance electronic countermeasures resistance for selected vehicular mounted net radios. Award Engineering Development contract for a Survivable Low Profile Antenna for radios mounted in tracked combat vehicles. Continue to provide technical support for National and International Military Communications Technical Standards development efforts. Continue to provide Engineering Development technical support for the Special Forces Burst Communications System (SFBCS), for Army Marinecraft radio equipment and for ancillary equipments related to the Single Channel Ground and Airborne Radio Subsystem (SINCGARS-V).

D. (U) BASIS FOR CHANGE BETWEEN FY 1981 AND FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1979	FY 1980	FY 1981	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	4732	5243	4823	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	4135	5267	8213	Continuing	Not Applicable

The change in FY 1979 was the result of reprogramming approximately $67 thousand in Project D487 to fund the cost of performing technical evaluation of alternative Division Area Communications Concepts to support the selection of the best technical approach for the Mobile Subscriber Equipment (MSE) portion of the Joint Tactical Communications Program (TRI-TAC). The remaining difference of $530 thousand is due to an administrative error in the FY 1980 Descriptive Summary that reflected Project D488 at $1895 thousand for FY 1979 versus the $2425 thousand actually requested and approved for FY 1979. The

Program Element: #6.47.01.A
DOD Mission Area: #256 - Tactical Communications

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reduction for FY81 is primarily the result of delaying the start of Project D487 Engineering Development contractual efforts for Fiber Optics Cable and Millimeter Wave Radio Systems due to higher priority program requirements for FY 1981 funds. The change in FY 1980 is due to application of a general Congressional reduction.

E. (U) OTHER APPROPRIATION FUNDS: ($ in thousands)

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional To Completion	Total Estimated Cost
Other Procurement, Army:						
Funds (current requirements)	123800	86700	106700	*	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	133800	93900	*	-	Continuing	Not Applicable
Quantities (current requirements)	**	**	**	*	**	**
Quantities (as shown in FY 1980 submission)	**	**	**	-	**	**

* OPA is a nonauthorization appropriation, therefore, funding is not shown for the year following the budget year.
**Varying quantities of many different items (i.e., FY80 - 11 items, FY81 - 16 items).

The primary differences in FY 1979 are the result of significant cost savings on competitive contract awards for six of the twenty items procured. In addition, one item for $900 thousand was cancelled and small unit price adjustments were made to four other items. The change in FY 1980 is due to a $6.5 million Congressional reduction as follows: Small Unit Transceiver AN/PRC-68 cut $1 million; Very High Frequency (VHF) Transceiver Multicoupler cut one-half million dollars; Field Telephone TA-838 cut $1 million; and Teletypewriter Terminal AN/UGC-74 cut $4 million. Procurement funding for this cut program is contained in the Other Procurement, Army (OPA) Appropriation, Budget Activity 2 (Communications and Electronics Equipment), Telecommunications - Combat Support Communications Subactivity.

Program Element: #6.47.01.A
Title: Communications Engineering Development
DOD Mission Area: #256 - Tactical Communications
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F. (U) DETAILED BACKGROUND AND DESCRIPTION: The objective of this program is to develop tactical communications equipments and systems that will be employed by the Army from the forward edge of the battle area back thru the division and corps areas. Many of these items are also employed in the Theater Army area. This program does not include nor duplicate, those systems/equipment developed under the Joint Tactical Communications (TRI-TAC) Program, the Tactical Satellite Communications Ground Environment (TACSATCOM), and the Single Channel Ground and Airborne Radio Subsystem (SINCGARS-V). The projects under this program completed the development actions leading to the fielding of the current family of tactical net radios and ancillary items, and to the tactical multichannel/switching systems and equipment currently fielded and in production. This program now is primarily involved in the product improvement and enhancement of the current families of tactical net radios and associated ancillary items plus the tactical multichannel switched system assemblages and equipments. These improvements provide for increased capability, enhanced electronic countermeasures resistance, improved operational mobility, increased reliability, extended life cycle, reduced maintenance requirements, improved interface/interoperability with other systems, and facilitates the smooth transition to the future TRI-TAC, facilitates the smooth transition to the future TRI-TAC, TACSATCOM, and SINCGARS systems. This program develops those tactical communications equipment and ancillary items for unique Army purposes (i.e., Special Forces and Marinecraft), or that are not part of one of the three major systems indicated above but will be used in conjunction with these developments (i.e., Fiber Optic Cable Systems). This program also provides support for the Communications System Design Facility used to design, test, and evaluate technical equipment design modifications, solve interface problems by establishing a particular configuration in a laboratory environment and providing software technical support for fielded tactical automatic circuit and message switching systems. Support is also provided for the development of National (MIL STD 188 Series) and International (NATO and Quadripartite) Military Tactical Communications Systems Technical Standards). This program includes the Army's participation in the Engineering Development (ED) phase (starting in FY 1982) of the Joint Tactical Information Distribution System (JTIDS) Class 2 terminal program. Army participation is essential to insure that unique requirements to support JTIDS employment in the Air Defense Artillery role and other ground environments is designed in and adequately tested during the ED phase.

G. (U) 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 into Engineering Development by this effort. This program provides support to Program Element 6.37.46.A Single Channel Ground and Airborne Radio Subsystem (SINCGARS-V) for ancillary equipments/components such as antennae, amplifiers, etc. This program does not include nor duplicate, those systems/equipment developed under the Joint Tactical Communications (TRI-TAC) Program, the Tactical Satellite Communications Ground Environment (TACSATCOM), and the Single Channel Ground and Airborne Radio Subsystem (SINCGARS-V).

H. (U) WORK PERFORMED BY: The in-house Army developing organizations are the US Army Communications Research and Development Command (CORADCOM); Project Manager, Army Tactical Communications System (ATACS); and Project Manager, Single Channel Ground

Program Element: #6.47.01.A Title: Communications Engineering Development
DOD Mission Area: #256 - Tactical Communications Budget Activity: #4 - Tactical Programs

and Airborne Radio Subsystem (SINCGARS-V), all located at Fort Monmouth, NJ. Contractual efforts in FY 1981 will be performed by Tobyhanna Army Depot, PA; Hazeltine Corporation, Green Lawn, NY; Collins Radio, Cedar Rapids, IA; and Mitre Corporation, Bedford, MA. In addition, FY 1980 contract awards are planned for the Steerable Null Antenna Processor (SNAP), the Log Periodic Directional Antenna, and for the upgrading of the Communications Systems Design Center at the Center for Communications Systems at CORADCOM. In FY 1981 a contract will be awarded for the Survivable Low Profile Antenna.

1. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: Prior accomplishments include the completed development actions leading to the fielding of the current family of single channel tactical net radios and associated ancillary items (i.e., Radio Sets AN/VRC-12, AN/PRC-25, and AN/PRC-77); and the current inventory or in production items of tactical multichannel multiplexers/combiners/radios plus associated assemblages, tactical automatic and semiautomatic switching systems (AN/TTC-25, AN/TTC-38, SB-3082, SB-3614, and AN/TTC-41), Link Encryption Device (Key Generator TSEC/KG-27), Technical Control Facilities (AN/TSQ-84 and AMTSQ-85), Telephone Sets (TA-838 and 938) and Communications Terminal AN/UGC-74 (Smart Teletypewriter). Developments were completed and production initiated for the Small Unit Transceiver (AN/PRC-68), Combination Radio Set (AN/PRC-70) for Special Forces/Ranger Units, and improved antennae for manpack and vehicular versions of the current net radio family. Developments were completed and production initiated in FY 1977 for the upgrading of the Corps/Theater Area Multichannel Network to provide a 48/96 channel backbone system. Product improvements to multichannel assemblages plus new components were developed and completed by the end of FY 1979 to extend the useful life cycle, provide digital access and facilitate a smooth transition to future Joint Tactical Communications Program (TRI-TAC) developed digital switching systems. Initial production of these upgrading components and assemblages started in FY 1977 for the High Speed Serial Data Buffer (TD-1065), and the Band IV tuning head for the Army standard AN/GRC-103 Radio Set; FY 1978 for the Radio Terminal Set AN/TRC-151 and Radio Repeater Set AN/TRC-152; and FY 1979 for the upgrading components to the Communications Technical Control Facility AN/TSQ-84A and the Time Division Digital Multiplexer TD-1069. Continued support for the Communications Systems Design Facility and technical support for the development of National and International Tactical Communications System Technical Standards. Efforts were initited in FY 1979 to accelerate the Long Haul Fiber Optic Cable System Development thru taking advantage of industry accomplishments and moving directly from Exploratory development to Engineering Development. A system engineering, design, and specification preparation contract was initiated. This initial phase will also involve design trade offs and technical evaluations and selection of available fiber optic components to be used in the follow on Engineering Development hardware contracts.

2. (U) FY 1980 Program: Provide initial production support on the Time Division Digital Multiplexer TD-1069, AN/TSQ-84A Communications Technical Control Facility upgrading components, and the TD-1250 Multiplexer. Continue systems engineering,

Program Element: 6.47.01.A Title: Communications Engineering Development
DOD Mission Area: 7256 - Tactical Communications Budget Activity: 4 - Tactical Programs

design and specification preparation contractual efforts leading to a FY 1982 Long Haul Fiber Optics Cable System Engineerng Development contract award. Type classify the Digital Data Signal Generator SG-1139 and prepare procurement package for FY 1981 initial production contract. Award Engineering Development contracts for the Automatic Switchboard SB-3614 Product Improvement, the Steerable Null Antenna Processor (SNAP), the Log Periodic Directional Antenna and for the Fast Charge Dry Nickel Cadmium (NICAD) Battery BB-542, to be used with Radio Set AN/PRC-70. Provide technical support for the completion of a requirements document for a millimeter wave radio system. Continue fabrication of prototype models of the Teletypewriter Multiplexer Facility AN/TSC-97. Continue support for the Communications Systems Design Facility and technical support for National and International Tactical Communications System Technical Standards development. Award an Engineering Development contract for the upgrading of the Communications Systems Design Facility.

3. (U) FY 1981 Planned Program: Complete the fabrication of the prototype models of the Teletypewriter Multiplexer Facility AN/TSC-97 and initial testing. This assemblage houses the Time Division Digital Multiplex TD-1069 for employment at Corps Command and Area Nodes. The TD-1069 is already in production for Divisional employment and fills the need to economize on transmission channels between nodal points by combining teletypewriter and data systems into a single bit stream for transmission. Complete the Fiber Optic Cable system engineering, design and specification preparation contract; and prepare the Engineering Development hardware contract procurment data package. Prepare for the FY 1982 transition from Advanced Development phase to Engineering Development contract awards for the Area Distribution Fiber Optic Cable System and Millimeter Wave Command Post Radio to replace the heavy, bulky, slow to install multipair metallic distribution cables used in and around command posts from Brigade thru Corps level. Continue the development of the Automtic Switchboard SB-3614 Digitization Product Improvement to improve interoperability and extend secure voice capability resulting from the initial fielding of TRI-TAC digital switches; and extend the useful service life for use by active and reserve component forces. Continue Engineering Development on the Log Periodic Directional Antenna and complete Engineering Development and prepare for initial production of the Steerable Null Antenna Processor (SNAP). Both are devices employed on selected combat net radios in the forward area to provide enhanced resistance to electronic countermeasures. The Log Periodic Antenna is used primarily at command posts for vehicular or nonvehicular mounted radios while the SNAP is intended primarily for mobile operation with vehicular mounted radios. Award Engineering Development contract for a Survivable Low Profile Antenna for net radios/mounted in tracked combat vehicles. This antenna is to provide reliable, survivable operation from ballistic, shock and heat threats; and reduce the high visual signature presented by current tank mounted antennae. All necessary experimental work will be performed and the Survivable Low Profile Antenna will be ready for full scale development. Complete specifications and release solicitations for a FY 1982 award for a family of Standardized Quick Erectable Antenna Masts to replace the proliferation of incompatible, special purpose, slow to erect and manpower intensive antenna masts used for combat net radios, intelligence systems and multichannel microwave radio systems. Complete an Engineering Development contract for the upgrading of the Communications System Design Facility (CSDF). Continue support for the CSDF and technical support for National and International Military

Program Element: 6.47.01.A
DOD Mission Area: 6256 - Tactical Communications

Title: Communications Engineering Development
Budget Activity: 04 - Tactical Programs

Communications System Technical Standards development. Provide initial production support for the Digital Data Signal Generator SG-1139 and continue support to the Army Marinecraft Radio program.

4. (U) FY 1982 Planned Program: Award Engineering Development contracts for the High Power/Low Noise Radio Frequency Amplifier, the Broadband Vehicular Antenna, a family of standardized Quick Erect Antenna Masts for Single Channel and Multichannel radio systems, a Long Haul Fiber Optics Cable System, an Area Distribution Fiber Optic Cable System and a Millimeter Wave Command Post Radio System. All necessary experimental work will have been performed and the above items will be ready for full scale development. Continue monitoring Survivable Low Profile Antenna, Directional Antenna and Automatic Switchboard SB-3614 Product Improvement contractual efforts. Continue support of the Joint Tactical Information Distribution System (JTIDS) Class 2 terminal developments which transitions to Engineering Development in FY 1982. Continue participation in JTIDS technology assessments of Time Division Multiple Access (TDMA), Advanced Time Division Multiple Access (ATDMA) and Distributed Time Division Multiple Access (DTDMA) techniques for determination of best approach for improving JTIDS terminals. Continue support for the Communications System Design Facility and for National and International Tactical Communications Systems Technical Standards development. Provide initial production support for the Steerable Null Antenna Processor (SNAP), and the Militarized Digital Message Entry Device and rechargeable battery for the Special Forces Burst Communications System (SFBCS).

5. (U) Program to Completion: This is a continuing program for Projects D487 and 488. In the FY83-85 period primary emphasis will be on completion of engineering development and initiating production of the Survivable Low Profile Antenna, the Long Haul and Area Distribution Fiber Optic Cable Systems, the Millimeter Wave Command Post Radio System, the High Power/Low Noise Radio Frequency Amplifier, the Broadband Vehicular Antenna, and a family of Quick Erectable Antenna Masts. Engineering developments for a new family of tracked/wheeled vehicle Command Post/communications assemblages, an improved High Frequency radio set, and a Net Radio Retransmission Facility to support the Single Channel Ground and Airborne Radio System (SINCGARS) will be initiated. In Project D451, the Army will continue support of the JTIDS Class 2 terminal development phase to insure Army design parameters for ground environment employment are satisfied.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.04.A
Title: Unattended Ground Sensors (UGS)
DOD Mission Area: #255 Tactical Surveillance, Reconnaissance & Target Acquisition
Budget Activity: #4 - Tactical Programs

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	4000	2000	3918	7164	11105	44558
DL73	Remotely Monitored Battlefield Sensor System (REMBASS)	4000	2000	3918	7164	11105	44558

B. (U) 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 such as radar. 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 target development during all conditions of weather and visibility. This program element consists of one active ED program - REMBASS. REMBASS consists of unattended ground sensors, including seismic, seismic acoustic classifier, magnetic, infrared, relay devices, read-out devices, and power sources which will provide the field commander with a passive, unattended hand emplaced ground sensor system in FY 1983 and with an air and artillery delivery capability in FY 1985.

C. (U) BASIS FOR FY 1981 RDTE REQUEST: This year Engineering Development (ED) is involved with fabrication of hand emplaced sensors and read out devices to conduct Development Test II/Operational Test II, to conduct a development in-process review, and to continue development of air and artillery sensors and delivery.

Program Element: #6.47.04.A
DOD Mission Area: #255 Tactical Surveillance, Reconnaissance & Target Acquisition

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

D. (U) BASIS FOR CHANGE BETWEEN FY 1981 AND FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1979	FY 1980	FY 1981	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	4000	2000	3918	18269	44558
Funds (as shown in FY 1980 submission)	4000	2000	3500	15100	44349

The increases in the FY81 program and beyond reflects a Feb 79 DA decision to field a REMBASS hand emplaced capability in FY83 and an air and artillery capability in FY85.

E. (U) OTHER APPROPRIATION FUNDS: ($ in thousands)

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional To Completion	Total Estimated Cost
Other Procurement, Army						
PEWS						
Funds (current requirements)	0	0	0	0	10254	20710
Funds (as shown in FY 1980 submission)	0	0	0	0	0	12200
Quantities (current requirements)	0	0	0	0	3000	7000
Quantities (as shown in FY 1980 submission)	0	0	0	0	0	4000

PEWS procurement dollars reflect buying out the Army Acquisition Objective and do not include United States Marine requirements or any Foreign Military Sales. FY79 RDTE reductions in the REMBASS program have resulted in higher costs as the program

Program Element: #6.47.04.A
DOD Mission Area: #255 Tactical Surveillance, Reconnaissance & Target Acquisition

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

schedule has changed. REMBASS procurement dollars will be developed during the FY82-86 cycle, to include logistic backup. FY 1982/83 initial effort is to outfit 16 Active Army Divisions and the training base with hand emplaced REMBASS capability with an Initial Operational Capability of FY 1983. The FY 1984 and beyond effort will support the procurement of (a) additional hand emplaced items for eight reserve divisions, (b) the Active Army (16 Division) logistic backup, (c) full quantities of air and artillery delivered sensors and repeaters to equip the 16 Active Army Divisions, training base and eight reserve divisions. The REMBASS quantities are not shown above but are comprised of a variety of configuration end items such as seismic acoustic classifying sensors, relay devices, monitoring devices, power sources, and classifying sensors packaged in artillery shells.

Program Element: #6.47.04.A
DOD Mission Area: #255 Tactical Surveillance, Reconnaisance & Target Acquisition

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

F. (U) DETAILED BACKGROUND AND DESCRIPTION: The objective of this project is to develop the techniques of target detection, identification, and classification using passive remote sensors and to produce Engineering Development (ED) system models suitable for extensive user tests. Feasibility of the remote sensor concept was proven in Vietnam between 1968 and 1973. Selected Advanced Development (AD) models were tested and transitioned into ED as REMBASS. These items will meet the requirements of the user to detect, identify, and classify targets with an expected Initial Operational Capability (IOC) for a hand emplaced sensor system of FY 1983 and an IOC of FY 1985 for an air and artillery capability. It employs a variety of sensor types including magnetic, seismic, seismic acoustic classifier, and infrared. The REMBASS program made a major breakthrough in discriminating between personnel and wheeled and tracked vehicle targets. Data from field tests at Ft Huachuca in August 1979 demonstrated that the probability of the REMBASS classifying sensor correctly identifying personnel is 97%, wheeled vehicles - 73% and tracked vehicles - 89%.

G. (U) RELATED ACTIVITIES: Coordination between the services has been formalized with a Joint Service Memorandum of Agreement for Tactical Remote and Physical Security 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. There is extensive international interest in the REMBASS program. Inquiries have been received from Australia, Canada, Egypt, France, Germany, Israel, Korea, Norway, Saudi Arabia, Sweden, and the United Kingdom. Information has been provided to NATO panels and other international forums. Commander, European Command, initiated a combined (United Kingdom, Germany, United States) study program, AVID GUARDIAN, which proved conclusively that unattended ground sensors perform reliably and effectively under European conditions of heavy military traffic, high speeds, and severe weather. In addition to US Army Marine Corps, and NATO users, potential domestic users include the Federal Bureau of Investigation, State Department (Sinai Field Mission), Immigration and Naturalization Service, Drug Enforcement Agency and state law enforcement agencies. Domestic inquiries have been received concerning REMBASS-type hardware for protection of PERSHING missile battalions, MX missile, ground-launch CRUISE missile, and tactical aircraft (i.e., B-52). Army Remote Sensors (REMS) will be used at the Lake Placid Winter Olympics to provide security against unauthorized intrusion. This program element is the Engineering Development effort corresponding to 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. The Advanced Development (AD) work reported under program element 6.37.04.A REMBASS has been discontinued.

H. (U) WORK PERFORMED BY: Responsibility for management of the REMBASS project is assigned to Project Manager (PM), FIREFINDER/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, and Adelphi, MD; US Army

Program Element: #6.47.04.A
Title: Unattended Ground Sensors (UGS)
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Mobility Equipment Research and Development Command (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; RCA Corporation, Camden, NJ, and Burlington, MA; Analytics Incorporated, Philadelphia, PA; The Analytic Sciences Corporation, Reading, MA; Value Service Engineering, West Long Branch, NJ.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: REMBASS: Validation In-Process Review (IPR) for basic components of the REMBASS to enter Engineering Development (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, and engineering development contract was awarded in June 1977 to RCA Corporation. Platoon Early Warning System (PEWS): Fabrication of ED hardware for the 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 PEWS entered the production phase of development with contract award 31 July 1978 to International Signal and Control Corporation, Lancaster, PA, with an Initial Operational Capability scheduled for FY 1981.

2. (U) FY 1980 Program: Continue Engineering Development contract for REMBASS hand emplaced hardware. A final design review will be held and approval given for fabrication of these configuration end items. A procurement package for design and fabrication of the engineering development models of the air and artillery delivered sensor and repeater and the artillery Terminal Delivery Vehicle (TDV) will be prepared.

3. (U) FY 1981 Planned Program: Completion of hand emplaced hardware fabrication, the DT II/OT II testing of hand emplaced hardware. conduct of the development in-process review for hand emplaced REMBASS. Continuance of the air and artillery delivery capability development.

4. (U) FY 1982 Planned Program: Continue design and fabrication of air and artillery delivered sensor, repeater, and TDV. Award production contract for hand emplaced REMBASS end items, initial operational capability scheduled FY83.

5. (U) Program to Completion: Award production contract for air and artillery delivered sensor and repeaters and TDV in FY 1984.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.06.A
DOD Mission Area: #215 - Land Combat Support

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

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	905	948	290	0	Continuing	Not Applicable
	QUANTITIES						
D517	Radiac Equipment Engineering Development	905	948	290	0	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Radiological measurement detection and alarm equipment is required on the battlefield to enable the force to survive in a nuclear environment and to allow the commander to properly assess the nuclear environment when fighting the battle. Commanders require near-realtime knowledge of ground radiation patterns so that radiation hazard areas can be included in tactical plans. Commanders and medical personnel require the radiation history of individual soldiers and units so that soldiers or units approaching lethal radiation doses can be moved away from the threat environment and given prompt medical treatment appropriate to the level of radiation received. This program provides for the engineering development of the radiological survey and dosimetry equipment required by the Army. Current equipment measures delayed gamma radiation only; new equipment will have the important additional capability of measuring prompt (from fireball) radiation, and will detect both neutrons and gamma rays. The dynamic range of new devices will be substantially improved. Alarm capabilities to alert the threatened soldier are included in new equipment. Errors made in reading data are significantly reduced by proving for auto-ranging and digital read-out. New equipment will be reduced in weight and size, and will combine the capabilities of the family of current radiac meters into single units, thereby reducing the unit and man-carried load.

C. (U) BASIS FOR FY 1981 RDTE REQUEST: The aerial radiacmeter will complete low-rate initial production. The individual dosimeter, the tactical dosimeter, and the fixed installation monitor will complete developmental testing and will enter initial production. First article tests will be conducted on the vehicular radiacmeter. The X-ray probe for the alpha survey meter will continue engineering development.

Program Element: #6.47.06.A
DOD Mission Area: #215 - Land Combat Support

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

Major Milestones		Current Milestone Dates	Milestone Dates Shown in FY 1980 Submission
Radiacmeter			
Vehicular	IOC*	FY 1982	FY 1981
Aerial	IOC	FY 1982	FY 1982
Individual	IOC	FY 1983	FY 1982
Tactical	IOC	FY 1983	FY 1982
Installation	IOC	FY 1982	FY 1982
Monitor	IOC	FY 1982	FY 1982
X-Ray Probe	TC**	FY 1981	FY 1981

*IOC - Initial Operational Capability
**TC - Type Classification

The individual radiac meter IOC was delayed into FY 1983 because there was a 6-month delay in initiating operational/developmental testing by the user. The tactical radiacmeter IOC was delayed into FY 1983 because final test results from the proponent and the Independent Evaluation Report from the tester were delayed 9 months.

D. (U) BASIS FOR CHANGE BETWEEN FY 1981 AND FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1979	FY 1980	FY 1981	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	905	948	290	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	1055	948	1178	Continuing	Not Applicable

The decrease in FY 1979 funding occurred because $150K was reprogrammed from radiac engineering development into radiac advanced development. In FY 1981, limitations in Army total obligational authority have forced continuing this program at a reduced level.

Program Element: 06.47.06.A Title: Radiological Defense Equipment
DOD Mission Area: 0215 - Land Combat Support Budget Activity: 04 - Tactical Programs

E. (U) OTHER APPROPRIATION FUNDS: ($ in thousands)

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional To Completion	Total Estimated Cost
Other Procurement Army						
Funds (current requirements)	5900	3500	3700	3700	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	5000	3500	1300	-	Continuing	Not Applicable
Quantities (Numerous procurements of a variety of instruments)						

The estimate of 5000 in FY 1979 was in error. The estimate from the field was actually 5800. Fund estimates for FY 1981 have increased to 3700 because a facilitization (industrial base preparedness) program was in the interim initiated for the tactical dosimeter.

Program Element: #6.47.06.A Title: Radiological Defense Equipment
DOD Mission Area: #215 - Land Combat Support Budget Activity: #4 - Tactical Programs

F. (U) 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 semifixed installations. The objective of this program is to develop dosimetric devices having the performance parameters required by modern nuclear weapons, tactics, and doctrine. A family of radiological equipment is being developed to provide aerial, vehicular, dismounted, and fixed installation capabilities to measure both prompt (from fireball) and residual (from fallout) 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 dosimeters 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 and aerial radiacs provide for an extremely fast survey capability that does not exist today. The vehicular radiac system will mount in armored fighting vehicles and can effectively monitor outside fallout radiation levels from within the vehicle. The vehicular radiac may also be used in a dismounted role. The aerial radiac will be mounted in Army aircraft. It will automatically correct for altitude, and then compute and record the ground dose rate. The fixed installation fallout monitor will provide a capability to remotely monitor radiation in as many as 10 separate locations at fixed or semifixed installations such as depots or command posts. An X-ray probe for alpha radiation detection is being developed that will enable standoff detection of plutonium. This capability is required in the event of an accident involving plutonium scatter. Current procedures require a "hands and knees" survey with the alpha detector held within a few centimeters of the ground. Fewer items of new equipment will be required as rate metering and dosimetric capabilities are combined in multipurpose devices. Aural and visual alarms are included to warn the soldier of the presence of a threatening nuclear environment. User error is virtually eliminated with the inclusion of auto-ranging and digital read-out.

G. (U) RELATED ACTIVITIES: This effort is related to Exploratory Development conducted in Program Element (PE) 3.27.03.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 through the Tri-Services Radiac Working Group to preclude duplication.

H. (U) WORK PERFORMED BY: In-house Army efforts are performed by the US Army Electronics Research and Development Command (ERADCOM), 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; and Xetex Inc, Redwood City, CA.

Program Element: 6.47.06.A
Title: Radiological Defense Equipment
DOD Mission Area: 7215 - Land Combat Support
Budget Activity: 4 - Tactical Programs

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: Initiated low-rate initial production on the aerial radiac. Type classified the vehicular radiac for limited production and initiated production contract for vehicular installation. Initiated development testing of the fixed-installation radiation monitor. Completed development testing of the tactical dosimeter, and prepared for type classification. Initiated developmental and operational tests for the individual dosimeter.

2. (U) FY 1980 Program: Complete low-rate initial production for aerial radiac. Complete developmental testing on fixed installation monitor and individual dosimeter, and award initial production contracts. Type classify as standard the tactical dosimeter and award the initial production contract. Conduct first article tests on the vehicular radiac. Initiate developmental testing on the X-ray probe for the alpha survey meter and prepare the procurement package.

3. (U) FY 1981 Planned Program: Complete development testing of the X-ray probe for the alpha survey meter. Type classify the x-ray probe as standard, and procure 1000 units. Prepare a procurement package for the digital radiac Engineering Development contract. Continue low-rate initial production of the individual dosimeter, the tactical dosimeter, and the fixed-installation monitor.

4. (U) FY 1982 Planned Program: Develop Engineering Development prototype models for the digital radiac. Continue to investigate new technology, such as large-scale integration, that can substantially reduce production costs.

5. (U) Program to Completion: Type classify as standard the digital radiac, and enter limited production in FY 1984. Enter Engineering Development for the miniature airborne radiac (FY 1985), the data annotation system for the aerial radiac (FY 1985), and the miniature multipurpose radiac (FY 1986).

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.09.A
Title: Identification Friend or Foe (IFF) Equipment
DOD Mission Area: #254 - Tactical Command and Control
Budget Activity: #4 - Tactical Programs

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional To Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT QUANTITIES	0	1700	3233	6009	Continuing	Not Applicable
D530	IFF Equipment	0	1700	3233	6009	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Objective is to provide engineering development models of equipment to meet Army IFF requirements for Air Defense and Battlefield weapons. These requirements are a result of the shortcomings in IFF equipment discovered in the Israeli conflict and subsequent studies. Approach is to develop (1) an advanced air defense IFF system in coordination with the other services and our allies, to overcome the weaknesses of the current Mark XII system, (2) develop equipment for the noncooperative identification of aircraft by selected weapon platforms, to enable positive identification of foes and friends with malfunctioning transponders, (3) develop equipment and systems to satisfy Army requirements for identification of combat vehicles on the battlefield. Additional tasks include the application of the Mark XII IFF to new weapon/surveillance systems, and engineering development of selected identification aids, specifically, a multifunction radar transponder beacon.

C. (U) BASIS FOR FY 1981 RDTE REQUEST: Award contract for engineering development models of Mark XII IFF transponder technical improvements, and continue contracts for Mark XII IFF interrogator for the new air defense acquisition radar, and for the multifunction radar transponder beacon.

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1980 Submission
Award Contract, Mark XII Interrogator for Air Defense Acquisition Radar	FY80	Not Shown
Award Contract, Mark XII Improvements	FY81	Not Shown

Program Element: #6.47.09.A Title: Identification Friend or Foe (IFF) Equipment
DOD Mission Area: #254 - Tactical Command and Control Budget Activity: #4 - Tactical Programs

D. (U) BASIS FOR CHANGE BETWEEN FY 1981 and FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands).

	FY 1979	FY 1980	FY 1981	Additional To Completion	Estimated Cost
RDTE					
Funds (current requirements)	0	1700	3233	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	0	1700	2790	Continuing	Not Applicable

The Project D530 increase from $2790 to $3233 in FY81 reflects increased DOD emphasis on rapid development of a new identification system.

E. (U) OTHER APPROPRIATION FUNDS: Not Applicable

Program Element: #6.47.09.A Title: Identification Friend or Foe (IFF) Equipment
DOD Mission Area: #254 - Tactical Command and Control Budget Activity: #4 - Tactical Programs

F. (U) DETAILED BACKGROUND AND DESCRIPTION: The existing air defense IFF system, the Mark XII system, evolved from the Air Traffic Control beacon, and does not have performance consistent with secure military identification requirements. The Mark XII Radio Frequency design, by being constrained to work within the Air Traffic Control system, represents technology 30 years old or more, and hence does not provide any significant capability in a countermeasures environment. Because of this, the Mark XII has not been adopted as the NATO IFF standard, and the resulting IFF problem has prompted NATO to rate IFF as the number one priority for air defense. In response, Under Secretary Defense Research Engineering Memo of 19 Jan 79 established a Joint Service IFF Program to define and implement a NATO IFF system. Possible candidates for follow-on to the Mark XII include the NATO Identification System (NIS), Joint Tactical Information Distribution System (JTIDS), and an improved Mark XII. NIS is being defined by a Project Group within NATO, with US technical participation headed by the Massachusetts Institute of Technology (M.I.T), Lincoln Laboratory. Improvements to Mark XII may be of several types: improvement to individual items of equipment or functions within the current system to improve performance until a new identification system can be implemented, and/or a major change to the overall Mark XII system, probably consisting of a new mode of integration, which would reduce vulnerability to active exploitation. The NIS also includes the identification of ground targets, or Battlefield IFF, where no automatic identification system presently exists. Following Israeli reports of IFF problems in the Oct 73 conflict, the Defense Science Board studied the IFF situation, and their conclusions included the recommendation that the Army develop a Question and Answer (Q&A) IFF system for the identification of ground combat vehicles. Noncooperative IFF techniques are also being pursued. These offer the advantage of providing positive identification of hostiles as well as friends, permitting engagement at maximum ranges with current firing doctrines without adding equipment to each platform to be identified. The most advanced techniques are in the area of aircraft identification using radar signature analysis, and systems for HAWK and PATRIOT are likely to be the first to reach engineering development. Additional applications of the Mark XII system are also planned, including interface and installation in the new air defense acquisition radar, and possibly a version of an interrogator for Army attack helicopters, if helicopter air- to- air combat is viewed as a strong possibility. Finally, a multifunction radar transponder beacon is being sought by Special Forces units, to facilitate their locations and identification by Air Force and Navy support aircraft. It is anticipated that, for this application, an existing commercial beacon can be modified to perform satisfactorily.

G. (U) RELATED ACTIVITIES: Advanced Development efforts on NATO Identification System (NIS) including Battlefield Identification Friend or Foe, Mark XII Improvements and Noncooperative Identification are accomplished under Program Element 6.37.06.A. The Air Force and Navy are participants in the Joint Service development of NIS, with the overall program being coordinated by the Air Force System Program Office (SPO). This coordinated effort is designed to avoid possible duplication of effort.

Program Element: #6.47.09.A Title: Identification Friend or Foe (IFF) Equipment
DOD Mission Area: #254 - Tactical Command and Control Budget Activity: #4 - Tactical Programs

M. (U) WORK PERFORMED BY: Army IFF activities are managed by the Combat Surveillance and Target Acquisition Laboratories in Fort Monmouth, NJ. Application of Mark XII to the new air defense acquisition radar would be accomplished by Hazeltine Corporation of Greenlawn, NY. The multifunction radar transponder beacon would be accomplished by Motorola in Phoenix, AZ.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: This is a new start. In years past, this program element funded engineering development of the Mark XII IFF system.

2. (U) FY 1980 Program: Award a contract for application of the Mark XII system to new air defense acquisition radar. The interrogator will be a slight modification of the AN/TPX-46 used with HAWK missile. Award contract for multifunction radar transponder beacon, for use by Special Forces.

3. (U) FY 1981 Planned Program: Continue contracts for application of Mark XII to new air defense acquisition radar, and multifunction radar transponder beacon. Award contract for engineering development models of Mark XII technical improvements developed under PE 6.37.06.A. IFF. Specific improvements, as yet undefined, may include receiver modifications, a steering antenna, or a new secure mode 5 to reduce active exploitation. All necessary experimental work will be performed, and the proposed system will be ready for full-scale development.

4. (U) FY 1982 Planned Program: Continue contract for Mark XII improvements. If NIS program is sufficiently advanced, award contract for ED models of portions of NATO Identification System.

5. (U) Program to Completion: This is a continuing program. Future efforts will include engineering development models of NIS, for both air defense and battlefield applications, and engineering development models of noncooperative IFF signal processors, for both airborne and ground targets.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.10.A
Title: Night Vision Devices
DOD Mission Area: #215 - Land Combat Support
Budget Activity: #4 - Tactical Programs

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	2031	3000	6032	9251	Continuing	Not Applicable
	QUANTITIES						Not Applicable
DL70	Night Vision Devices	2031	3000	6032	9251	Continuing	Not Applicable

B. (U) 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 parts 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 efficiency approaching that of daylight. These devices are needed in order to provide for target acquisition and task accomplishment and enhanced survivability on the obscured, 24-hour-a-day battlefield. Exploitation of technological advances will permit fielding devices to meet this critical need. 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 maxium use of common sensors in the night sights of as many weapon systems as possible, and by making technology changes compatible with existing sights.

C. (U) BASIS FOR FY 1981 RDTE REQUEST: Development will continue on high-performance, lightweight Aviation Night Vision Goggles that will enable nap-of-the-earth flight operations under starlight and overcast starlight. The engineering development of the low-cost night vision aid will be started. These devices will make possible the fielding of night vision aids for the individual soldier in the numbers required at a cost which can be afforded by the Army.

Program Element: #6.47.10.A Title: Night Vision Devices
DOD Mission Area: #215 - Land Combat Support Budget Activity: #4 - Tactical Programs

D. (U) BASIS FOR CHANGE BETWEEN FY 1981 AND FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1979	FY 1980	FY 1981	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	2031	3000	6032	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	1872	3000	5463	Continuing	Not Applicable

Increase in FY 1979 ($159) was completion of dvelopment of a closed cycle cooler for the Night Observation Device, Long Range (AN/TAS-6). Increase in FY 1981 ($788) is to accelerate completion of Engineering Development of the pilot's goggles and night vision aids by one year in the face of inflation.

E. (U) OTHER APPROPRIATION FUNDS: ($ in thousands): Not Applicable

Program Element: #6.47.10.A
DOD Mission Area: #215 - Land Combat Support

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

F. (U) DETAILED BACKGROUND AND DESCRIPTION: With the current second generation Night Vision Goggles, pilots cannot fly nap-of-the-earth at less than 1/4 moonlight illumination. Development of a high-performance Aviation Night Vision Goggle, the objective of this program, will provide a capability to fly nap-of-the-earth with less than starlight illumination. The dramatic increase in capability has been made possible by the exploitation of recent advancements in third generation image intensification technology. The goggles will be used in all helicopters not equipped with the Pilot's Night Vision System (PNVS). Using the same third generation image intensification technology in a low-cost night vision aid will reduce the production cost of goggles for all other applications. Increases in reliability of these tubes will further reduce life cycle costs.

G. (U) RELATED ACTIVITIES: The United States Navy, Marines, and Air Force utilize the same sensors and/or end item equipment as the Army. The Army has configuration management responsibility for these sensors, which are being utilized by NATO allies as well. The efforts of the Services and our allies are closely coordinated, and duplication thus avoided. Advances realized in Program Element 6.37.10A, Night Visio- Advanced Development, are utilized.

H. (U) WORK PERFORMED BY: In-house work is performed by the United States Army Night Vision and Electro-Optics Laboratory, Fort Belvoir, VA. Current major contractors are Bell and Howell Corporation, Chicago, IL; Varian Associates, Palo Alto, CA; and ITT, Roanoke, VA.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 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), Night Observation Device, Long-range (NODLR) (AN/TAS-6), and Infrared (IR) Aiming Light AN/PAQ-4. Initiated Engineering Development of Pilots Night Vision Goggles.

2. (U) FY 1980 Program: Continue Engineering Development of a high-performance pilot's night vision goggles and start Development Test II and Operational Test II.

3. (U) FY 1981 Planned Program: Complete Engineering Development of pilot's goggles. Development and Operational Tests will be completed, maintenance and support concepts will be finalized and engineering changes made. Conduct Development Acceptance In-Process Review. Start Engineering Development of low-cost night vision aids. Fabricate Engineering Development model aids based on evaluation of competitive models from Advanced Development. All neccessary experimental work will be performed, and the proposed system will be ready for full-scale development.

Program Element: #6.47.10.A
DOD Mission Area: #215 - Land Combat Support

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

4. (U) FY 1982 Planned Program: Transition pilot's goggles to production. Continue engineering development of low-cost night vision aids. Start Engineering Development of Lightweight Weapon Sight and Combat Vehicle Thermal Driver's Viewer. All necessary experimental work will be performed, and the proposed systems will be ready for full-scale development.

5. (U) Program to Completion: This is a continuing program.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.11.A
Title: Aircraft Electronic Warfare (EW) Self-Protection Systems
DOD Mission Area: #257 - Electronic Warfare & Counter-C I
Budget Activity: #4 - Tactical Programs

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	9082	9928	12322	21055	Continuing	Not Applicable
	QUANTITIES						Not Applicable
DC52	Scout/Attack Helicopter Survivability Systems	2480	3150	7097	7061	Continuing	Not Applicable
D665	Special Electronic Mission Aircraft Survivability Systems	6602	6778	5225	13994	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program provides for the development, test, and type classification for production and fielding of Aircraft Survivability Equipment (ASE) systems required for the survival and increased combat effectiveness needs of tactical and special electronic mission aircraft (SEMA). This program addresses infrared, radar, laser, optical/electro-optical directed air defense threats and potential enemy airborne interceptors. The program is time-phased to be a logical follow-on advanced development from PE 6.37.11.A, Aircraft Electronic Warfare Self-Protection (AEWSP) Equipment. Resultant production programs provide for the survivability needed to meet tactical and special electronic mission aircraft (SEMA) requirements to increase combat effectiveness by reducing or eliminating the ability of threat air defense systems to detect, hit, damage, or destroy Army aircraft. The program is adjusted continually to meet the changing nature of technology and responds to stated user requirements, of threat documentation, and the Required Operational Capability (ROC) for Aircraft Survivability Equipment (ASE) for both current and developmental Army aircraft.

C. BASIS FOR FY 1981 RDTE REQUEST: This program provides for continued development/improvement of advanced infrared (IR), radar, and laser systems and subsystems to counter the maturing threats to the Army aircraft. These threats involve

primarily antiair systems but also include

represent an ever-increasing threat to the survival and combat effectiveness of Army tactical aircraft. This program continues the engineering development with incremental funding for the AVR-2 laser warning receiver to respond to this threat. Since the deployment of the basic SA-7 and SA-9, major improvements to these infrared (IR) missile systems have been made. This requires upgrading and supplementing of deployed IR countermeasure systems. The continued development of the improved source for the ALQ-144 IR jammer, the selected mission aircraft (SEMA) version of the ALQ-156 missile detector, the UH/EH-60 Blackhawk helicopter IR suppressor, and the initiation of the joint Army/Navy AAR-46 passive missile detector are included in this program to keep pace with the threat. US Army special electronic mission aircraft (SEMA) are seriously threatened by surface-to-air and air-to-air continuous wave (CW) homing missiles. The continuation of the Army's portion of the joint development program with the Navy of the ALQ-162 CW radar jammer is included in the program to address this threat and its projected growth.

D. (U) BASIS FOR CHANGE BETWEEN FY 1981 AND FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1979	FY 1980	FY 1981	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	9082	9928	12322	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	9082	9928	11995	Continuing	Not Applicable

The FY81 increase reflects a change in project D665 caused by program adjustments for inflation.

Program Element: #6.47.11.A Title: Aircraft Electronic Warfare (EW) Self-Protection Systems
DOD Mission Area: #257 - Electronic Warfare & Counter-C I Budget Activity: #4 - Tactical Programs

E. (U) OTHER APPROPRIATION FUNDS: ($ in thousands)

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional To Completion	Total Estimated Cost
Aircraft Procurement, Army						
Funds (current requirements)	30761	54479	31677	50480	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	28009	46627	39416	-	Continuing	Not Applicable
Quantities (current requirements)	1816	1336	883	1139	Continuing	Not Applicable
Quantities (as shown in FY 1980 submission)	1126	1718	1331	-	Continuing	Not Applicable

Procurement quantities include up to 17 different types of Aircraft Survivability Equipment (ASE) which support 11 separate aircraft modification lines. This program is closely coordinated with the aircraft programs. Funding and quantity differences for FY79, 80, and 81 reflect changes in ASE quantity requirements caused by changes to the aircraft production/modification schedules.

Program Element: #6.47.11.A
DOD Mission Area: #257 - Electronic Warfare & Counter-C I

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

F. (U) DETAILED BACKGROUND AND DESCRIPTION: This program, like the advanced development program, Aircraft Electronic Warfare Self-Protection Systems (AEWSP) Equipment, combines two engineering development (ED) projects managed by the Army Project Manager for Aircraft Survivability Equipment (PM-ASE): DC 52, Scout/Attack Helicopter Survivability Systems, and D665, Special Electronic Mission Aircraft Survivability Systems. Both projects were initiated in 1971 after the Soviets introduced the SA-7 shoulder-fired surface-to-air missile (SAM) in the Mideast. In 1972, the SA-7 was used against Army helicopters in Vietnam. The aircraft were quickly equipped with the infrared (IR) suppressors and low reflectance paint developed under this program and the advanced development program, PE 6.37.11.A, AEWSP Equipment. 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 (APR-25/26) were used to detect enemy radar-directed weapons. Together, these efforts demonstrated the need for and the credibility of aircraft survivability equipment (ASE) and countermeasures across the electromagnetic spectrum. Accordingly, requirements were established for present fleet and developmental aircraft to enable them to complete combat and combat support missions in the presence of the full range of modern sophisticated radar, IR, laser, optical, and electro-optical directed threat weapons on the mid-intensity battlefield. Since program initiation and the early success in Vietnam, the program has successfully developed countermeasures which have been subsequently produced and deployed to maintain the combat effectiveness of Army aircraft in the presence of an increasing threat.

G. (U) 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 for Aircraft Survivability Equipment (PM-ASE) and PE 6.32.15.A, Joint Survivability Investigations, for which the PM-ASE is the Senior Army Representative. In 1977, the Joint Logistics Commanders 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 and laser, warning receivers for most helicopters and selected fixed-wing aircraft; radar jammers, for attack and other selected helicopters/fixed-wing aircraft; and infrared (IR) jammers and pulse doppler missile warning detectors for selected helicopters and low/slow fixed-wing aircraft; (2) Navy: IR jammers for large helicopters, continuous wave (CW) radar jammers for Navy aircraft and Army special electronic mission aircraft (SEMA) and ultraviolet missile warning detectors for selected helicopters and fixed-wing aircraft; 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) Army Armaments Group (NAAG) and Quadripartite Working Groups. At the request of the German and United Kingdom representatives, discussions on the joint use of US Army ASE were conducted in 1978/1979 and are planned for 1980.

Program Element: 0.47.11.A
DOD Mission Area: 0257 - Electronic Warfare & Counter-C I

Title: Aircraft Electronic Warfare (EW) Self-Protection Systems
Budget Activity: 04 - Tactical Programs

H. (U) WORK PERFORMED BY: US Army Aviation Research and Development Command (AVRADCOM), St Louis, MO; US Army Electronics Research and Development Command (ERADCOM), Ft Monmouth, NJ; Electronic Warfare Laboratory, Ft 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; Calspan Corp., Buffalo, NY; Emerson Electronic, St Louis, MO; Grumman Aircraft Company, Bethpage, NY; Loral, Inc., Yonkers, NY; Garret AiResearch, Torrance, CA; Honeywell Inc., Lexington, MN; Perkin Elmer, Norwalk, CT; Sikorsky Aircraft Company, Stratford, CT; Bell TEXTRON, Hurst, TX.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 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 development models and applied to attack, observation and utility helicopters. This IR signature reduction equipment was successful in reducing the effectiveness of the SA-7 and convincingly proved that Army aircraft could survive against sophisticated infrared (IR) missiles. In 1976, improved IR suppressors were fielded to frontline US tactical aircraft in Germany, Korea, and the United States. Advanced development was completed, and engineerig 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 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 ALQ-156 missile detector system entered engineering development (ED) in 1976 and continued ED through FY 1978. The APR-39(V)2 advanced radar warning receiver and ALQ-136(V)1 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 control and transmission, initiated in FY 1976, were completed and entered production. The flat plate canopies to reduce glare for the OH-58 and AH-1 helicopters satisfactorily completed engineering development and were approved for production. Based on successful completion of engineering development (ED), production was initiated for the ALQ-144 infrared (IR) jammer (FY 1979), OH-58 IR suppressor (FY 1977), OV-1 IR suppressor (FY 1979), AH-1S IR suppressor (FY 1979), and RU-21 IR suppressor (FY 1978). The AVR-2 laser warning receiver entered ED under this program in FY 1979 and the development required to adapt the AH-1S IR suppressor to the EH-1 special electronic mission aircraft (SEMA) and UH-1 medical evacuation (MEDIVAC) aircraft was initiated in FY 1979. Also in FY 1979, development test (DT)/operational test (OT) II were performed for the APR-39(V)2 radar warning receiver and

Program Element: #6.47.11.A
Title: Aircraft Electronic Warfare (EW) Self-Protection Systems
DOD Mission Area: #257 - Electronic Warfare & Counter-C I
Budget Activity: #4 - Tactical Programs

ALQ-136(V)1 radar jammer. 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 equipment is 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 APR-39(V)1 and (V)2 radar warning receivers, the ALQ-144 IR jammer, the ALQ-136 radar jammer and the AVR-2 laser warning receiver.

2. (U) FY 1980 Program: This program continues the required development for the completion of ED testing/preparation for production decision for the APR-39(V)2 radar warning receiver, ALQ-136(V)1 radar jammer and the ALQ-156 (basic for CH-47) missile detector system. Production validation testing is to be performed on the Tactical Radar Threat Generator (TRTG), the AH-1S suppressor and the OV-1D IR suppressor. The program includes continued development for the incremented funding of the AVR-2 laser warning receiver and the initiation/continuation of the ALQ-156 (SEMA version) missile detector, the improved source for the ALQ-144 IR Jammer, the improved low-speed/hover IR suppressor for the UH/EH-60 Blackhawk helicopter and the Army's portion of the ALQ-162 continuous wave (CW) radar jammer development with the Navy.

3. (U) FY 1981 Planned Program: The FY 1981 program continues the engineering development (ED) for the AVR-2 laser warning receiver, the improved source for the ALQ-144 infrared (IR) Jammer, the ALQ-156 missile detector for Special Electronics Mission Aircraft (SEMA) applications, the improved low-speed/hover IR suppressor for the UH/EH-60 Blackhawk helicopter, and the Army's portion of the joint development with the Navy of the ALQ-162 continuous wave (CW) radar jammer. The joint development of the AAR-46 passive missile detector with the Navy will be initiated under this program in FY 1981.

4. FY 1982 Planned Program: This year's program includes the production validation testing for the EH/UH helicopter IR suppressor, the ALQ-136(V)1 radar jammer, the ALQ-156 (basic for CH-47) missile detector, and the APR-39(V)2 radar warning receiver. The FY 1982 program will continue the engineering development/tests for the AVR-2 laser warning receiver, the improved low-speed/hover IR suppressor for the UH/EH-60 Blackhawk helicopter, the Army's portion of the joint ED programs with the Navy for the ALQ-162 CW radar jammer and AAR-46 passive missile detector, and the SEMA version of the ALQ-156 missile detector. Under this program the radar warning receiver (RWR) modifications to the basic APR-39 series RWR will be initiated. This year's program also initiates the Army's portion of the joint service programs for expendables, advanced self-protection radar jammer (ASPJ) integration/testing and digital RF memory (DRFM) developments to upgrade radar jamming systems against frequency agile/pulse doppler radar threats.

5. (U) Program to Completion: This is a continuing program.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #DC52
Program Element: #6.47.11.A
Title: Scout Attack Helicopter Survivability Systems
Title: Aircraft Electronic Warfare (EW) Self-Protection Systems
DOD Mission Area: #257 - Electronic Warfare/ Counter-C³I
Budget Activity: #4 - Tactical Programs

A. (U) DETAILED BACKGROUND AND DESCRIPTION: The objective of this project is the development, test, and type classification of Aircraft Survivability Systems. These systems are made up of equipments selected from P.E. 6.37.11.A, Aircraft Electronic Warfare (EW) Self-Protection Equipment, project DB52, Scout/Attack Helicopter Survivability Equipment which have demonstrated the capability to significantly enhance the combat effectiveness of scout and attack helicopters. The approach is to continue development of selected infrared (IR), radar, optical and laser countermeasures and test/support equipment. Emphasis is placed upon integration of systems on specific aircraft as a part of its survivability suit, and assessment of the associated system reliability, availability, maintainability, facilities, and training requirements. This project also interfaces with and complements P.E. 6.47.11.A, Aircraft Electronic Warfare (EW) Self-Protection Equipment, project D665, Special Electronic Mission Aircraft (SEMA) Survivability Systems to provide the development of the complete protection suit of active and passive countermeasure hardware required for Army Aviation to maintain an effective tactical posture. Alternatives are determined by the US Army Materiel Development and Readiness Command/US Army Training and Doctrine Command (DARCOM/TRADOC) Permanent Steering Group (PSG) requirements analysis. Foreign state-of-the-art and enemy threat intelligence will be considered throughout the project.

B. (U) RELATED ACTIVITIES: Related Aircraft Electronic Warfare Self-Protection (AEWSP) developments are conducted by the Air Force and Navy for their specific needs. To preclude duplication of effort, these developments are coordinated through 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, the Joint Tri-Service Electronic Warfare Panel, and the Joint Technical Coordinating Group on Aircraft Survivability (JTCG/AS). Formal requirements documents submitted by each Service are also reviewed by other Services. Tasks in this project are a continuation of successful efforts initiated in PE 6.37.11.A, Aircraft Electronic Warfare (EW) Self-Protection Equipment, project DB52, Scout/Attack Helicopter Survivability Systems. Projects are closely coordinated to preclude an internal duplication of effort.

C. (U) WORK PERFORMED BY: United States (US) 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, Incorporated, Nashua, NH; International Telephone and Telegraph Corporation, Nutley, NJ; Tracor Incorporated, Austin, TX; Calspan Corporation, Buffalo, NY;

Project: #DC52 Title: Scout Attack Helicopter Survivability Systems
Program Element: #6.47.11.A Title: Aircraft Electronic Warfare (EW) Self-Protection Systems
DOD Mission Area: #257 - Electronic Warfare/ Counter-C³I Budget Activity: #4 - Tactical Programs

Loral Incorporated, Yonkers, NJ; American Electronics Laboratory, Lansdale, PA; Bell Helicopter International, Fort Worth, TX; Perkin-Elmer, Norwalk, CT; Sikorsky, Stratford, CT; Garrett Air Research, Torrance, CA.

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 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 development models and applied to attack, observation, and utility helicopters. This IR signature reduction equipment was successful in reducing the effectiveness of the SA-7 and convincingly proved that Army aircraft could survive against sophisticated infrared (IR) missiles. In 1976, improved IR suppressors were fielded to frontline 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 ALQ-144 IR Jammer, applicable to current tactical helicopters, as well as the AH-64 advanced attack helicopter, 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 airborne interceptors. The M-130 entered production in 1977. Vulnerability reduction efforts to harden the tailboom of the AH-1S COBRA helicopter were completed. The OH-58 vulnerability reduction programs for flight controls and transmission, initiated in FY 1976, were completed and entered production. The flat plate canopies to reduce glare for the OH-58 and AH-1 helicopters satisfactorily completed engineering development (ED) and were approved for production. Based on successful completion of ED under this project, production was initiated for the ALQ-144 infrared (IR) jammer (FY 1979), OH-58 IR suppressor (FY 1977), OV-1 IR suppressor (FY 1979), AH-1S IR suppressor (FY 1979), and RU-21 IR suppressor (FY 1978). The development required to adapt the AH-1S IR suppressor to the EH-1 special electronic mission aircraft (SEMA) and the UH-1 medical evacuation (MEDIVAC) aircraft was initiated in FY 1979. Most of the above equipment is being adapted as appropriate by other Services in accordance with the tri-Service Memorandum of Agreement.

2. (U) FY 1980 Program: This project will complete production validation testing for the AH-1S and the OV-1D IR suppressors. The project includes continued development for the incrementally funded AVR-2 laser warning receiver.

Project: #DC52 Title: Scout Attack Helicopter Survivability Systems

Program Element: #6.47.11.A Title: Aircraft Electronic Warfare (EW) Self-Protection Systems

DOD Mission Area: #257 - Electronic Warfare/ Counter-C I Budget Activity: #4 - Tactical Programs

3. (U) FY 1981 Planned Program: The FY 1981 program continues the engineering development (ED) for the AVR-2 laser warning receiver and initiates development of an improved source for the ALQ-144 infrared (IR) jammer and the improved low speed/hover IR suppressor for the UH/EH-60 Blackhawk helicopter. The joint Army/Navy development of the AAR-46 passive missile detector will be initiated in FY 1981.

4. FY 1982 Planned Program: Production validation testing for the EH-UH special electronic mission aircraft/medical evacuation aircraft (SEMA/MEDIVAC) IR suppressor will be conducted. The FY82 program will continue the ED/tests for the AVR-2 laser warning receiver, the improved low speed/hover IR suppressor for the UH/EH-60 Blackhawk helicopter. The radar warning receiver (RWR) modifications to the basic APR-39 series (RWR) will be initiated.

5. Program to Completion: The major efforts will be the completion of the AVR-2 improved laser warning receiver and low speed/hover IR suppressor for the UH/EH-60 Blackhawk helicopter. Additionally, the ED program for the outyears will initate development of low radar cross section hub covers for tactical helicopters, chaff expendables for use in the M-130 chaff/flare dispenser, a detector modification for the AVR-2 laser warning receiver, a/ radar jammer, the optical warning location/designation (OWL/D) system, optical jammers, and active laser countermeasures. Countermeasures against threat weapons require constant review and updating. All aircraft survivability programs, advanced development (AD) and engineering development (ED), 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).

6. (U) Major Milestones: Not Applicable

Project: #DC52 Title: Scout Attack Helicopter Survivability Systems
Program Element: #6.47.11.A Title: Aircraft Electronic Warfare (EW) Self-Protection Systems
DOD Mission Area: #257 - Electronic Warfare/ Counter-C I Budget Activity: #4 - Tactical Programs

7. (U) Resources ($ in thousands):

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	2480	3150	7097	7061	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	2480	3150	5825	-	Continuing	Not Applicable
Aircraft Procurement Army						
Funds (current requirements)	5433	9310	5829	16045	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	5976	9614	5572	-	Continuing	Not Applicable
Quantities (current requirements)	352	308	110	443	Continuing	Not Applicable
Quantities (as shown in FY 1980 submission)	-	-	-	-	Continuing	Not Applicable

The difference in RDTE funding for FY81 represents an increase due to project adjustments for inflation. Procurement funding variations reflect changes in Aircraft Survivability Equipment (ASE) applications to varying requirements in aircraft production/modification schedules.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D665 Title: Special Electronic Mission Aircraft Survivability Systems
Program Element: #6.47.11.A Title: Aircraft Electronic Warfare (EW) Self-Protection Systems
DOD Mission Area: #257 - Electronic Warfare/Counter-C3I Budget Activity: #4 - Tactical Programs

A. (U) 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 antiaircraft weapons using infrared, radar, or optical guidance. AEWSP systems are developed after feasibility has been demonstrated under Project D653, Special Electronic Mission Aircraft (SEMA) Survivability Equipment. The approach in this project is to continue the development of selected electronic active response, threat detection, and complementing ground support equipment. 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. (U) RELATED ACTIVITIES: This project interfaces with Project #DC52, Scout/Attack Helicopter Survivability Systems, which is included in Program Element 6.47.11.A. 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, the Joint tri-Service Electronic Warfare Panel, and the Joint Technical Coordinating Group on Aircraft Survivability (JTCG/AS). Formal requirements documents submitted by each Service are also reviewed by other Services. Projects in this Program are a continuation of successful programs initiated in PE 6.37.11.A.

C. (U) 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; Calspan Corporation, Buffalo, NY; Loral, Inc., Yonkers, NJ; American Electronics Laboratory, Lansdale, PA; Bell Helicopter International, Fort Worth, TX, Perkin-Elmer, Norwalk, CT; Honeywell, Lexington, MN.

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: The M-130 chaff/flare dispenser completed engineering development (ED) and entered production in 1977. The ALQ-144 infrared (IR) jammer successfully completed engineering development and the validation in-process review (IPR) was approved for production in 1978. The ED for the ALQ-136 radar jammer initiated in December 1976 was completed in FY79. The ALQ-136 is a lightweight radar jammer designed primarily for helicopter application to counter

threat radars associated with air defense guns and surface-to-air missiles. ED was continued on the ALQ-156 missile warning detector system, a lightweight pulse doppler radar that detects the approach of a missile and automatically triggers the M-130 flare dispenser. A full scale ED contract was awarded in January 1977 for the 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 APR-39(V)1 radar warning receiver (RWR) is designed. An ED contract was awarded in FY79 for the AVR-2 laser warning receiver designed to detect laser designators and/or laser range finders.

2. (U) FY 1980 Program: This program continues the required developments for the completion of engineering development (ED) testing/preparation for production decision for the APR-39(V)2 radar warning receiver, ALQ-136(V)1 radar jammer and the ALQ-156 (basic for CH-47) missile detector system. Production validation testing is to be performed for the Tactical Radar Threat Generator (TRTG), an aircrew training device mounted on a ground vehicle and capable of generating signals representative of those emitted by threat radars. Development continues for the incremental funding of the AVR-2 laser warning receiver and the initiation/continuation of the ALQ-156 missile detector for special electronic mission aircraft (SEMA), the improved source for the ALQ-144 infrared (IR) jammer (to defeat recently identified threats), the improved low speed/hover IR suppressor for the UH/EH-60 Blackhawk helicopter, and the Army's portion of the ALQ-162 continuous wave (CW) radar jammer development with the Navy.

3. (U) FY 1981 Planned Program: The FY 1981 program continues the ED for the ALQ-156 (basic for SEMA) missile detector, and the Army's portion of the joint development with the Navy of the ALQ-162 continuous wave (CW) radar jammer. The joint development of the AAR-46 passive missile detector with the Navy will be initiated under this program.

4. (C) FY 1982 Planned Program: This year's program includes the production validation testing for the ALQ-136(V)1 radar jammer, the ALQ-156 (basic for CH-47) missile detector, and the APR-39(V)2 radar warning receiver, the ALQ-156 (basic for SEMA) missile detector, and the Army's portion of the joint ED programs with the Navy for the ALQ-162 CW radar jammer and the AAR-46 passive missile detector. This program provides for the Army's portion of the joint service programs for [monopulse] expendables, advanced self-protection radar jammer (ASPJ) integration and testing, and digital RF memory (DRFM) developments.

5. Program to Completion: The major efforts will be the joint Army/Navy AAR-46 passive missile detector development, the ALQ-156 (basic for special electronic mission aircraft) missile detector, and the Army's portion of the joint service development of _____ expendables, advanced self-protection radar jammer (ASPJ), and digital radio frequency memory (DRFM)

Project: #D665 Title: Special Electronic Mission Aircraft Survivability Systems
Program Element: #6.47.11.A Title: Aircraft Electronic Warfare (EW) Self-Protection Systems
DOD Mission Area: #257 - Electronic Warfare/Counter-C^{3}I Budget Activity: #4 - Tactical Programs

developments in preparation for production. In addition, in the outyears, engineering development (ED) programs will be initiated for detector modification for the AVR-2 laser warning receiver, chaff expendables for use in the M-130 dispenser, a radar jammer developments, the optical warning location/designation system optical jammers, and active laser countermeasures. This is a continuing project and developments will be transferred from advanced development Project D653, Special Electronics Aircraft Mission (SEMA) Equipment. 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).

6. (U) Major Milestones: Not Applicable.

7. (U) Resources ($ in thousands):

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	6602	6778	5225	13994	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	6602	6778	6170	-	Continuing	Not Applicable
Aircraft Procurement, Army						
Funds (current requirements)	25328	45169	25848	34435	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	28009	46627	39416	-	Continuing	Not Applicable

Project: #D665 Title: Special Electronic Mission Aircraft Survivability Systems

Program Element: #6.47.11.A Title: Aircraft Electronic Warfare (EW) Self-Protection Systems

DOD Mission Area: #257 - Electronic Warfare/Counter-C^{3}I Budget Activity: #4 - Tactical Programs

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
Quantities (current requirements)	1464	1028	773	696	Continuing	Not Applicable
Quantities (as shown in FY 1980 submission)	1126	1718	1331	-	Continuing	Not Applicable

The FY81 net decrease reflects a combination of an increase due to program adjustments for inflation and a shift of $1.5 million from FY81 to FY82 to align the program with the incremental funding policy. This program is tied to and closely coordinated with the aircraft programs, and procurement funding and quantity variations reflect changes in aircraft survivability equipment (ASE) applications to varying requirements in aircraft production/modification schedules.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.12.A
Title: Tactical Data System (TDS) Interoperability
DOD Mission Area: #254 - Tactical Command and Control
Budget Activity: #4 - Tactical Programs

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	1500	4984	11928	19073	Continuing	Not Applicable
D321	Joint Advanced Tactical Command, Control, and Communications (C^3P) (TACS/TADS)	1500	0	0	0	0	28110
D323	USA TDS Interoperability	0	4984	9965	14109	Continuing	Not Applicable
D324	USA/NATO TDS Interoperability	0	0	1963	4964	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Tactical commanders have a requirement to be aware of the battlefield situation on a continuing near-realtime basis. To satisfy this requirement, a large amount of data received from a variety of sources must be continuously obtained, processed, correlated and displayed. This activity demands that tactical automated systems have the capability to exchange information readily. These programs support the Army's efforts to achieve its goal of tactical data systems interoperability through the establishment of interfaces and the development of standards, procedures, and protocols. The USA TDS Interoperability (D323) Project will increase the operational effectiveness of the Army'S battlefield automated systems through interoperability. A systems approach to automation interoperability engineering will be employed to accomplish the necessary materiel developer (Systems Engineer) actions during the interoperability development phases of: interoperability concept definition, technical interface design planning, system modifications, interoperability testing, configuration management, and post-deployment support. The development and implementation of this program not only satisfies an urgent need from an internal Army viewpoint, but also complements the Army's participation in the Joint Interoperability of Tactical Command and Control Systems (JINTACCS) program (6.47.79.A). The USA/NATO Tactical Data Systems Interoperability (D324) Project has been established to meet the requirement that US Army tactical data systems be compatible and be able to interoperate with systems of other NATO nations. Included in this project are design and standardization activities in satisfaction of the Culver Nunn Amendment which emphasizes the intent of Congress that equipment for US Forces in NATO should be standardized, or at least made interoperable with that of other NATO nations to the maximum extent possible.

Program Element: #6.47.12.A Title: Tactical Data System (TDS) Interoperability
DOD Mission Area: #254 - Tactical Command and Control Budget Activity: #4 - Tactical Programs

The intra-Army program is both influenced by and influences the design, implementation, and testing of US Army systems with NATO interoperability requirements.

C. (U) BASIS FOR FY 1981 RDTE REQUEST: USA TDS Interoperability: FY81 funds are required to implement the Intra-Army Interoperability Program. Actions planned include finalization of the Battlefield Interface Implementation Plan (BIIP), cost estimate for 36 automated interfaces, top-down system engineering design for data flow on the battlefield (Army Technical Interface Design Plan - ATIDP) and interface designs for the fire support, command and control and air defense battlefield functional areas. The initial planning and design of interfaces between eight pairs of automated systems will be accomplished. USA/NATO TDS Interoperability: FY81 funds are required to initiate technical and administrative support for those Army elements which are affected by the NATO TDS Program. These funds will also provide for Army involvement in the USA/NATO Command, Control, and Communications (C^3) committee structure. Included in this effort is the identification and technical assessment of NATO-agreed and US-endorsed interoperability requirements relative to tactical data equipment/systems.

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1980 Submission
a. Publish Battlefield Interface Management Plan (BIMP)	None Shown (See notes at end)	FY79
b. Publish Battlefield Automation Interoperability System Engineering Management Plan (BAISEMP)	FY79	None Shown
c. Initiate Definition of Design Standards for Interoperability	FY79	None Shown
d. Initiate Technical Interface Design Plans (TIDP's)	FY79	FY79
e. Publish Battlefield Interface Implementation Plan	FY80	None Shown
f. Initiate Emulation	FY81	FY80
g. Initiate Interop Tests Teleprocessing Design Center (TDC)	FY81	FY80

Program Element: #6.47.12.A
DOD Mission Area: #254 - Tactical Command and Control

Title: Tactical Data System (TDS) Interoperability
Budget Activity: #4 - Tactical Programs

h.	Initiate System Mods	FY81	FY80
i.	Initiate Compatibility and Interoperability (C&I) Tests	FY81	FY81
j.	Complete Army TIDP	FY81	None Shown
k.	Complete Functional TIDP'S	FY82	None Shown
l.	Complete Definition of Design Standard for Interoperability	FY82	None Shown
m.	Initiate Post Deployment Support	FY82	FY81
n.	Complete TIDP'S	FY85	FY84
o.	Complete Emulations	FY85	FY84
p.	Complete Emulation C&I	FY86	FY84
q.	Complete Systems Mods	FY87	FY85
r.	Complete C&I	FY87	FY85
s.	Begin Configuration Management (NATO TDS)	FY81	None Shown
t.	Prepare Test Bed Modifications (NATO TDS)	FY82	None Shown

Milestone a. (BIMP) replaced by milestones b. ((BAISEMP) overview plan) e. ((BIIP) detailed plan). Milestones c., j., l. added to reflect emphasis on a top-down engineering approach. Slippage of other milestones is due to lack of out-of-cycle personnel space authorizations in FY 1980 and elimination of TOS funding for FY 1980. TOS/TACFIRE was the initial TIDP developed in FY79. Milestones s. and t. have been added for the USA/NATO TDS Interoperability (D324) Project.

Program Element: #6.47.12.A Title: Tactical Data System (TDS) Interoperability
DOD Mission Area: #254 - Tactical Command and Control Budget Activity: #4 - Tactical Programs

D. (U) BASIS FOR CHANGE BETWEEN FY 1981 AND FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1979	FY 1980	FY 1981	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	1500	4984	11928	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	1500	6984	8100	Continuing	Not Applicable

The difference in funding profiles between the FY 1981 and the FY 1980 Congressional Descriptive Summaries for this program element is a result of the following: USA/NATO TDS Program (D324) funding cut of $2.0 million for FY 1980 was executed due to concern of possible duplication of effort between this program and the Joint Interoperability of Tactical Command and Control Systems (JINTACCS) Program (6.47.79.A). The FY 1981 funds for D324 project including all attendant activities are projected at $1.954 million; the FY 1981 funds for USA TDS Program (D323) have been increased by $1.874 million to include required project activities as necessitated by current interoperability plans in accordance with direction by the Vice Chief of Staff, Army, to support the Battlefield Automation Interoperability System Engineering Management Plan (BAISEMP).

E. (U) OTHER APPROPRIATION FUNDS: ($ in thousands): Not Applicable.

Program Element: #6.47.12.A Title: Tactical Data System (TDS) Interoperability
DOD Mission Area: #254 - Tactical Command and Control Budget Activity: #4 - Tactical Programs

F. (U) DETAILED BACKGROUND AND DESCRIPTION: The objective of USA TDS Interoperability (D323) is to increase the operational effectiveness of the Army's battlefield automated systems through interoperability. Placing fire on the target in direct coordination with sensors, troop action, and logistics support for the field commander is the interoperability objective. The effectiveness of individual weapon and support systems is multiplied by the ability of the commander to control his forces as an integrated battlefield system. Interoperability provides that force multiplier effect. Specific command and control interface requirements will be refined and optimized by coordination with the Training and Doctrine Command (TRADOC). Technical Interface Design Plans (TIDP) for the five functional battlefield groups to include Intelligence, Fire Support, Air Operation, Operations Control, and Admin/log and each system-to-system interface will specify the design, performance criteria, communications needs, and test criteria. Hardware and software modifications to weapon, sensor, and support systems will be made for systems to be tested. Compatibility and interoperability (C&I) tests will be conducted to demonstrate the effectiveness of data transfer across the system interfaces. Following successful C&I testing, Operational Effectiveness Demonstrations (OED) will be conducted to evaluate the performance of interoperable systems under field conditions. The objective of USA/NATO TDS Interoperability (D324) is to define levels of NATO National Tactical Data Systems interoperability in order to insure that the NATO combat forces can operate effectively as part of a multinational force. This program has been initiated in concert with a view toward strenghtening the North Atlantic Alliance. The Culver-Nunn Amendment of 1975 emphasized the intent of Congress that equipment for US Forces in NATO should be standardized or at least made interoperable with that of other NATO nations to the maximum extent possible. In order to realize these objectives, it is essential that system engineering design controls be applied to ongoing and planned US Army tactical data system projects concurrently with the development of system engineering interoperability plans. This approach will serve to guide all current/future US Army tactical data equipment/system design activity in satisfaction of Congrasional mandate, so as to maximize the operational effectiveness of combined NATO National tactical forces deployment. Both the system engineering plan and the interoperbility plan will be intergrated as much as possible with counterpart plans at the Joint and Intra-Army levels. The development and implementation of this program not only satisfies an urgent need from an internal Army viewpoint, but also complements Army participation in Joint (JINTACCS) and NATO (RSI) interoperability programs.

G. (U) RELATED ACTIVITIES:

1. (U) Program element 6.47.79.A/D310 and D309, Joint Interoperability of Tactical Command and Control Systems (JINTACCS). These programs have been established to meet the requirement for the Services' automated tactical command and control systems to be compatible and to interoperate in joint military operations. The intra-Army program is both influenced by and influences the design, implementation, and testing of Army systems participating in the JINTACCS (Army) program.

Program Element: #6.47.12.A Title: Tactical Data System (TDS) Interoperability
DOD Mission Area: #254 - Tactical Command and Control Budget Activity: #4 - Tactical Programs

2. (U) Communications Research and Development Command (CORADCOM) Interoperability Management Division of the Center for Systems Engineering and Integration (CENSEI) has developed a management plan which describes the responsibilities for accomplishing specific actions under each of the programs addressed in this summary. This plan provides the necessary guidance to Army agencies to preclude duplicate effort within the Army.

M. (U) WORK PERFORMED BY: USA TDS Interop (D323): Contractors: Computer Sciences Corporation, Red Bank, NJ. Analytics Corporation, Tinton Falls, NJ. MITRE Corporation, McLean, VA. In-House organization; US Army Communications Research and Development Command, Fort Monmouth, NJ.

USA/NATO TDS Interop (D324): To date this project has been unfunded; therefore, no contractual effort has been initiated. Significant contractual effort will be required once this program starts. The in-house organization responsible for this program is: US Army Communications Research and Development Command, Fort Monmouth, NJ.

1. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments:

a. (U) USA TDS Interoperability (D323) - Training and Doctrine Command (TRADOC) assembled the Army requirements for interoperability of automated systems in the Army Battlefield Interface Concept (ABIC-78). The first iteration was approved by Department of the Army on 28 Dec 78. The ABIC will be revised annually reflecting changes as required by the user community. Accomplishments, through support from Project Element 6.47.12/D321 Tactical Air Control System/Tactical Air Defense Systems (TACS/TADS), were to develop the US Army Material Development and Readiness Command DARCOM plan to complement ABIC requirements as the Battlefield Automation Interoperability System Engineering Management Plan (BAISEMP). Department of the Army approved the Plan on 30 May 1979. Actions begun in FY79 include: preparation of the Battlefield Interface Implementation Plan (BIIP) which contains the detailed procedures, schedules, and costs to implement ABIC; preparation of a refined cost estimate and interface assessment of ABIC 48; evaluation of the applicability of NATO, JINTACCS, and national standards to the technical parameters of the interface and identification of shortfalls for future standards; preparation of the Technical Interface Design Plan (TIDP) for the interoperability of the Tactical Operations System (TOS) and the Tactical Fire Direction System (TACFIRE).

b. (U) USA/NATO TDS Interoperability (D324) - NATO conferences/meetings have been attended to include the Allied Tactical Data Systems Interoperability Agency Military Command, Control and Informations Systems Working Group and STANAGS Subgroups to discuss and plan for interoperability of various systems (specifically TACFIRE and British and German equivalent

Program Element: #6.47.12.A Title: Tactical Data System (TDS) Interoperability
DOD Mission Area: #254 - Tactical Command and Control Budget Activity: #4 - Tactical Programs

systems). Additionally, project planning for D324 and coordination. with D323 project personnel have been accomplished for FY79 and prior years.

2. (U) FY 1980 Program: For USA TDS Interoperability (D233) Project, Communications Research and Development Command (CORADCOM) is managing and implementing the Army's efforts to achieve the interface requirements, as defined in the current Army Battlefield Interface Concept (ABIC), requiring support form Army Project Managers, laboratories, test activities, and contractors. The following specific tasks are being pursued: reassessment of system interface requirements as addressed in the ABIC, completion of the Battlefield Interface Implementation Plan (BIIP) and Technical Feasibility/Cost Estimate, documentation of efforts accomplished on the Tactical Operations System/Tactical Fire Direction System Technical Interface Design Plan (TOS/TACFIRE TIDP) for use in fire support and operations TIDP effort, preparation of the Army TIDP, which represents the top-down systems engineering approach to battlefield automation. In addition, the Army TIDP is establishing the relationships of Joint Interoperability of Tactical Command and Control Systems (JINTACCS), North Atlantic Treaty Organization (NATO), and intra-Army interoperability design requirements. Key systems will be identified to which interoperability standards will be written, applied and enforced. Functional group TIDP's are being prepared for fire support, operations and air defense. Eight system-to-system TIDP's will be intiated involving the following systems: TACFIRE, General Support Rocket System, Automated Target Hand-Off System, Field Artillery Meteorological Acquisition System, Remotely Piloted Vehicle, Position Locating and Reporting System, automation of the Tactical Operations Center and specified intelligence systems. TIDP and functional TIDP's will define the framework for achieving interoperability which will be compatible with the JINTACCS program approach. The system-to-system TIDP's will completely define the interface between each pair of systems. Procedures are being established for conducting compatability and interoperability tests and validation and independent evaluation of the results and the relationship of this program to JINTACCS test facilities. Review and assessment of interfaces between TACFIRE, Battery Computer System (BCS), and Mortar and Artillery Locating Radar (AN/TPQ-36 and AN/TPQ-37) will be conducted as specified in the first six priorities of the ABIC. USA/NATO TDS Interoperability (D324) Project, managed by Communications Research and Development Command (CORADCOM), will specify those systems and interfacing requirements effected by the USA NATO TDS Program in order that concept formulation of design interface requirements may begin in FY81. The basis for these design requirements is being derived from Army participation in the USA/NATO Command, Control and Communications committees and the JINTACCS (Army) Program. Those Army systems which will be affected at various levels by their NATO counterparts include the TACFIRE System, AN/TSQ-73, and the Tactical Operational Center (automated) support system for Corps and Supporting Elements. For those Army systems identified, Techaical Interface Design Plan (TIDP) development and Compatibility and Interoperability (C&I) test planning are being initiated. Planning will also begin for Configuration Management of Army systems which will be effected by NATO TDS interoperability requirements.

3. (U) FY 1981 Planned Program: Under USA TDS Interoperability (D323) Project, efforts initiated in FY 1980 will be

Program Element: #6.47.12.A Title: Tactical Data System (TDS) Interoperability
DOD Mission Area: #254 - Tactical Command and Control Budget Activity: #4 - Tactical Programs

continued, and the Army Technical Interface Design Plan (TIDP), Battlefield Interface Implementation Plan (BIIP) and Technical Feasability/Cost Estimate updated to reflect the latest user requirements established by TRADOC. The functional group TIDP for intelligence will be prepared. Priority in funding will be on emulation, design, and modification of systems for which system-to-system TIDP'S have been completed. Compatibility and interoperability tests will be initiated. Additional system-to system TIDP's will be produced based on reassessment of the priorities established in ABIC. For USA/NATO Interoperability (D324) Project the ABIC will also address those Army systems which are planned to be interfaced with the various NATO C^3 TDS. These should include the following: US Army Tactical Fire Direction System (TACFIRE) with its British and German equavalents; Missile Minder (AN/TSQ-73), with its German equivalent and the tactical operational center automated system for Corps and the supporting elements with its British and German equivalents. TIDP development will commence and compatability and interoperability (C&I) test planning for these system interfaces will continue throughout FY81. Configuration Management planning will continue and preparation will begin for modifications to the Army interoperability test bed.

4. (U) FY 1982 Planned Program: Complete the intelligence functional group Technical Interface Design Plan (TIDP). Previous iterative documents will be updated to reflect current user requirements. TIDP's completed in FY 1980 and FY 1981 will be updated, and configuation managed. Systems emulated at the TDC will be updated and design and modification of additional systems for test will be conducted. Engineering development for interface design of the Army systems which will interface with the NATO Command, Control and Communications TDS as provided in the ABIC will continue. Design modifications to the testbed will be implemented.

5. (U) Program to Completion: USA TDS Interoperability (D323) Project is a continuing program. The period after FY 1982 will include compatibility and interoperability testing for the remainder of interfaces defined in the Army Battelfield Interface Concept. A set of interface design standards will exist for developing tactical data systems. It is anticipated that new automated systems will be introduced and those in the field will be changed/updated. Therefore, there will be a continuing need for interoperability configuration management for developmental and operational systems. Completion of the USA/NATO TDS Interoperability (D324) Project will include development of system engineering and interoperability plans which will serve to guide all current and future US Army Tactical Data System (TDS)/equipment design activities. The result of these design activities when applied to Army TDS will satisfy the Culver Nunn Amendment which emphasizes the intent of Congress that equipment for US Forces in NATO should be standardized, or at least made interoperable with that of the other NATO nations to the maximum extent possible. Full-scale interoperability testing between US, GE, and UK Armies' tactical data systems by emulation techniques (or actual systems) in accordance with technical guidance of the engineering plans will be accomplished. Also included in this project is the development and implementation of an interoperabiltiy test program which will serve to verify and validate interoperability-and standardization objectives between US Army and other NATO national armies' tactical data systems/equipment. For both projects (D323 and D324), close coordination with the JINTACCS (D309) Project will be maintained.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D323 Title: US Army Tactical Data Systems (TDS) Interoperability
Program Element: #6.47.12.A Title: Tactical Data Systems Interoperability
DOD Mission Area: #254 - Tactical Command and Control Budget Activity: #4 - Tactical Programs

A. (U) DETAILED BACKGROUND AND DESCRIPTION: This project insures compatibility and operational effectiveness of the Army's Tactical Data Systems (TDS). Placing fire on the target in direct coordination with sensors, troop action, and logistics support for the field commander is the interoperability objective. The battlefield decision process is enhanced by timely and accurate information achieved by interoperable automated systems as defined by the Army Battlefield Interface Concept (ABIC). The effectiveness of individual weapon and support systems is multiplied by the ability of the commander to control his forces as an integrated battlefield system. Interoperability provides that force multiplier effect. A top-down system engineering approach will be used to fully implement battlefield interoperability. Specific command and control interface requirements will be refined and optimized by coordination with Training and Doctrine Command (TRADOC). Management, design, and test planning must be developed. A Technical Interface Design Plan (TIDP) for the five functional battlefield groups to include Intelligence, Fire Support, Air Operations, Operations Control, and Admin/Log and each system-to-system interface will specify the design, performance criteria, communications needs and test criteria. Hardware and software modifications to weapon, sensor, and support systems will be made for TDS systems as they become available. Compatibility and interoperability (C&I) tests will be conducted to demonstrate the effectiveness of data transfer across the system interfaces. Following successful C&I testing, Operational Effectiveness Demonstration (OED) will be conducted to evaluate the performance of interoperable systems under field conditions.

B. (U) RELATED ACTIVITIES:

1. (U) Program Element 6.47.79.A/D310 and D309, Joint Interoperability of Tactical Command and Control Systems (JINTACCS). These programs have been established to meet requirement for the Services automated tactical command and control systems to be compatible and to interoperate in joint military operations. The intra-Army program is both influenced by and influences the design, implementation and testing of Army systems participating in the JINTACCS (Army) program.

2. (U) Program Element 6.47.12.A/D324, USA/NATO Tactical Data Systems Interoperability. This program has been established to meet the requirement that US Army tactical data systems be compatible and to interoperate with systems of other NATO nations. Included in this project is design and standardization activities in satisfaction of the Culver Nunn Amendment which emphasizes the intent of Congress that equipment for US Forces in NATO should be standardized, or at least made interoperable with that of other NATO nations to the maximum extent possible. The intra-Army program is both influenced by and influences the design, implementation and testing of US Army systems with NATO interoperability requirements.

Project: #D323 Title: US Army Tactical Data Systems (TDS) Interoperability
Program Element: #6.47.12.A Title: Tactical Data Systems Interoperability
DOD Mission Area: #254 - Tactical Command and Control Budget Activity: #4 - Tactical Programs

3. (U) Effort for the US Army participation in NATO, JINTACCS, and intra-Army interoperability programs is controlled and coordinated within the Communications Research and Development Command (CORADCOM) Management Division in the Center for Systems Engineering and Integration, to assure no unnecessary duplication of effort.

C. (U) WORK PERFORMED BY: Contractors: Computer Sciences Corp., Red Bank, NJ. Analytics Corporation, Tinton Falls, NJ. Mitre Corporation, McLean, VA. In-house organization: US Army Communications Research and Development Command, Fort Monmouth, NJ.

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: Training and Doctrine Command (TRADOC) assembled the Army requirements for interoperability of automated systems in the Army Battlefield Interface Concept (ABIC-78). The first iteration was approved by Department of the Army on 28 Dec 78. The ABIC will be revised annually reflecting changes as required by the user community. Accomplishments, through support from Program Element 6.47.12/D321, Tactical Air Control System/Tactical Air Defense System (TACS/TADS), were to develop the US Army Materiel Development and Readiness Command (DARCOM) plan to complement ABIC requirements as the Battlefield Automation Interoperability System Engineering Management Plan (BAISEMP). Department of the Army approved the Plan on 30 May 1979. Actions begun in FY79 include: Preparation of the Battlefield Interface Implementation Plan (BIIP) which contains the detailed procedures, schedules, and costs to implement ABIC, preparation of a refined cost estimate and interface assessment of ABIC 78, evaluation of the applicability of NATO, JINTACCS and national standards to the technical parameters of the interface and identification of shortfalls for future standards. Preparation of the Technical Interface Design Plan (TIDP) for the interoperability of Tactical Operations System (TOS) and Tactical Fire Direction System (TACFIRE).

2. (U) FY 1980 Program: Communications Research and Development Command (CORADCOM) is managing and implementing the Army's efforts to achieve the interface requirement , as defined in the current Army Battlefield Interface Concept (ABIC), requiring support from Army Project Managers, laboratories, test activities, and contractors. The following specific tasks are being pursued; Reassessment of the system interface requirements as addressed in the ABIC; Completion of the Battlefield Interface Implementation Plan (BIIP) and Technical Feasibility/Cost Estimate; Documentation of efforts accomplished on the TOS/TACFIRE TIDP for use in Fire Support and Operations TIDP effort; Preparation of the Army TIDP, which represents the top-down systems engineering approach to battlefield automation. In addition, the Army TIDP is establishing the relationships of JINTACCS, NATO, and intra-Army interoperability design requirements. Key systems will be identified to which interoperability standards will be written, applied, and enforced. Functional group TIDP's are being prepared for Fire Support,

Project: #D323 Title: US Army Tactical Data Systems (TDS) Interoperability
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DOD Mission Area: #254 - Tactical Command and Control Budget Activity: #4 - Tactical Programs

Operations Control and Air Ops. Eight system-to-system TIDP's will be initiated involving the following systems: TACFIRE, General Support Rocket System, Automated Target Hand-Off System, Field Artillery Meteorological Acquisition System, Remotely Piloted Vehicle, Position Locating and Reporting System, automation of the Tactical Operations Center and specified intelligence systems. TIDP and functional TIDP's will define the framework for achieving interoperability which will be compatible with the JINTACCS program approach. The system-to-system TIDP's will completely define the interface between each pair of systems. Procedures are being established for conducting compatibility and interoperability tests and validation and independent evaluation of the results and the relationship of this program to JINTACCS test facilities. Review and assessment of interfaces between TACFIRE, Battery Computer System (BCS), and Mortar and Artillery Locating Radar (AN/TPQ-36 and AN/TPQ-37) will be conducted as specified in the first six priorities of the ABIC.

3. (U) FY 1981 Planned Program: *Efforts initiated in FY 1980 will be continued and the Army Technical Interface Design* Plan (TIDP), Battlefield Interface Implementation Plan (BIIP), and Technical Feasibility/Cost Estimate updated to reflect the latest user requirements established by Training and Doctrine Command (TRADOC). The functional group TIDP for intelligence will be prepared. Priority in funding will be on emulation, design, and modification of systems for which system-to-system TIDP's have been completed. Compatibility and interoperability tests will be initiated. Additional system-to-system TIDP's will be produced based on reassessment of the priorities established in Army Battlefield Interface Concept (ABIC).

4. (U) FY 1982 Planned Program: Complete the intelligence functional group TIDP. Previous iterative documents will be updated to reflect current user requirements. TIDP's completed in FY 1981 will be updated and configuration managed. Systems emulated at the Teleprocessing Design Center will be updated and design and modification of additional systems for test will be conducted.

5. (U) Program to Completion: This is a continuing program. The period after FY 1982 will include compatibility and interoperability testing for the remainder of interfaces defined in the Army Battlefield Interface Concept. A set of interface design standards will exist for developing tactical data systems. It is anticipated that new automated systems will be introduced and those in the field will be changed/updated. Therefore, there will be a continuing need for interoperability configuration management for developmental and operational systems. Coordination with JINTACCS and NATO interoperability programs will be maintained.

6. (U) Major Milestones:

Project: #D323 Title: US Army Tactical Data Systems (TDS) Interoperability
Program Element: #6.47.12.A Title: Tactical Data Systems Interoperability
DOD Mission Area: #254 - Tactical Command and Control Budget Activity: #4 - Tactical Programs

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1980 Submission
a. Publish Battlefield Interface Management Plan (BIMP)	FY79	FY79
b. Publish Battlefield Automation Interoperability System Engineering Management Plan (BAISEMP)	FY79	None Shown
c. Initiate Definition of Design Standards for Interoperability	FY79	None Shown
d. Initiate Technical Interface Design Plans (TIDP's)	FY79	FY79
e. Publish Battlefield Interface Implementation Plan	FY80	None Shown
f. Initiate Emulation	FY81	FY80
g. Initiate Interop Tests Teleprocessing Design Center (TDC)	FY81	FY80
h. Initiate System Mods	FY81	FY80
i. Initiate Compatibility and Interoperability (C&I) Tests	FY81	FY81
j. Complete Army TIDP	FY81	None Shown

Project: #D323 Title: US Army Tactical Data Systems (TDS) Interoperability
Program Element: #6.47.12.A Title: Tactical Data Systems Interoperability
DOD Mission Area: #254 - Tactical Command and Control Budget Activity: #4 - Tactical Programs

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1980 Submission
k. Complete Functional TIDP's	FY82	None Shown
l. Complete Definition of Design Standards for Interoperability	FY82	None Shown
m. Initiate Post Deployment Support	FY82	FY81
n. Complete TIDP's	FY85	FY84
o. Complete Emulations	FY85	FY84
p. Complete Emulation C&I	FY86	FY84
q. Complete System Mods	FY87	FY85
t. Complete C&I	FY87	FY85

Milestone a. (BIMP) replaced by milestone b. ((BAISEMP) overview plan) and e. ((BIIP) detailed plan). Milestone c., j., k., and l.k added to reflect emphasis on a top-down engineering approach. Slippage of other milestones is due to lack of out-of-cycle personnel space authorizations in FY 1980 and elimination of TOS funding for FY 1980. TOS/TACFIRE was the initial TIDP developed in FY79.

7. (U) Resources ($ in thousands):

Project: #D323 Title: US Army Tactical Data Systems (TDS) Interoperability
Program Element: #6.47.12.A Title: Tactical Data Systems Interoperability
DOD Mission Area: #254 - Tactical Command and Control Budget Activity: #4 - Tactical Programs

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	0	4984	9965	14109	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	0	4984	10100	-	Continuing	Not Applicable

FY81 difference is the result of a general Congressional reduction.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.13.A
DOD Mission Area: #216 - Land Combat Service

Title: Combat Feeding, Clothing, and Equipment
Budget Activity: #4 - Tactical Programs

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional To Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	3375	4526	2543	3463	Continuing	Not Applicable
DL40	Clothing and Equipment	2487	1029	1072	2519	0	Not Applicable
DL42	Personnel Armor System	265	0	0	0	0	Not Applicable
DL47	Wholesomeness Testing of Irradiated Foods	273	2497	0	0	0	Not Applicable
D548	Military Subsistence	350	1000	1471	944	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Success on the battlefield is directly related to the individual soldier's physical 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 soldier: 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, i.e., mountain climbing, extreme cold weather, and desert gear; the improvement of field food service equipment, fabric field shelters, field service equipment, and field printing equipment; and the evaluation of domestic and foreign food service equipment for effectiveness in meeting military food system requirements to avoid the expense of in-house research and development. This request provides for Navy, Air Force, and Marine Corps food service research requirements as part of the DOD Food Research, Development, Testing, and Engineering (RDT&Eng) Program managed by the Army as Executive Agent for all the Services and the Defense Logistics Agency (DLA).

C. (U) BASIS FOR FY 1981 RDTE REQUEST: This program provides for correction of known deficiencies in items of individual clothing and equipment and allows the completion of Engineering Development on items transitioning from Advanced Development programs. The improvements planned under this program will incorporate the latest developments in material and equipment design and are expected to significantly increase individual combat efficiency under the diverse geographical and climatological battlefield conditions. Food service developments in this and related Program Elements (PE's) provide for more efficient (and cost-effective) provision of this vital element of life support systems for the Joint Services under conditions of peacetime training, emergency deployment, and combat. The work to be performed under this request allows for exploitation to

Program Element: #6.47.13.A
DOD Mission Area: #216 - Land Combat Service

Title: Combat Feeding, Clothing, and Equipment
Budget Activity: #4 - Tactical Programs

methods, materials, and capabilities developed under related basic research programs and deemed suitable for Engineering Development prior to adoption as Standard.

D. (U) BASIS FOR CHANGE BETWEEN FY 1981 and FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1979	FY 1980	FY 1981	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	3375	4526	2543	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	1385	4529	5334	Continuing	Not Applicable

The increase in funds in FY 1979 was to satisfy an urgent requirement for a combat vehicle crewman's (CVC) uniform. Funds for FY 1981 were decreased following the proposed termination of the program for wholesomeness testing of irradiated foods. The Army decision to terminate irradiated foods research (Project DL47) includes an offer to transfer research assets associated with this program to the US Department of Agriculture. The reduction in this PE FY 1981 is almost entirely the result of this termination action and the elimination of Project DL47, Wholesomeness Testing of Irradiated Foods. FY80 reduction is the result of a general Congressional reduction.

E. (U) OTHER APPROPRIATION FUNDS: Not Applicable.

Program Element: 6.47.13.A Title: Combat Feeding, Clothing, and Equipment
DOD Mission Area: 9216 - Land Combat Service Budget Activity: 4 - Tactical Programs

F. (U) 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 engineering of operational rations and food service equipment and development of improved field shelters. The projects within this Program Element directly affect the soldier's safety, effectiveness, comfort, and survivability. This is the final stage of development for items transitioning from Advanced Development Program Elements comprising the Army clothing, individual equipment, and DOD food system development programs.

G. (U) RELATED ACTIVITIES: Each of the military Services performs work to develop its Service-peculiar items of clothing and equipment; however, to preclude duplication of effort, close coordination is maintained, through tri-Service working groups, and many of the items developed under this program are used by all the Services. The Army has overall responsibility, to include funding, for the Department of Defense (DOD) Food, Research, Development, Testing, and Engineering (RDT&Eng) Program, which includes specific efforts to respond to DOD and the Joint Services' requirements. Related work in clothing and equipment is conducted in PE 6.27.23.A, Clothing, Equipment, and Shelter Technqlogy; PE 6.37.47.A, Project D669, Clothing and Equipment. Work in food is conducted PE 6.11.02.A, Project AH52, Research in Support Equipment of Individual Soldier; in PE 27.24.A, Project AH99, Food Technology; and in PE 6.37.47.A; Project D610, Food Advanced Development.

H. (U) WORK PERFORMED BY: The US Army Natick Research and Development Command at Natick, MA, performs the majority of in-house efforts. 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; US Army Cold Regions Test Center, Fort Greely, AL; Letterman Army Institute of Research, San Francisco, CA; US Army Research Institute of Environmental Medicine, Natick, MA.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: Completed Development Test II/Operational Test II (DT II/OT II) on personnel armor system (infantry helmet and fragmentation vest), and adopted the system as standard equipment to replace what was essentially World War II (WW II) and Korean War vintage equipment. Contracted for ski mountain boot for DT II/OT II testing. Type classified Phase I of combat vehicle crewman (CVC) clothing system (includes one-piece hot weather coverall jacket, and summer gloves). Initiated ED of Phase II of the CVC system (includes coverall liner, insulated NOMEX balaclava protective face mask, ballistic shell for DH-132 helmet, summer and winter leather boots, and standard overboots with modified closure). Held Development Acceptance In-Process Review (DEVA IPR) for aircraft cold-weather sleeping bag and adopted item. Product-improved the sun, wind, and dust goggles as ballistic eye protection for CVC. DEVA IPR was held for temperate battle dress uniform (combat camouflage uniform shirt and trousers were approved for use by Army personnel on 3 November 1978). Evaluated foreign

Program Element: #6.47.13.A Title: Combat Feeding, Clothing, and Equipment
DOD Mission Area: #216 - Land Combat Service Budget Activity: #4 - Tactical Programs

and domestic food service equipment for potential in field, garrision and hospital food service system applications. The mobile field kitchen was adopted as Army Standard and is now being issued to troop units users replacing the World War II vintage M45 tent kitchen.

2. (U) FY 1980 Program: Fabricate battle dress unifrom for test in tropic. Complete DT II/OT II on Phase II of CVC clothing system and hold DEVA IPR. Complete Engineering Development (ED) on ski mountain boot. Initiate ED on a new infantry combat boot. Continue short-term improvements to Army and United States Marine Corps (USMC) field food service equipment. Evaluate foreign and commercial food service equipment. Complete ED on food service equipment for military Services to include USMC field refrigeration equipment and three-pan bake oven. Continue short-term improvements for field feeding equipment. Initiate insect-resistance testing of alternative protective packaging materials for incorporation in the initial procurement of the new meal ready-to-eat (MRE) individual combat ration.

3. (U) FY 1981 Planned Program: Complete ED on battle dress uniform program. Conduct DT II/OT II on infantry combat boot. Award contract for arctic canteen prototypes for DT II/OT II. Initiate ED on chemical warfare agent patient wrap, ballistic explosive ordnance disposal (EOD) suit, and modular general purpose tentage. Initiate ED of Army continuous flow bakery system leading to DEVA IPR and type classification. Initiate ED on improved heating sources for field feeding equipment to include use of alternative fuels. Continue evaluation of selected domestic and foreign food service equipment for potential Services use in garrison and/or field food service systems. Continue insect-resistance testing of MRE package.

4. (U) FY 1982 Planned Program: Continue ED on those tasks not completed in FY81. Initiate ED on armor protection for advanced attack helicopter crews, extreme cold weather flying gloves; petroleum, oil, lubricants (POL) handwear; combat vehicle crewman (CVC)/artilleryman ballistic/noise attenuation helmet; transportable helicopter enclosure; and ballistic eye protective goggles. Complete ED on modular tentage, infantry combat boot, and continuous flow bakery system. Continue ED of improved heating sources. Continue evaluation of domestic and foreign food service equipment for possible Services' application.

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

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.14.A
Title: Tactical Electric Power Sources
DOD Mission Area: #216 - Land Combat Service Support
Budget Activity: #4 - Tactical Programs

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	1118	5095	3938	6056	Continuing	Not Applicable
	QUANTITIES						
D194	Engine Driven Generators	828	750	856	3051	Continuing	Not Applicable
D196	Silent Power Generating Sources	290	4345	3082	3005	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The 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 in the inventory. Current engine-driven generators, particularly in the power range of 0.5 Kilowatt (kW) to 10 kW, have low power efficiency, are noisy, have easily detected heat (infrared) signatures, are heavy and bulky, require excessive maintenance, and are not fuel efficient. This program will provide the Army with improved tactical power generation equipment to achieve major benefits with respect to mobility, noise, heat reduction, increased power efficiency, reduction in fuel consumption, commonality of components, standardization to reduce number of different types of generators, and 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, inefficient generators which will degrade effectiveness of supported combat systems, and increase operational costs due to higher fuel consumption.

C. (U) BASIS FOR FY 1981 RDTE REQUEST: Funding is required to continue 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:

Program Element: #6.47.14.A
DOD Mission Area: #216 - Land Combat Service Support

Title: Tactical Electric Power Sources
Budget Activity: #4 - Tactical Programs

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1980 Submission
Complete test model design/fabrication	4th Qtr FY 1981	4th Qtr FY 1980
Complete development and operational tests	2nd Qtr FY 1983	1st Qtr FY 1982
Development acceptance in-process review	3rd Qtr FY 1983	3d Qtr FY 1982

Milestones have been delayed by one year due to reprograming of FY 1979 funds to meet a critical high-priority project that developed after the FY 1980 budget was submitted.

D. (U) BASIS FOR CHANGE BETWEEN FY 1981 AND FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1979	FY 1980	FY 1981	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	1118	5095	3938	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	3027	5095	5850	Continuing	Not Applicable

The FY 1979 decrease reflects reprograming by the Army of funds from Silent Power Generating Sources to meet a critical high-priority project that developed after the budget was submitted. The FY 1981 reduction in funding reflects a 1-year delay in completion of skill performance aids (SPA) in project Silent Power Generating sources and a 30 kW low fuel consumption turbine generator in project Engine-Driven Generators due to a revision of Army funding priorities.

Program Element: #6.47.14.A
DOD Mission Area: #216 - Land Combat Service Support

Title: Tactical Electric Power Sources
Budget Activity: #4 - Tactical Programs

E. (U) OTHER APPROPRIATION FUNDS: ($ in thousands)

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional To Completion	Total Estimated Cost
Other Procurement, Army: Item: Generator Set, GTED, 10 kW, 60 Hz						
Funds (current requirements)	0	0	0	0	158000	166600*
Funds (as shown in FY 1980 submission)	0	0	12600	-	51000	69100
Quantities (current requirements)	0	0	0	0	5817	5917*
Quantities (as shown in FY 1980 submission)	0	0	485	0	1931	2393

The FY 1981 procurement request was deferred pending completion of additional test requirements.

*The total estimated cost increase reflects an increase in the total number of sets required. The basis of issue and the distribution plans are currently being revised and will be reviewed in an In-Process Review (IPR) to be held in February 1980.

Program Element: #6.47.14.A Title: Tactical Electric Power Sources
DOD Mission Area: #216 - Land Combat Service Support Budget Activity: #4 - Tactical Programs

F. (U) DETAILED BACKGROUND AND DESCRIPTION: This program supports development of power generation and related equipment to satisfy the Army's requirements for efficient and reliable 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 units for silent power generation, 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, higher in reliability, and have low aural and thermal signatures.

G. (U) RELATED ACTIVITIES: In order to prevent a duplication of effort, the Army maintains continuing coordination with 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.

H. (U) WORK PERFORMED BY: In-house effort and contract monitoring is performed by US Army Mobility Equipment Research and Development Command, Fort Belvoir, VA. Contractors to be competitively selected in FY 1980 have not yet been identified.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: The Development Test II/Operational Test II (DT IIA/OT IIA) of the 10kW 60 Hz gas turbine generator were completed. A special verification test to insure operation on contaminated fuel was successfully completed on this generator.

2. (U) FY 1980 Planned Program: Engineering Development of 10kW turbine-engine silencing kits will be initiated. Contractual efforts will be initiated for the design and fabrication of a 1.5kW methanol fuel cell member of the Silent Lightweight Electrical Energy Plant (SLEEP) family. Efforts on the 1.5kW fuel cell represent a new ED start in FY 1980. Phase I design and analysis and component development and tests will be completed. The Validation In-Process Review (IPR) to make a decision for type classification and procurement of the 10kW 60Hz gas turbine generator is scheduled for February 1980.

Program Element: #6.47.14.A Title: Tactical Electric Power Sources
DOD Mission Area: #216 - Land Combat Service Support Budget Activity: #4 - Tactical Programs

3. (U) FY 1981 Planned Program: Continue Engineering Development of the 1.5 kW methanol fuel cell power plant. Fabricate preliminary full-size 3.0 kW and 50 kW fuel cell power plants and test. Initiate preparation of skill performance aids for these power plants. Test silenced models of the 10kW 60 Hertz (Hz) generator.

4. (U) FY 1982 Planned Program: DT II and OT II will be conducted on the silenced 10kW 60Hz generator. DT II will also be conducted on the 1.5kW methanol fuel cell power unit and OT II will be initiated. Engineering Development of the 3.0kW and 5.0kW methanol fuel cell power plants will be initiated. Engineering Development also will be initiated on the 30kW recuperative gas turbine generator to improve its fuel consumption. 10kW turbine generators will be fabricated with component changes to provide 400 Hz for DT II/OT II tests.

5. (U) Program to Completion: This is a continuing program.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.17.A Title: General Combat Support
DOD Mission Area: #216 - Land Combat Service Support Budget Activity: #4 - Tactical Programs

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	3726	5636	12229	13961	Continuing	Not Applicable
	QUANTITIES						
DH01	Combat Engineer Equipment	640	759	865	2999	Continuing	Not Applicable
DH14	Container Distribution Equipment	605	550	0	0	Continuing	Not Applicable
DL17	Camouflage	0	853	0	0	Continuing	Not Applicable
DL39	General Support Equipment	1033	1872	2377	2571	Continuing	Not Applicable
DL41	Fuels Handling Equipment Systems	0	0	1550	3366	Continuing	Not Applicable
D429	Tactical Rigid-Wall Shelters	725	844	6479	3647	Continuing	Not Applicable
D461	Marine Oriented Logistics Equipment	0	0	0	261	Continuing	Not Applicable
D832	Combat Medical Materiel	723	758	958	1117	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The Army requires new and advanced combat support and combat service support equipment to provide responsive logistics resupply and increased ground mobility capabilities to the current and future battlefield. The effectiveness and survivability of the combat forces in a hostile situation is highly dependent on the capabilities to supply vital cargo, such as fuel, ammunition, food and medical supplies to field units quickly and in the required quantities, and to provide hardened shelters to preserve communications, command, and control capabilities in either a nuclear or non-nuclear battlefield environment. Primary objectives of this program element are to provide materiel that will increase the Army's tactical mobility, increase battlefield survivability, and reduce the logistics burden through: a new family of tactical bridging to improve capabilities for crossing rivers and natural barriers; new water purification equipment to insure adequate supplies of potable water from any source; equipment capable of offloading, transporting and handling containerized cargo and bulk fuels; a new family of multiuse standard tactical shelters, hardened against nuclear, ballistic, and chemical/biological threats, to protect sophisticated electronic equipment; camouflage systems to defeat enemy surveillance threat; Army-peculiar watercraft for logistics resupply; new and more efficient environmental control equipment (heating/air-conditioning); and new and improved field casualty treatment systems vital for maintaining combat effectiveness.

Program Element: 6.47.17.A Title: General Combat Support
DOD Mission Area: 0216 - Land Combat Service Support Budget Activity: 04 - Tactical Programs

C. (U) BASIS FOR FY 1981 RDTE REQUEST: Funding is required to conduct Engineering Development (ED) of US-designated components of internationally standard Bridging for 1985 and Beyond; a jointly required Army and Marine Corps amphibious reconnaissance boat; a 250,000 British Thermal Unit per Hour (BTUH) multifuel heater; a high-rate output water purification unit; a rapidly emplaceable petroleum pipeline outfit; a standard family of tactical shelters and hardened shelters to house critical communications and electronics systems; and various equipment for field medical support in a combat environment.

D. (U) BASIS FOR CHANGE BETWEEN FY 1981 AND FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1979	FY 1980	FY 1981	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	3726	5636	12229	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	6186	5777	10266	Continuing	Not Applicable

The net decrease in FY 1979 funding reflects the combined effects of: deletion of user requirement and termination of efforts to develop an electronic container identification system under project DH14 (Container Distribution System); deferral of proposed efforts in project DL17 (Camouflage) due to lack of user requirements documentation; deferral of efforts in project DL41 (Fuels Handling Equipment Systems) due to program realignment and funds reprogramed to its counterpart Advanced Development project DK41, "POL Distribution Systems," under PE 6.37.26.A, "Combat Support Equipment"; reduction in scope of efforts in project DL39 (General Support Equipment) due to rescheduling of high-capacity water purification equipment development; and a partial offset increase in DH01 (Combat Engineer Equipment) to initiate efforts on a silently-propelled inflatable reconnaissance boat required jointly by the Marine Corps and Army for special missions. The decrease in FY 1980 funding is a result of minor budgetary adjustments applied to four projects in the Program Element. The net decrease in funding requirement for FY 1981 reflects the combined effects of: reductions in projects DH01 and DL39, and increases in projects DL41 and D832 (Combat Medical Materiel) due to refined program objectives and scheduling for various specific hardware items; increase in project D429 (Tactical Rigid-Wall Shelters) to initiate efforts on hardening of shelters against nuclear, ballistic, and chemical/biological threats; deferral of proposed efforts in projects DH14, DL17, and D461 (Marine Oriented Logistics Equipment), due to delay in completing prerequisite Advanced Development of various items resulting from lack of approved user requirements, budgeting reprograming actions, or assigned low priority.

Program Element: #6.47.17.A Title: General Combat Support
DOD Mission Area: #216 - Land Combat Service Support Budget Activity: #4 - Tactical Programs

E. (U) OTHER APPROPRIATION FUNDS: ($ in thousands)

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional To Completion	Total Estimated Cost
Other Procurement, Army						
Ribbon Bridge Erection Boat:						
Funds (current requirements) 1/	0	0	8300	13300	45152	79752
Funds (as shown in FY 1980 submission)	0	0	7700	-	57500	78200
Quantities (current requirements)	0	0	100	150	544	994 2/
Quantities (as shown in FY 1980 submission)	0	0	100	-	668	968
Water Purification Unit 600 gal/hr						
Funds (current requirements) 3/	0	1900	0	0	1381	8581
Funds (as shown in FY 1980 submission)	0	1900	0	-	200	6100
Quantities (current requirements)	0	11	0	0	8	49 2/
Quantities (as shown in FY 1980 submission)	0	11	0	-	1	42

1/ The FY 1981 increase of funds reflects revised cost estimates. The FY 1982 program is a new planned procurement. The increase in total estimated cost reflects the combined effects of a change in the procurement strategy (e.g., new programed buy in FY 1982), revised total quantities, and revised cost estimates.

2/ Reflects revised (increased) total quantity requirements.

3/ The increase in funds for "Additional to Completion" and "Total Estimated Cost" is due to the combined effect of revised cost estimates (increase) and increase in the total quantities required.

Program Element: #6.47.17.A Title: General Combat Support
DOD Mission Area: #216 - Land Combat Service Support Budget Activity: #4 - Tactical Programs

F. (U) DETAILED BACKGROUND AND DESCRIPTION: This program supports the Engineering Development (ED) of various items of combat support and combat service support equipment that meet the Army's critical needs in logistics supply, mobility, counter-surveillance, survivability, and field medical care. Specific activities conducted under this program essential to meet requirements to support land combat and contingency operations include: capabilities for rapid combat engineer construction; resupply of increasingly greater amounts of containerized cargo; mobile water purification units; environmental control for shelters and vehicles housing critical electronic equipment and personnel in all climates; resupply and distribution to field elements of bulk fuels, oils, and lubricants (POL); camouflage techniques and equipment to counter the surveillance threats; tactical shelters to meet Department of Defense standardization goals and to afford required protection of sensitive communication/electronic systems; and equipment to meet requirements for field medical care.

G. (U) RELATED ACTIVITIES: Close coordination is maintained with other Services to avoid duplication, and to provide program guidance, through the Joint Committee on Tactical Shelters, the Defense Medical Materiel Board, the Joint Container Steering Group, and the Program Advisory Group for Bulk Petroleum Fuels Distribution. The projects of this Program Element contain items and systems that have progressed to Engineering Development (ED) 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 Shelter Technology; 6.27.33.A, Mobility Equipment Technology; and 6.27.72.A, Combat Casualty Treatment Technology. In FY 1981 the trilateral, United States, United Kingdom and Federal Republic of Germany (US-UK-FRG) Bridging for 1985 and Beyond program will enter ED. A trilateral steering committee directs this NATO standardization/interoperability effort.

H. (U) 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 US Army Medical Bioengineering Research and Development Laboratory, Fort Detrick, MD. Current and potential contractors include Raytheon Corporation, Bedford, MA; Radian Corporation, Alexandria, VA; Energy Transformation Corporation, Boyertown, PA; Goodyear Aerospace, Litchfield Park, AR; Gichner Mobile Systems, Dallastown, PA; Brunswick Corporation, Marion, VA; and Craig Systems, Lawrence, MA.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: Preliminary evaluation tests were conducted on a prototype military amphibious reconnaissance boat, which is under development to meet joint requirements of the US Army and US Marine Corps, and procurement of twelve improved design boats was initiated for development and operational testing (DT/OT II). Tests of commercial candidate prototypes of a ribbon bridge erection boat were completed, with the finding that none of the items evaluated meets the performance requirements. Engineering Development (ED) was completed on the 600 gallon per hour Reverse Osmosis Water

Program Element: #6.47.17.A Title: General Combat Support
DOD Mission Area: #216 - Land Combat Service Support Budget Activity: #4 - Tactical Programs

Purification Unit (ROWPU) and the item was type classified as Standard. Initial designs for a 3000/2000 gallon per hour ROWPU were completed. Fabrication was continued of Development Test II (DT II) prototypes of a 250,000 British Thermal Unit per hour (BTUH) multifuel heater which will replace existing hazardous, low-efficiency space heaters in mobile shelters, hangars, and buildings. ED testing was completed on a Hi-Speed Mini-Sterilizer for field medical use, and preparation of acceptance decision documentation was begun. Operational Testing (OT) was initiated of a helicopter slung, solid pesticide dispersal unit. OT of a mosquito light trap system was completed. Two new prototype environmentally protected medical supply containers with additional and revised electronics have been fabricated for test. Prototypes of a Medical Aidman's bag were developed. Four additional one-side expandable tactical shelters were procured for DT/OT II testing.

2. (U) FY 1980 Program: Procurement of prototypes of the military amphibious reconnaissance boat will be completed, and DT/OT II will be conducted. Active signature simulators of the Hawk missile system radars will be procured for tests with commercially available passive inflatable decoy sets. Tests (DT II) will be conducted of the 250,000 BTUH multifuel heater and fabrication will begin of prototypes for OT II. Prototypes of the 3000/2000 gallon per hour (gph), Reverse Osmosis Water Purification Unit (ROWPU) will be fabricated for Force Development Test and Evaluation (FDTE), and skill performance aids will be prepared. Fabrication and tests of a module for the 600gph ROWPU to provide capability to purify chemically and biologically contaminated water will be accomplished. Engineer Development (ED) tests of the helicopter slung, solid pesticide dispersal unit and of a field high capacity X-ray system will be conducted. ED of environmentally protected medical supply containers will be continued. Field tests of the prototype Medical Aidman's bag will be completed and acceptance decision made. ED will be initiated of a field ambulance litter loading device. For this item and all other items under this program where Engineering Development will be initiated in FY 1980, FY 1981, or FY 1982, all necessary experimental work will have been performed and the proposed items will be ready for full-scale development. Acceptance decision reviews will be held for the mosquito light trap system and the Hi-Speed Mini-Sterilizer. DT/OT II will be completed of the one-side expandable International Organization of Standards (ISO) shelter. A contract for the design of a 20-foot non-expandable ISO shelter will be awarded. ED of hardened communication/electronic shelters, types S250 and S280, will be initiated.

3. (U) FY 1981 Planned Program: Final designs will be initiated of components for Bridging for 1985 and Beyond as selected and agreed to by the trilateral United States/United Kingdom/Germany Steering Committee. ED of the military amphibious reconnaissance boat will be completed and a technical data package prepared for procurement. OT II will be conducted of the 250,000 BTUH multifuel heater, and a decision review held to accept the item and begin procurement. ED II tests of the 3000/2000 gph Reverse Osmosis Water Purification Unit (ROWPU) will be conducted, and hardware will be modified for OT II testing. Design and fabrication of DT II/OT II prototype rapidly emplaceable petroleum pipeline outfit will be initiated. Engineer design will be completed and fabrication begun of DT II/OT II prototype non-expandable 20-foot ISO shelter. Ed of two-side expandable ISO shelters and on hardened communication/electronic shelters will be continued. ED tests of the

Program Element: #6.47.17.A Title: General Combat Support
DOD Mission Area: #216 - Land Combat Service Support Budget Activity: #4 - Tactical Programs

environmentally protected medical supply containers and the field ambulance litter loading device will be completed. Acceptance decision reviews will be held of the field high capacity X-ray system; helicopter slung, solid pesticide dispersal unit; and the environmentally protected containers.

4. (U) FY 1982 Planned Program: Designs will be continued of United States (US) components for Bridging for 1985 and Beyond. Design of access and egress system for current inventory bridging will be initiated. Engineering Development (ED) of a tunnel detection system will be initiated. Operational Test II (OT II) will be conducted of 3000/2000 gph Reverse Osmosis Water Purification Unit (ROWPU). ED designs of 15,000 British Thermal Units per hour (BTUH) and 60,000 BTUH members of multifuel heater family will be initiated. Procurement of DT II/OT II prototype rapidly-emplaceable petroleum pipeline outfit will be completed. Design and fabrication of DT II/OT II prototype of self-supporting 10,000 barrel fabric fuel storage tank will be initiated. ED of tactical rigid wall shelters will continue with emphasis on expedited fielding of hardened shelters for critical communication/electronic systems. ED tests of portable decontamination equipment for chemical warfare casualties, and of modular patient monitoring and treatment devices for care of combat casualties within forward field ambulances will be initiated. Acceptance decision review of the field ambulance litter loading device will be held.

5. (U) Program to Completion: This is a continuing program. ED of various items will be conducted as they progress from associated advanced development programs.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D429 Title: Tactical Rigid Wall Shelters
Program Element: #6.47.17.A Title: General Combat Support
DOD Mission Area: #216 - Land Combat Service Support Budget Activity: #4 - Tactical Programs

A. (U) DETAILED BACKGROUND AND DESCRIPTION: This program provides for the Engineering Development of conventional tactical shelters (both nonexpandable and expandable) to replace the proliferation of shelters in the Army inventory, and to replace a portion of the working and storage space currently provided by expensive Theater of Operations (Engineer) type of units. These shelters will be part of the Department of Defense (DOD) Standard Family of Tactical Shelters, will have rapid erection and displacement capability, and will conform to American National Standards Institute (ANSI)/International Organization for Standardization (IOS) criteria. This program also includes developing a family of hardened nonexpandable communication/electronic shelters designed to withstand the effects of fragments from exploding munitions; nuclear warfare, in particular the blast wave and thermal pulse; and nuclear radiological, chemical, and biological warfare. There is no current shelter available to counter the combined threat of conventional, nuclear, and nuclear radiation/biological/chemical (NBC) warfare.

B. (U) RELATED ACTIVITIES: Each of the Military Services performs work to develop its Service-peculiar shelters; however, close coordination is maintained through the Joint Committee on Tactical Shelters (JOCOTAS) and its Joint Technical Working Group. Shelters developed under this program will be used by other Services. Exploratory Development work in shelters is performed in PE 6.27.23.A, Clothing, Equipment, and Shelter Technology, Project A427, Tactical Rigid Wall Shelters; and in PE 6.21.20.A, Nuclear Effects/Near Millimeter Waves/Fluidics, Project AH25 Nuclear Effects/Near Millimeter Waves/Fluidics. Advanced Development is accomplished in PE 6.37.26.A, Combat Support Equipment, Project D428, Tactical Rigid Wall Shelters.

C. (U) WORK PERFORMED BY: The US Army Natick Research and Development Command, Natick, MA, performs the majority of the work on general purpose/conventional tactical shelters, and the US Army Electronics Research and Development Command, Adelphi, MD, has the lead on hardened communication shelters. Other Government facilities involved are: US Army Tank-Automotive Research and Development Command, Warren, MI; US Army Communications Research and Development Command, Fort Monmouth, NJ; US Army Communications and Electronics Materiel Readiness Command, Fort Monmouth, NJ; US Army Armament Research and Development Command, Dover, NJ; and US Army Test and Evaluation Command, Aberdeen Proving Ground, MD. Potential contractors who will be competitively selected are Goodyear Aerospace, Litchfield Park, AR; Brunswick Corporation, Marion, VA; Nordan Company, Tulsa, OK; Gichner Mobile Systems, Dallastown, PA; and Craig Systems, Lawrence, MA. Contracts are valued at $3,150,000.

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: Various small shelters previously developed by the Marine Corps were acquired (via transfer of Army funds to the Marine Corps) for evaluation as to their suitability for various Army uses. The results of

Project: #D429 Title: Tactical Rigid Wall Shelters
Program Element: #6.47.17.A Title: General Combat Support
DOD Mission Area: #216 - Land Combat Service Support Budget Activity: #4 - Tactical Programs

these evaluations determined that the Marine shelters were unsuitable relative to satisfying Army requirements. Engineering Development (ED) of one-side expandable shelter was initiated, and prototypes were procured for Developmental Testing II/Operational Testing II (DT/OT II). Examples of uses of the one-side expandable shelters are to house portable aviation maintenance shop sets, diagnostic test equipment for advanced attack helicopter, and various automatic data processing equipment. A study was completed which indicated the best approach for transporting shelters on land as part of tactical relocation is by the use of dolly mobilizer sets.

2. (U) FY 1980 Program: Complete DT II/OT II of one-side expandable shelter. Continue development of dolly mobilizer sets for expediting short-range relocating of tactical shelters deployed in a Theater of Operation. Initiate ED on 20-foot nonexpandable shelter and the two-side expandable shelter. Award contract for prototype hardened communication/electronic shelters. Typical uses of the 20-foot nonexpandable shelter are for command and control facilities and to house topographical imagery processing sets. Examples of uses of the two-side expandable shelter are as a double-surgery operating facility and for housing tactical computers. The hardened communication/shelters will be used to support such systems as: TRI-TAC, Pershing II, SOTAS, and TOS.

3. (U) FY 1981 Planned Program: Conduct Developmental Validation In-Process Review and type classify the one-side expandable shelter. Continue ED of the dolly mobilizer sets, the nonexpandable 20-foot shelter, and the two-side expandable shelter. Conduct engineering tests of various prototype hardened communication/electronic shelters and contract for the design and fabrication of optimized prototype hardened shelters for DT/OT II in FY 1982.

4. (U) FY 1982 Planned Program: Continue ED of the nonexpandable 20-foot shelter and the two-side expandable shelter. Complete DT/OT II on hardened communication/electronic shelters and type classify early in FY 1983.

5. (U) Program to Completion: This is a continuing program.

6. (U) Major Milestones: None

7. (U) Resources ($ in thousands):

Project: #D429 Title: Tactical Rigid Wall Shelters
Program Element: #6.47.17.A Title: General Combat Support
DOD Mission Area: #216 - Land Combat Service Support Budget Activity: #4 - Tactical Programs

RDTE	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
Funds (current requirements)	725	844	6479	3647	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	725	900	1200	-	Continuing	Not Applicable
Quantities (current requirements)	N/A					
Quantities (as shown in FY 1980 submission)	N/A					

Decrease in FY 1980 funding level is the result of a general Congressional reduction. Increase in funding profile in FY 1981 is to fund the urgent requirement for hardened communication/electronic shelters (as described in paragraph A above) and reflects an increase in Army priority.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.18.A Title: Physical Security
DOD Mission Area: #216 - Land Combat and Service Support Budget Activity: #4 - Tactical Programs

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT QUANTITIES	7399	4336	6279	5747	Continuing	Not Applicable (Not Feasible to List)
9L82	Physical Security	7399	4336	6279	5747	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The objective of the program is to conduct engineering development of a tri-Service family of interior 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 weapon systems and critical areas including arms rooms and storage facilities. Significant manpower savings are practical when adequate detection systems are installed. The Department of Defense uses more than 16,000 guard personnel daily. Development is directed toward satisfying requirements for a Facility Intrusion Detection System (FIDS) and for Physical Security Lighting and Barrier Systems. All developments are aimed for satisfying tri-Service requirements.

C. (U) BASIS FOR FY 1981 RDTE REQUEST: To accomplish Army testing and evaluation of Development Test II/Operational Test II (DT II/OT II) 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 US Army Communication Electronics Board Development (USACEBD), Ft. Gordon, GA. Continue Engineering Development of the Advanced FIDS components: Large Area Console, Satellite Control Processor, Small Area Console, Remote Displays, Interior and Exterior Interfaces between the Air Force's Coder Multiplexer Sensor Data (CMSD) and FIDS Multipoint Data Transmission System (MDTS), Portable Duress Sensor, Radio Frequency Motion Sensor, TV Camera, and TV Monitor. Initiate Engineering Development of the Department of Defense lighting and barrier subsystem.

Program Element: #6.47.18.A Title: Physical Security
DOD Mission Area: #216 - Land Combat and Service Support Budget Activity: #4 - Tactical Programs

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1980 Submission
Type Classification (TC) of Interim FIDS	FY82	Not Shown
TC of Advanced FIDS, Group I	FY83	Not Shown
TC of Electronic Alerting System	FY83	Not Shown
TC of Advanced FIDS, Group II	FY84	Not Shown
TC of Group I Components of Security Lighting and Barriers System	FY85	Not Shown

D. (U) BASIS FOR CHANGE BETWEEN FY 1981 AND FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1979	FY 1980	FY 1981	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	7399	4336	6279	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	5400	4341	4730	Continuing	Not Applicable

1.29 million dollars of FY79 Funds from Program Element #6.37.26.A and 0.709 million FY79 dollars from Program Element #6.47.17.A were reprogrammed into this program element to permit award of a contract for DT/OT II models of the Interim Facility Intrusion Detection System. The decrease in FY80 reflects a general Congressional reduction applied to this program.

Program Element: #6.47.18.A Title: Physical Security
DOD Mission Area: #216 - Land Combat and Service Support Budget Activity: #4 - Tactical Programs

FY81 funds have been transferred to this program element from Program Element #6.37.05.A to continue that effort in the full-scale development phase. Additional FY81 funds provide for minor program adjustments and inflation.

E. (U) OTHER APPROPRIATION FUNDS: ($ in thousands)

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional To Completion	Total Estimated Cost
Other Procurement, Army:						
Funds (current requirements)	10000	3400	8600	5900	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	10000	3400		-	Continuing	Not Applicable

Adjustments to FY81 result from restructuring the chemical site upgrade program.

F. (U) DETAILED BACKGROUND AND DESCRIPTION: The objective is to conduct all design, development, test, and evaluation required to field a complete, integrated physical security system to protect materiel, bases, facilities, installations, and personnel against theft, sabotage, and espionage. Developments will be directed towards satisfying the Navy, Air Force, and Army's Materiel Need for an interior security system (Facility Intrusion Detection System (FIDS)), and their requirement for a Physical Security Lighting and Barrier System. The Approach is to develop: (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, monitoring, and readout components; (4) physiological and/or psychological deterrent devices; (5) devices to protect cargo in depots or in transit by truck or ship; (6) standardized securing equipment and locking hardware; and (7) exterior lighting and barrier systems. Interfaces necessary to integrate exterior sensors developed by the Air Force and potential shipboard security equipment components adopted by the Navy will also be developed in consonance with the direction from the Under Secretary of Defense for Research and Engineering (Memorandum of 26 July 1979) for the Army to "develop the command, control, and display subsystem (CCDS) of the Department of Defense standardized physical security equipment system; ensure that the CCDS has the capacity and design to manage all segments of the entire military/commercial security equipment land based systems." In addition, there will be a continuing evaluation of commercial physical security equipment as well as those items that might be developed by other government agencies.

G. (U) RELATED ACTIVITIES: This program follows from Advanced Development Program Element 6.37.05.A, Physical Security. This program leads into the fielding of physical security equipment. The Interim Facility Intrusion Detection System is being

Program Element: #6.47.18.A Title: Physical Security
DOD Mission Area: #216 - Land Combat and Service Support Budget Activity: #4 - Tactical Programs

developed under this Program Element, as directed by the Under Secretary of Defense in his above-referenced memorandum of 26 July 1979, to provide interior intrusion detection systems to all Department of Defense (DOD) elements. Related are 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, BISS, and the Navy is being accomplished to assure utilization of related technologies and developments and to prevent duplication of effort. Coordination is accomplished by memberships of joint working groups and by attendance at other Service and department 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 the Army single point of contact is the Project Officer for Physical Security Equipment (POPSE), who monitors and coordinates the development, acquisition, integrated logistic support, and installation of physical security systems.

H. (U) WORK PERFORMED BY: The US Army Mobility Equipment Research and Development Command (MERADCOM), Fort Belvoir, VA, is assigned responsibility for Physical Security Research, Development, Test and Evaluation. Other government agencies currently involved are the US Army Test and Evaluation Command, Aberdeen, MD, and the Naval Weapons Support Center, Crane, Indiana, for development of the FIDS Smoke Deterrents. Major contractors are GTE Sylvania, Mountainview, CA, and Sonicraft, Chicago, IL.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments:

(U) Joint-Services Interior Intrusion Detection System (JSIIDS): Development of the 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. During FY73 a family of J-SIIDS intrusion sensors, a local audible alarm, a fixed duress sensor, a control unit, and three monitor units were Type Classified for use in arms rooms. Production contracts for all components were awarded during FY73, and Initial Operational Capability was achieved during 1QFY75. Additional buys were made in FY76 and FY77. Additional J-SIIDS components, including a commercial alarm monitor interface, a special application alarm monitoring system, an alarm line security attachment, and remote resynchronization kit were Type Classified and a production contract awarded for these components during FY77. J-SIIDS development terminated in FY79.

(U) Lighting and Barriers: This effort will not be funded until FY81.

(U) Facility Intrusion Detection System (FIDS): This task was initiated in 1QFY74. Full-scale development of the Interim (Basic) FIDS was approved. Contracts for Engineering Development Models of intrusion sensors, a sensor self-test

Program Element: #6.47.18.A Title: Physical Security
DOD Mission Area: #216 - Land Combat and Service Support Budget Activity: #4 - Tactical Programs

subsystem, and a Command, Control Display Subsystem (CCDS) were also awarded in 4QFY74. Experience gained in developing the J-SIIDS components was directly applicable to the FIDS effort. During FY76 the ED models were received and in-house evaluation initiated. As a result of this evaluation and of user input, numerous software and hardware changes were incorporated, most significant of which was a complete in-house reconfiguration of the CCDS. Based upon these changes, a contract for Development and Operational Test (DT II/OT II) models of the CCDS was awarded during 4QFY76. During FY77 purchase descriptions for DT II/OT II models of sensors were prepared and held in abeyance pending FY78 contract funds. Also, during FY77 the ED models and the reconfigured CCDS were integrated into an in-house "Interim FIDS" which was demonstrated to DOD and various DOD elements.

(U) In FY78 the first DT II/OT II models of the CCDS were received and in-house evaluation initiated. Also in FY78 contract packages were prepared for complete DT II/OT II models of interim FIDS systems, including CCDS, sensor, stimuli, etc. Anticipated award in 4Q78 was delayed due to a Small Business Administration (SBA-8A) action. The contract was awarded in 1Q79. The contract was modified in FY79 to include a Coder Multiplexer Sensor Data to Central Master Control interface.

2. (U) FY 1980 Program: Security Lighting and Barriers Systems: This task is not funded until FY81. Facility Intrusion Detection System (FIDS): The design and fabrication of the Interim FIDS and the Group 1 Components being developed will continue. The contract will be modified to provide for a J-SIIDS Control Processor Receiver (JCPR). In-house effort is required to provide technical direction to the contractor and to insure that the contractor complies with the requirements of the contract. Funds will be transferred to Night Vision and Electro-Optics Lab (NV&EOL) to continue development of the FIDS surveillance subsystem. Funds will also be transferred to Test and Evaluation Command to initiate planning for DT II and to witness contractor testing. Funds will be transferred to Project Office, Physical Security Equipment, to support their coordination function.

3. (U) FY 1981 Planned Program: Security Lighting and Barriers Systems: Those components being developed which were certified by a Validation In-Progress Review to be ready for full-scale development (FSD) will enter FSD under this task. These components, will be identified as Group 1 Components and models will be procured for testing. Group 1 Components are anticipated to consist of the following:

(1) Lights/fixtures to augment existing lighting systems illumination. (2) Personnel barriers to enhance intruder delay of existing fences and interface with the Air Force Base Intrusion Sensor System sensors. (3) Vehicle barriers to delay penetration, and (4) uninterruptible power supply for perimeter lighting.

Program Element: #6.47.18.A Title: Physical Security
DOD Mission Area: #216 - Land Combat and Service Support Budget Activity: #4 - Tactical Programs

(U) Facility Intrusion Detection System: The system contract for Interim FIDS and Advanced FIDS Group 1 Components will be completed and items will be delivered to the test site for DT II and OT II. In-house effort will be required to ensure items comply with the contracts requirements. Engineering developent contracts will be awarded for a Covert Duress Sensor, Contraband Sensor, Smoke Deterrent System, Radio Frequency Link, and a Strain Sensor. Data for the Portable Duress Sensor will be procured. Funds will be transferred to Night Vision & Electro-Optics Laboratory (NV&EOL) to complete development of the surveillance subsystem and to support testing. Test and Evaluation Command (TECOM) will be funded to conduct DT II of Interim FIDS and Advanced FIDS Group 1. Mobility Equipment Research and Development Command (MERADCOM) will support the Electronic Alerting System as required. Based upon the results of the IPR, detailed site and system designs will be initiated. Acquisition of equipment to implement site and system requirements will begin.

4. (U) FY 1982 Planned Program: Security Lighting and Barriers Systems: Engineering Development Testing of Group 1 Components will be completed, and contracts will be awarded for Development Test II/Operational Test II (DT II/OT II) models. Group 1 Components are: (1) Lights/Fixtures to augment existing lighting systems, (2) Personnel barrier to enhance intruder delay of existing fences and interface with BISS interfaces, (3) Vehicle barriers to delay vehicle penetration, and (4) uninterruptible power supply for perimeter lighting. Funds will be transferred to Test and Evaluation Command (TECOM) for DT II test planning.

(U) Facility Intrusion Detection System: The contracts awarded in FY81 for the Covert Duress Sensor, Response Device, Radio Frequency Data Link, and Contraband Sensor will continue. In-house effort is required to provide technical guidance to the contractors and to insure that the items will interface properly with the FIDS Components already developed. The system contractor of the Interim FIDS will be required to integrate the Advanced Group 2 FIDS Components into the existing FIDS. In-house effort will be required to coordinate between the developing contractor of Group 2 items and the system contractor. Funds will be provided to TECOM to perform DT II/OT II on Interim FIDS and Advanced FIDS Group 1 Components. Mobility Equipment Research and Development Command (MERADCOM) will support TECOM testing as required. Funds will be provided Night Vision & Electro-Optic Laboratory for its support of Development Test II/Operational Test II (DT II/OT II). DT II/OT II will be completed. Interim FIDS will be type classified in fourth Quarter.

(U) Electronic Alerting System: The Electronic Alerting System will undergo DT II and OT II. Planning and preparation for the Development In-process Review to be held 1QFY83 will be initiated.

(U) Securing Equipment and Locking (SEAL) Hardware: Engineering Development Models of high-security locking system(s) for nuclear and chemical storage magazines will be procured.

Program Element: #6.47.18.A Title: Physical Security
DOD Mission Area: #216 - Land Combat and Service Support Budget Activity: #4 - Tactical Programs

5. (U) *Program to Completion: This is a continuing program.* In FY83 and the outyears, there will be a continuing effort to develop physical security hardware which is capable of countering the ever-increasing sophistication of the threat to military personnel and property. 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 the Department of Defense.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.23.A
Title: Special Purpose Detectors
DOD Mission Area: #255 - Tactical Surveillance Reconnaissance and Target Acquisition
Budget Activity: #4 - Tactical Programs

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	126	99	164	8482	Continuing	Not Applicable
	QUANTITIES						Not Applicable
DL72	Nettable Radars	0	0	0	8482	Continuing	Not Applicable
DL79	Information-Identification-Position Devices	126	99	164	0	0	1200

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The tactical commander is expected to face a numerically superior, well trained and equipped enemy. In order to counter this threat, our commanders must have responsive force multipliers, such as responsive communications and timely, accurate, and comprehensive intelligence information. Photography is one intelligence means by which the commander can "see the battlefield." 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. (U) BASIS FOR FY 1981 RDTE REQUEST: The requested funds will permit completion of development of the Mobile Army Ground Imagery Interpretation Center (MAGIIC).

D. (U) BASIS FOR CHANGE BETWEEN FY 1981 AND FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

Program Element: #6.47.23.A Title: Special Purpose Detectors
DOD Mission Area: #255 - Tactical Surveillance Budget Activity: #4 - Tactical Programs
Reconnaissance and Target Acquisition

	FY 1979	FY 1980	FY 1981	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	126	99	164	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	2327	99	151	0	Not Applicable

Decrease in FY79 was due to decrease in developmental effort for Tactical Imagery Processing System (TIPS). Funds were reprogrammed into General Support Rocket System (GSRS). Increase in FY81 funding profile is due to inflation.

E. (U) OTHER APPROPRIATION FUNDS: ($ in thousands)

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional To Completion	Total Estimated Cost
Other Procurement Army:						
Funds (current requirements)	0	0	0	0	0	25500
Funds (as shown in FY 1980 submission)	0	5800	0	0	0	31300
Quantities (current requirements)	0	0	0	0	0	Not Applicable
Quantities (as shown in FY 1980 submission)	0	3	0	0	0	Not Applicable

The FY80 procurement figures differ because the operational requirement for Mobile Army Ground Imagery Interpretation Center was reexamined and the original quantity of 21 full systems was found to be invalid. A joint Army, Air Force tactical reconnaissance study showed that full MAGIIC systems were not required at the Corps instrumented airfields nor were they required at

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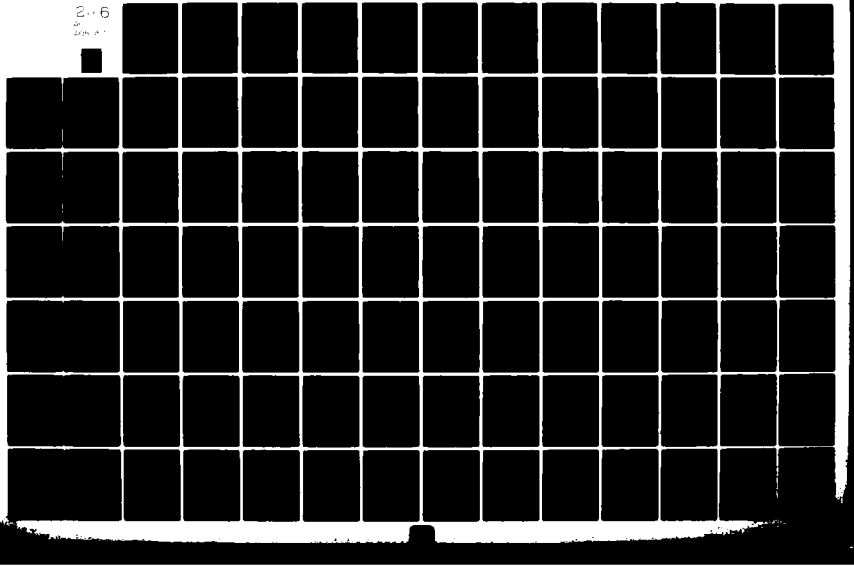

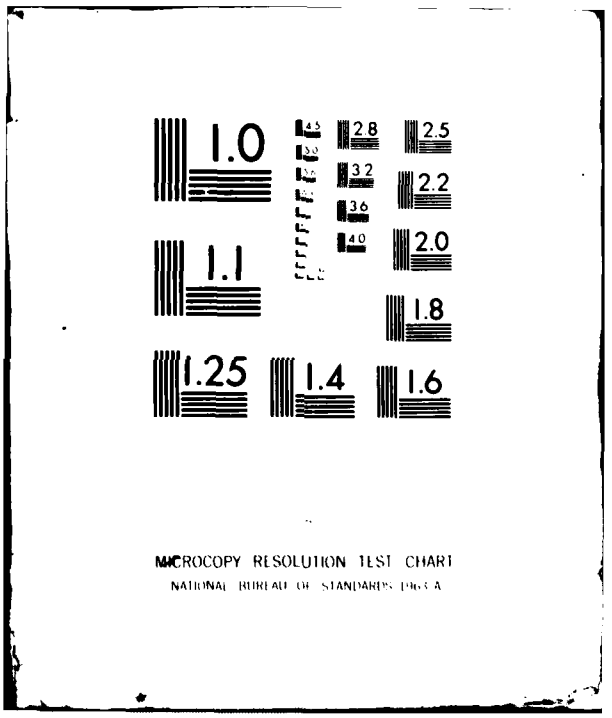
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Program Element: #6.47.23.A Title: Special Purpose Detectors
DOD Mission Area: #255 - Tactical Surveillance Reconnaissance and Target Acquisition Budget Activity: #4 - Tactical Programs

Air Force tactical reconnaissance squadrons. For this reason, the quantity of full MAGIIC systems was reduced from 21 to 7 and funds were reduced accordingly. Six of the seven systems were purchased with FY78 funds. The decision was made not to purchase the seventh system in FY79 and the funds were deleted in the FY80 budget.

Program Element: #6.47.23.A Title: Special Purpose Detectors
DOD Mission Area: #255 - Tactical Surveillance Reconnaissance and Target Acquisition Budget Activity: #4 - Tactical Programs

F. (U) DETAILED BACKGROUND AND DESCRIPTION: The Mobile Army Ground Imagery Interpretation Center (MAGIIC) is being procured 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 computer interface system for message input/output. The Army has procured the appropriate elements of the Air Force developed TIPI system with some sensor modifications to meet its MAGIIC requirements. Full-scale MAGIIC systems will be deployed at Corps headquarters for interpretation of hard copy photographic imagery from a variety of sensors.

G. (U) RELATED ACTIVITIES: The United States (US) Navy and Air Force utilize the same general technologies. Service and Department of Defense (DOD) 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 P.E. 6.37.19.A, Special Purpose Detectors. Procurement of the MAGIIC was performed by the USAF at Hanscom Air Force Base as part of the TIPI procurement. US Marine Corps is also purchasing the equipment.

H. (U) 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, and General Electric, Bedford, MA.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: The program to procure MAGIIC commenced in FY78. The Army requirements were to be satisfied by an add-on to an Air Force contract. Army requirements were identified, a Development Plan was written, the MAGIIC was type classified, and the procurement contract was awarded. The Tactical Imagery Processing System (TIPS) specifications were written, and a contract was formulated for development of two engineering models. The operational requirement for the TIPS system was reviewed, found invalid, and the program was terminated. $2215K in RDTE funds were reprogramed to satisfy higher priority requirements. Of the $126K remaining, $46K was used for labor and overhead and the remaining $80K was used to: (1) revise and refine the system life cycle cost estimate; (2) begin work on a System Deployment Planning Document; and (3) begin work on a Data Element Dictionary which is used to insure interoperability with a Tactical Operations System (TOS) type interface (the consumer of MAGIIC system's output).

2. (U) FY 1980 Program: Complete production of the System Deployment Planning Document and the Data Element Dictionary. Additionally, perform study as part of the Integrated Logistics Support plan for the system.

Program Element: 06.47.23.A Title: Special Purpose Detectors
DOD Mission Area: 7255 - Tactical Surveillance Reconnaissance and Target Acquisition Budget Activity: 04 - Tactical Programs

3. (U) FY 1981 Planned Program: Continue studies associated with life cycle integrated logistics support of the MAGIIC system, to include definition of communications interfaces with other systems. Develop deployment plan and accomplish type classification actions for partial systems.

4. (U) FY 1982 Planned Program: Begin engineering development of the Mettable Radar, a lightweight, highly mobile all-weather ground surveillance and target acquisition radar. The Mettable Radar will detect and locate targets with sufficient accuracy and timeliness to provide effective counterfire and intelligence data to units within each brigade. It will replace the AN/TPS-25, AN/TPS-58, and AN/TPS-5 radars. Each brigade will be equipped with a radar control center capable of integrating, netting, and controlling the individual radars, and disseminating data to fire support and intelligence units. The distributed nature of netting radars will increase survivability and effectiveness, and decrease the number of presently required radars.

5. (U) Program to Completion: This is a continuing program. Outyear requirements are under study.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.24.A
DOD Mission Area: #215 - Land Combat Support

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

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	3910	4439	2927	2850.	0	27251
	QUANTITIES						
	XM19 Alarm					-	38
	XM2 Sampler					-	33
DF45	Biological Defense Materiel	3910	4439	2927	2850	0	27251

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program provides for the Engineering Development (ED) of biological defense materiel and equipment to detect the presence of and to warn against a biological attack. Specially, the ED program is in response to an approved Required Operational Capability for a first-generation biological agent detection and warning system for Army field use. The biological detection and warning system (BDWS) currently under development consists of: the XM19 Biological Alarm, the XM2 Biological Sampler, and the M42 Alarm. The XM19 Alarm is a point sampling device which detects the presence of biological aerosols. The colocated XM2 Sampler is also a point sampling device, which upon automatic activation by the XM19 or by the operator, collects a viable quantity of the suspected biological aerosol for subsequent analysis by designated medical laboratories. The M42 Alarm provides a remote alarm capability. The system will be assigned to the Chemical Biological Radiological Element (CBRE) at brigade and higher organizational level.

C. (U) BASIS FOR FY 1981 RDTE REQUEST: Development Acceptance - In-Process Review (DEVA-IPR) and type classification (TC) of the Biological Detection and Warning System (BDWS) XM19/XM2 will be accomplished. Formal environmental testing of the XM19/XM2 will be conducted at Test and Evaluation Command (TECOM) test sites. First procurement actions will be initiated. Additionally, the XM19/XM2 will be tested as part of a joint US Army Europe/North Atlantic Treaty Organization exercise.

Program Element: #6.47.24.A
DOD Mission Area: #215 - Land Combat Support

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

D. (U) BASIS FOR CHANGE BETWEEN FY 1981 AND FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1979	FY 1980	FY 1981	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	3910	4439	2850	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	3287	4495	3019	Continuing	Not Applicable

The increased FY 1979 funding is due to contract cost growth exceeding scheduled cost.

The decrease in FY80 is a result of a general Congressional reduction applied to this program. The decrease in FY81 is a result of refinement in cost estimates.

E. (U) OTHER APPROPRIATION FUNDS: ($ in thousands)

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional To Completion	Total Estimated Cost
OPA Funds			0	2500	13800	16300
Funds (current requirements)	0	0				
Funds (as shown in FY 1980 submission)	0	0	0	0	0	0
Quantities (current requirements)						
Biological Detection and Warning System, XM19/XM2	0	0	0	71	147	Not Applicable
Quantities (as shown in FY 1980 submission)	0	0	0	0	0	0

Program Element: 06.47.24.A
DOD Mission Area: 0215 - Land Combat Support

Title: Biological Defense Materiel
Budget Activity: 04 - Tactical Programs

Funding and quantities were not shown in the FY 1980 submission because initial procurement of the Biological Detection and Warning System is scheduled for FY 1982.

Program Element: 6.47.24.A
Title: Biological Defense Materiel
DOD Mission Area: 0215 - Land Combat Support
Budget Activity: 04 - Tactical Programs

F. (U) DETAILED BACKGROUND AND DESCRIPTION: The objective of this program 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 a chemiluminescent reaction. The XM2 Sampler collects samples of the aerosols for subsequent identification by designated medical laboratories.

G. (U) 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. Duplication of effort is avoided through periodic meetings and reviews of the chemical-biological defense program by key personnel. The Army is responsible for its own chemical defense items and for those that meet joint requirements of the Army and other Services.

H. (U) WORK PERFORMED BY: In-house efforts are performed at the US Army Chemical Systems Laboratory, Edgewood, MD. Contracts have been awarded to: Bendix Corporation, Baltimore, MD; Stanford Research Institute, Menlo Park, CA; and Southern Research Institute, Birmingham, AL.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: During FY's 1978 and 1979 the following were accomplished relative to development of the biological detection and warning system (BDWS), XM19/XM2: (a) initial engineering designs were completed on the BDWS and evaluated on the BDWS; (b) engineering drawings and draft technical manuals were completed on BDWS; (c) field, engineering and reliability tests were conducted and evaluated on the BDWS. All results except reliability tests on the BDWS were found satisfactory. Field tests were performed on the XM19 Detector and XM2 Sampler to assess reliability. In FY 1979 the following were accomplished: (a) design activities emphasized continued evaluation of the XM19 detector air handling system, alarm algorithm, and the wash station; (b) several background tests were conducted to evaluate the performance of selected design changes to various air handling components of the biological detector, XM19; (c) narrowing the size range of particles accepted by the XM19 proved to reduce the false alarm rate of prototypes; and (d) studies were initiated to investigate approaches to providing the capability of determining "all clear" conditions after a biological attack. The data collected during the above tests and studies will help reduce false alarm rate and thereby increase reliability of the XM19 Detector and XM2 Sampler.

Program Element: #6.47.24.A
Title: Biological Defense Materiel
DOD Mission Area: #215 - Land Combat Support
Budget Activity: #4 - Tactical Programs

2. (U) FY 1980 Program: Prototype qualification testing - government will be conducted. Technical data package for Developmental Test II/Operational test II will be completed. All tests required to prepare reports for formal evaluation of program efforts/progress will be completed. All-clear monitor capability will be informally evaluated.

3. (U) FY 1981 Planned Program: Development Acceptance - In-Process Review (DEVA-IPR) and type classification (TC) of the Biological Detection and Warning System, XM19/XM2 will be completed. Formal testing will be initiated at Test and Evaluation Command (TECOM) test sites. First procurement actions will be initiated.

4. (U) FY 1982 Planned Program: First production of the Biological Detection and Warning System will be conducted during FY82 and will continue through third quarter FY 1983. In addition, the following items will enter engineering development (ED): (a) Biological Fixed-Installation Alarm, (b) Remote Sensing Biological Alarm, and (c) Biological All-Clear Kit.

5. (U) Program to Completion: This is a continuing program which supports Engineering Development of biological detection and warning equipment to improve the defense of US forces against biological warfare attack.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.25.A
Title: Chemical Defense Materiel
DOD Mission Area: #215 - Land Combat Support
Budget Activity: #4 - Tactical Programs

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	7902	18367	20627	41158	Continuing	Not Applicable
DF97	Chemical Defense Materiel	0	4291	2211	5957	Continuing	Not Applicable
D017	CB Collective Protection	90	195	1546	7611	Continuing	Not Applicable
D019	Individual Chemical Protection	6027	2653	2325	3722	Continuing	Not Applicable
D020	Chemical Detection Warning and Sampling Devices	1010	774	4543	10660	Continuing	Not Applicable
D023	Collective Protection Materiel for Armored Vehicles	0	9860	7849	10451	Continuing	Not Applicable
D138	Training System for Chemical Defense	775	594	2153	2757	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The objective is to develop improved rapid detection and warning systems, chemical decontamination systems, and protective materiel and equipment to alert US forces of the presence of a chemical warfare environment and to provide protection. Additionally, training systems are developed that will disseminate simulant persistent and nonpersistent chemical agent attacks. The new procective mask with appropriate components replaces the M17-series mask, the M24 aircrew mask, the M25A1 tanker mask, the M9A1 special purpose mask, and the Navy Mark V mask. The new mask provides improved peripheral vision, flexible lens for optical coupling, ease of filter (canister) replacement, and inturned periphery to improve fit, and improved respiratory protection with minimum burden to the user. The development of the new mask is in response to a Joint Service requirement. The requirement for improved chemical detection, warning, and identification materiel and equipment addresses the need to reduce the physiological and logistical burden on US forces while increasing their chances of survival in a chemical warfare environment. An improved decontamination system will provide United States (US) Forces the capability to remove or reduce the hazards posed by chemical agents on the battlefield and thus enhance our operational capability. There also exists a need for collective protection for certain headquarters and communications functions and certain armored vehicles and their crews in order to accomplish their assigned missions in an active chemical

Program Element: 6.47.25.A Title: Chemical Defense Materiel
DOD Mission Area: 215 - Land Combat Support Budget Activity: 4 - Tactical Programs

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.

C. (U) BASIS FOR FY 1981 RDTE REQUEST: Continue engineering development (ED) on the XM30 protective mask which includes: (1) conduct in-house engineering test, (2) fabricate development test/operational test (DT/OT) items, and (3) initiate DT/OT test. Complete ED and type classify the Chemical Agency Warning Transmission System (CAWTS). Conduct Development In-Process Review (DEVA-IPR) and type classify the M8 chemical alarm simulator. Continue ED on: (1) NBC marking system, and (2) NBC collective protection equipment for armored vehicles.

D. (U) BASIS FOR CHANGE BETWEEN FY 1981 AND FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1979	FY 1980	FY 1981	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	7902	18367	20627	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	10628	18725	24354	Continuing	Not Applicable

Project DF97, Chemical Defense Materiel, was reduced in FY 1981 because approved requirement documents on selected decontamination items will not be available. Project D017, CB Collective Protection, was reduced because the funds available are adequate to initiate design efforts on user selected vehicles, vans, and shelters. Because of technological problems associated with the development of the new mask, the subsequent rescheduling of key milestones such as DT II/OT II, Project D019, Individual Chemical Protection, required less funds in FY 1979. Project D019 was reduced in FY81 to support higher priority nonchemical projects. Project D020, Chemical Detection and Warning Materiel, was decreased in FY79 and in FY81 because of the lack of approved requirement documents on selected detection and alarm equipment. Project D023, Collective Protection Materiel for Armored Vehicles, was increased to fully fund the FY 1981 planned program. Project D138, Training Systems for Chemical Defense, was increased in FY 1979 and FY 1981 to support increased interest in the development of realistic chemical defense training systems.

E. (U) OTHER APPROPRIATION FUNDS: ($ in thousands). Not Applicable.

Program Element: #6.47.25.A
DOD Mission Area: #215 - Land Combat Support

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

F. (U) DETAILED BACKGROUND AND DESCRIPTION: The objective of this program is to conduct engineering development on defensive materiel and equipment to protect individuals from chemical agents by providing: protection for 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, and terrain; and the development of collective protection materiel for shelters, vans, and armored vehicles and their crews. Development of the new mask is in response to a Joint 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 materials 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 jeopardize the survivability of US forces in an active chemical or biological (CB) environment.

G. (U) RELATED ACTIVITIES: The memorandum of understanding (MOU) with Canada for protective mask and canisters was signed February 1979. 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 complete. 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.

H. (U) 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, NY; and Calispan Corporation, Buffalo, NY.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: Prior to FY 1979: (1) Advanced Development (AD) was completed on the liquid agent detector (LAD), (2) biomedical testing of B-1 dye (component of liquid agent detector (LAD)) was completed and the data confirms that the dye is mutagenic, (3) a modified safety protocol has been approved by the Surgeon General for use of the LAD in field testing, (4) the new protective mask, XM29, entered the engineering development (ED) phase September 1977. During FY79, accomplishments included: (1) Problems were encountered with coating of silicone to provide a durable surface and essential liquid agent penetration resistance of the new mask, (2) A Special In-Process Review (IPR) in April 1979 redirected the new mask program effort to the separate lens configuration (bonded lens) of the XM30 mask, (3) the improved airburst

Program Element: #6.47.25.A Title: Chemical Defense Materiel
DOD Mission Area: #215 - Land Combat Support Budget Activity: #4 - Tactical Programs

simulator entered ED, and (4) Development Test II and Operational Test II (DT/OT II) were completed on the liquid agent detector (LAD) paper.

2. (U) FY 1980 Program: Engineering development (ED) efforts will continue on the separated lens configuration of the XM30 Mask. XM30 tooling and components will be completed. Complete Development Acceptance In-process Review (DEVA-IPR) on the XM9 Liquid Agent Detector (LAD). Continue ED on Chemical Attack Warning and Transmission System (CAWTS). Initiate ED on the Nuclear Biological Chemical marking system. Initiate ED on the M8 chemical alarm simulator. Initiate integration/application of NBC collective protection equipment on armored vehicles that will be in procurement/development in FY 1981. Complete Development Test II (DT II) and conduct Operational test II (OT II) on an improved airburst simulator and a nonexplosive, portable bulk disseminator for nonpersistent agent simulant. These training devices are known as Phase II training devices.

3. (U) FY 1981 Planned Program: Continue engineering development (ED) on the XM30 protective mask which includes: (1) conduct in-house engineering tests, (2) fabricate development test/operational test (DT/OT) items, and (3) initiate DT/OT test. Complete ED and type classify the Chemical Agent Warning Transmission System (CAWTS). Conduct Development In-Process Review (DEVA-IPR) and type classify the M8 chemical alarm simulator. Continue ED on: (1) NBC marking system, and (2) NBC collective protection equipment for armored vehicles.

4. (U) FY 1982 Planned Program: Engineering development (ED) will continue on: (1) the XM30 protective mask, (2) remote sensing chemical agent alarm, and (3) modular collective protection equipment (MCPE) applications to vans, shelters, and associated equipment. Conduct a Development Acceptance In-Process Review (DEVA-IPR) on the XM30 mask following completion of Development Test/Operational Test II (DT/OT II). Initiate ED on: (1) the detector kit for waterborne chemical warfare agents, (2) clothing decontamination system, (3) special application decontamination system (e.g., plastic, optics, and electronics), and (4) decontamination station kit. All necessary experimental work on above equipment will be performed, and items will be ready for full-scale development.

5. (U) Program to Completion: This is a continuing program.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D023 — Title: Collective Protection Materiel-Armored Vehicles
Program Element: #6.47.25.A — Title: Chemical Defense Materiel
DOD Mission Area: #215 - Land Combat Support — Budget Activity: #4 - Tactical Programs

A. (U) DETAILED BACKGROUND AND DESCRIPTION: The Soviet Union continues to maintain a significant chemical warfare capability. The evidence is that they regard chemical weapons as an integral part of future tactical warfare. For example, they conduct extensive training exercises which stress operating proficiency in a chemical warfare protective posture and they have equipped their armored vehicles with collective protection systems. Other Warsaw Pact nations are similarly trained and equipped. To meet this threat, Congress directed in the FY 1978 DOD Appropriations Act (PL 95-79) that the Army prepare and fund a plan to provide nuclear-biological-chemical (NBC) protection for combat vehicles in development or procurement by 1981. Subsequently, enemy threat assessment and review of the Army's tactical doctrine for operating in a chemical contaminated environment resulted in an Army plan for providing NBC collective protection for fleet as well as developmental combat vehicles and their crews. This program is structured to support these specified needs to improve the Army's survivability on the battlefield in a contaminated environment. Specifically, this program provides engineering development of new and improved collective protection equipment for armored vehicles. This goal will be achieved through the development of improved air purification systems which can be used for positive pressurization of the vehicle, if it is assigned a rear area mission, or in providing ventilated facepiece protection if it is assigned a forward area mission. The provision of the improved collective protection system will enable the crews to perform combat duties without the encumbrance of complete individual protective equipment when operating in an NBC contaminated environment.

B. (U) RELATED ACTIVITIES: This was a new start in FY80. Previous related work has been done under PE 6.37.21.A Chemical Defense Materiel Concepts, Project D604, Collective Chemical Protection Materiel; PE 6.47.25.A, Chemical Defense Materiel, Project D017, CB Collective Protection; and PE 6.47.25.A, Chemical Defense Materiel, Project D018, Collective Protection-Vehicles and Vans. Foreign state of the art will be considered throughout the RDTE cycle. Related data are exchanged with allied countries via data exchange agreements and NATO Panel VII-NBC defense. Work being done in the collective protection program is coordinated with the other Services and NATO countries to avoid duplication of effort.

C. (U) WORK PERFORMED BY: US Army Tank-Automotive Research and Development Command Warren, MI, is responsible for the development and overall management of this program. In-house RDTE work is being performed by Chemical Systems Laboratory, Aberdeen Proving Ground, MD. Major contractors are working under the auspices of the armored vehicle program managers and include: Boeing, Seattle, WA; and Hughes, Canoga Park, CA. Studies and limited investigatory work have been done by Donalson, Minneapolis, MN; Honeywell, Minneapolis, MN; and Aero Physic, Washington, DC, under PE 6.37.21.A, Chemical Defense Materiel Concepts, Project D604, Collective Chemical Protection Materiel.

Project: #D023
Program Element: #6.47.25.A
DOD Mission Area: #215 - Land Combat Support

Title: Collective Protection Materiel-Armored Vehicles
Title: Chemical Defense Materiel
Budget Activity: #4 - Tactical Programs

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: Not Applicable. New Start in FY 1980.

2. (U) FY 1980 Program: Initiate vehicle interface development in preparation for the application of ventilated face mask type of nuclear, biological, and chemical (NBC) collective protection for the following armored vehicles which will be in development or procurement in FY 1981: (1) Infantry Fighting Vehicle, (2) Combat Fighting Vehicle, (3) General Support Rocket System, (4) Improved TOW Vehicle, (5) Division Air (4) Improved Tube Launched Optically Tracked, Wire Guided (TOW) Vehicle, (5) Division Air Defense Gun, (6) M109 Self-Propelled Howitzer, and M577A1 Command Post Carrier. The hybrid (combination ventilated face mask and positive pressure) is the collective protection system of choice for the XM1 Tank and the US ROLAND. The thrust of the FY 1980 program is toward reducing the US ROLAND's vulnerability to the nuclear biological chemical (NBC) warfare environment. This is to ensure integration of NBC, Protective equipment on the US ROLAND in time for full production. Initiate development of Technical Data Packages for incorporating the ventilated face mask on the designated vehicles.

3. (U) FY 1981 Planned Program: Continue work initiated in the previous year on the application of collective protection equipment on the US ROLAND Air Defense System. Continue work on vehicle interface development in preparation for the application of either the ventilated face mask or the hybrid type of NBC collective for the identified vehicles and new entries. The improved ventilated NBC system and associated interface hardware will be investigated for performance consistent with operational needs and doctrine. Continue development of technical data packages for incorporating the ventilated face mask on the designated vehicles. Initiate preproduction engineering and support activities for the application of protection systems to selected vehicles.

4. (U) FY 1982 Planned Program: Complete all technical data package work initiated in prior years. Continue (as required) preproduction engineering and support activities for the application of protection systems to selected vehicles. Current plan is to type classify the hybrid collective protection system directly from Advanced Development (AD) during FY 1982. All necessary experimental work will be performed and the hybrid collective protection system will be ready for full-scale development.

5. (U) Program to Completion: This is a continuing program.

6. (U) Major Milestones: Not Applicable.

Project: #D023 Title: Collective Protection Materiel-Armored Vehicles
Program Element: #6.47.25.A Title: Chemical Defense Materiel
DOD Mission Area: #215 - Land Combat Support Budget Activity: #4 - Tactical Programs

7. (U) Resources ($ in thousands):

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	0	9860	7849	10451	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	0	10160	6799	-	Continuing	Not Applicable

The FY 1981 increased funding provides expanded support for the Army's NBC Collective Protection Program for Armored Vehicles which include: (1) Post-attack technology, (2) vehicle protection technology, (3) on-vehicle decontamination technology, and (4) advanced filter development. The decrease in FY80 is a result of a general Congressional reduction applied to this program.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.27.A Title: Command and Control
DOD Mission Area: #254 - Tactical Command and Control Budget Activity: #4 - Tactical Programs

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	9117	22579	25015	14109	19371	116168
	QUANTITIES						
DC98	Position Location Reporting System	3350	8700	11968	9755	16089	67564
D183	Tactical Display System	2511	3639	5111	1933	3282	16476
D184	Tactical Computer System/ Tactical Computer Terminal	0	9000	7936	2421	0	19357
D284	Battery Computer System	2316	1042	0	0	0	11408
A570	Mortar Fire Control Calculator	940	198	0	0	0	1363

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program consists of three major areas. The Tactical Display System (TDS) is needed to annotate standard military maps in near-real time in order to access large volumes of data available in the data bases of tactical automated systems to present rapidly changing battlefield situations accurately and selectively while withstanding the battlefield environment. Automatic and selective display of up-to-date information speeds planning and operations over the current manual methods. The display is a one-meter-by-one-meter panel which presents tactical information graphically on a map background of the Commander's area of interest. The Position Location Reporting system (PLRS) is a joint US Army and US Marine Corps development that will provide combat commanders in the 1980's with automatic, near-real-time, precise locations of their field forces on the battlefield, regardless of terrain, weather, or geographical location. This system is required as a realtime position/navigation command and control capability in a highly mobile environment to enable commanders to accurately and rapidly navigate and position weapons systems and maneuver elements to ensure rapid employment of combat power. The Tactical Computer System/Tactical Computer Terminal (TCS/TCT) will satisfy Army needs for an intelligent terminal for Army automated field data processing systems. The Tactical Computer System/Tactical Computer Terminal (TCS/TCT) will make available to the Army a near-term standard set of modular, militarized, automatic data processing equipment that will be capable of being utilized in a variety of support packages thus enabling the Army to achieve reduced life cycle costs, shorter development cycles, simplified logistic support and training, and a reduction of computer proliferation. The modular

Program Element: #6.47.27.A Title: Command and Control
DOD Mission Area: #254 - Tactical Command and Control Budget Activity: #4 - Tactical Programs

nature of TCS and TCT further permit product improvements to be accomplished on a modular basis, thus enabling the Army to take advantage of state-of-the-art advances and to provide for graceful insertion of Military Computer Family (MCF) components as they become available for long-term standardization.

C. (U) BASIS FOR FY 1981 RDTE REQUEST: The Tactical Display System will enter full-scale development with plans of continuing competitive development of both a US-based technology; namely, Light Emitting Diode, and a foreign technology--Laser display developed by Elektro-Spezial in Germany. The continuation of each approach is contingent upon feasibility and validation of the respective technological approach. Emphasis will be directed at producibility, low cost, militarization, and system integration. Funds requested for the TCS/TCT are to be utilized for completion of the Integrated Logistics Support (Logistics, training, and support documentation (SPA)) contract initiated in FY79, initiate test measurement and diagnostic equipment (TMDE) programming efforts on the USM-410 for the TCS/TCT printed circuit board/modules, and complete development testing (DT-II) of the TCS/TCT equipment. These actions will enable the TCS/TCT equipment to be fully qualified and available as either stand-alone or embedded equipment for application in Army systems. The PLRS will be in DT/OT II which will thoroughly test the Engineering Development System. Automatic test equipment software will be initiated.

D. (U) BASIS FOR CHANGE BETWEEN FY 1981 AND FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1979	FY 1980	FY 1981	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	9117	22579	25015	33480	116168
Funds (as shown in FY 1980 submission)	13627	13591	15100	Continuing	Not Applicable

FY79 difference due to internal Army reprogramming. Increase in FY80 and FY81 is due to a reestimate of funds required for the PLRS programs and the inclusion of the TCS/TCT program in this program vice being accomplished under the Tactical Operations System (TOS) (Program Element 6.37.22.A).

Program Element: #6.47.27.A Title: Command and Control
DOD Mission Area: #254 - Tactical Command and Control Budget Activity: #4 - Tactical Programs

E. (U) OTHER APPROPRIATION FUNDS: ($ in thousands)

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional To Completion	Total Estimated Cost
Other Procurement Army						
Battery Computer System						
Funds (current requirements)	0	14600	35000	45000	53100	147700
Funds (as shown in FY 1980 submission)	0	16000	22000	---	Continuing	Not Applicable
Quantities (current requirements)						
Quantities (as shown in FY 1980 submission)						
Mortar Fire Control Calculator						
Funds (current requirements)	0	0	1000	2200	7300	10500
Funds (as shown in FY 1980 submission)	-	-	-	-	-	-
PLRS						
Funds (current requirements)	0	0	0	2200	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	0	0	0	0	--	--

The difference in Battery Computer System is due to inflation and revised and updated requirements. Mortor Fire Control Calculator requirements was not firm at time of FY 1980 submission.

Program Element: #6.47.27.A Title: Command and Control
DOD Mission Area: #254 - Tactical Command and Control Budget Activity: #4 - Tactical Programs

F. (U) DETAILED BACKGROUND AND DESCRIPTION: The Position Location Reporting System (PLRS) is a joint US Army and US Marine Corps development that will provide combat commanders in the 1980's with automatic near-realtime, precise location of their field forces on the battlefield, regardless of terrain, weather, or geographical location. The system will augment conventional communications on the battlefield, provide reliable navigation information to friendly forces, and enhance the Commander's ability to effectively control his maneuver elements. The Army requires a realtime positioning/navigation command and control capability in a highly mobile environment to enable Commanders to accurately and rapidly navigate and position weapons systems and maneuver elements to ensure rapid employment of combat power. This will allow for exploitation of technical superiority and act as a force multiplier to assist in defeating an enemy with a numerical advantage and greater fire power. The system employs a master unit located at or near Division Command Post with an alternate master unit located near Division Artillery for 100% backup to insure system survivability and continuity of operations during rapid command post displacements. The truck- or air-transportable master unit provides the commander with computer-controlled network management and dynamic situation display of lightweight (15-17 lbs) user units in manpack, vehicle, and airborne configurations distributed throughout the division's combat maneuver and fire support elements. Each user unit automatically transmits a self-identifying signal burst on a precision time-ordered schedule, measures time-of-arrival of designated user unit transmissions, and automatically relays these measurements to the master unit. The master unit computes and continuously updates the position of each user unit. Units equipped with PLRS obtain their location in coordinates, range and bearing to other friendly locations, the coordinate locations of other user units, an alarm indication when entering a predesignated boundary area such as a minefield, and the ability to exchange abbreviated digital data messages. Airborne users are provided position location, altitude, corridor guidance around obstacles/danger zones, and range and bearing information to locations of ground users or designated coordinate locations for typical combat missions such as medical evacuation, air mobile operations, resupply extraction, and operations requiring voice radio silence. The system is crypto-secure and offers a high degree of resistance to jamming and electronic vulnerability in a hostile electromagnetic environment. The network automatically utilizes surface/airborne user unit integral relays to achieve over-the-horizon transmission and overcome terrain obstruction to line of site communications. PLRS entered full-scale engineering development in 1976. Two master units and 64 user units in various configurations are scheduled for delivery and government testing FY80. The Development Acceptance In-Process Review (IPR) is scheduled for first quarter FY 1982, and the Initial Operational Capability date is first quarter FY 1984. The Army initiated development of the Tactical Computer System (TCS) primarily as an intelligent terminal for the Tactical Operations System (TOS). Subsequent to the TCS program initiation, the need for a smaller terminal in TOS resulted in the expansion of the program to include the Tactical Computer Terminal (TCT). It became apparent during the TCS/TCT development and testing efforts that this equipment not only satisfied the requirements of TOS, but similar requirements in many other systems as well. The need for a standard set of fully qualified Automatic Data Processing (ADP) equipment has been recognized by the Army, and for the long term the Army is committed to a Military Computer Family (MCF) to satisfy that need. For the near term, TCS and TCT have similar general applicability, and the Army seeks to capitalize on this by making this equipment available to any system developer whose

Program Element: #6.47.27.A Title: Command and Control
DOD Mission Area: #254 - Tactical Command and Control Budget Activity: #4 - Tactical Programs

needs they can satisfy. Operationally, the TCS/TCT may be utilized as a stand-alone system or as a subsystem of a major system. It is compact and fully militarized, thus enabling it to be employed in the M-577 armored command post carrier in the field at various echelons or in other shelter/van environments. The modular structure of the TCS and TCT permit these devices to be product-improved as requirements, technology changes, and life cycle cost consideration dictate. This structure further increases the flexibility this equipment has for satisfying diverse systems requirements as well as long-range adaptability to emerging Military Computer Family (MCF) equipment. Without the availability of TCS and TCT, the Army would be forced to continue the proliferation of individual unique terminal and processor systems for each system under development. Not only would this result in unacceptable duplication of research and development costs and increased development time, but more important, it would create an intolerable logistics and training burden for multiple ADP equipment and greatly restrict the Army's capabilities for realizing improved continuity of operations by sharing critical ADP resources when the need arises under adverse conditions. The TCS/TCT program, upon satisfactory completion of Development Test I (DT I) and subsequent successful validation In-Process Review (IPR), July 1978, proceeded into engineering development. The full Integrated Logistics Support contract, to include Skill Performance Aids (SPA) manuals, training and logistics, was awarded in January 1979 as a cost-plus-incentive-fee (CPIF) contract. In February 1979, a separate hardware contract, CPIF-type, was awarded for the engineering development hardware. The objective of the Tactical Display System (TDS) program is to develop a more effective means of displaying tactical situations in support of tactical automated systems.

G. (U) RELATED ACTIVITIES: Advanced Developmentof the Tactical Display System (TDS) was begun as a joint cooperative research and development program in January 1975 with 50 percent of the funds provided by the Federal Republic of Germany (FRG) and 50 percent under PE 6.37.23.A (Integration of Army Tactical Data System). Memorandums of Understanding between the US and FRG have been negotiated and concluded to continue this development into full-scale development under the same 50/50 financial arrangement, where the US funds would be provided under PE 6.47.27.A, Command and Control. The US Marine Corps is funding 40% of the PLRS development under Program Element 6.47.19.M, Other Marine Corps Development (Engineering). A 60/40 (US Army/USMC) sharing ratio will be applied to shared costs. The basic requirements and specifications for PLRS are stated in a 1976 USA/USMC Joint Services Operational Requirement. The Army plans to continue the development of PLRS with the Marine Corps to achieve an FY84 Initial Operational Capability (IOC). At the same time, the Army is planning to investigate through the use of a testbed, a PLRS/Joint Tactical Information Distribution System (JTIDS) hybrid under PE 6.37.07.A. The hybrid will consist of a slightly modified PLRS integrated with JTIDS. Also, the hybrid is intended to satisfy the Army's urgent requirements for secure, jam-resistant battlefield data distribution among command and control intelligence surveillance and target acquisition systems that will be fielded in the 1985 timeframe. The hybrid will continue to provide position/location information.

H. (U) WORK PERFORMED BY: Project Officer, Tactical Computer System/Tactical Computer Terminal (TCS/TCT), under Project Manager, Tactical Operations System/Operations Intelligence Tactical Data Systems (PM, TOS/OITDS), US Army Communications

Program Element: 6.47.27.A Title: Command and Control
DOD Mission Area: 6254 - Tactical Command and Control Budget Activity: 64 - Tactical Programs

Research and Development Command (CORADCOM), Fort Monmouth, NJ. Primary contractor is the Singer Co., Librascope Division, Glendale, CA. A contract for the TDS was awarded by CORADCOM, Ft Monmouth, NJ, to Litton Data Systems, Van Nuys, California, for LED module fabrication and prototype display development. A contract was awarded by German Ministry of Defense, BWB, Koblenz, Germany, to Elektro-Spezial, Bremen, Germany, for prototype development of the Tactical Laser Display System. Project Manager, Position Location Reporting System/Tactical Information Distribution System (PLRS/TIDS), under Program Manager Army Tactical Data systems (ARTADS), US Army Communications Research and Development Command (CORADCOM), Fort Monmouth, NJ. Primary contractor is Hughes Aircraft Company, Fullerton, CA.

1. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: For the Tactical Display System (TDS), the US and German Governments have negotiated and concluded agreements in FY79 for joint cooperative development through Engineering Development. One of the Memorandums of Understanding (MOU) is for continued development of the LED display, and the second MOU calls for the development of a LASER display system which is a foreign technology being built by Elektro-Spezial, a division of Philips, Bremen, West Germany. Both agreements are for equal cost sharing of the program. The PLRS contractor has conducted a trade-off analysis, and issued a Design Plan and a System Technical Description. Contractor tests of the Master Unit software programs began, and fifteen Large-Scale Integration (LSI) chips were completed. The internal PLRS Development Plan was updated to include a Joint Integrated Logistics Support Plan, and Procurement and Transmission Plans. Electronic Warfare and TEMPEST test plans were reviewed. The development of a jammer for use during Development Testing/Operational Testing II (DT/OT II) was completed. Two User Units were completed, and the majority of the master unit software was developed. Prototype Qualification Tests were initiated. Frequency Propagation Tests were initiated at Eglin Air Force Base, FL.

2. (U) FY 1980 Program: Competitive efforts for the TDS are underway to develop, produce, and logistically support LED modules at an affordable cost. This effort is critically important prior to full-scale development in order to validate that the technology can be produced as a hi-reliability, low-cost, modular approach. Development of a prototype LASER display has been initiated and configured for a shelter installation. Program actions for the TCS/TCT include the continuation of the ILS effort and the hardware engineering development effort. Continue TCT development testing (DT II) and initiate TCS DT II testing, and full communications testing of the TCS/TCT at Ft Huachuca, AZ. The maintenance engineering evaluation (MEE) and the individual and small group trials will be completed. Software programming on the USM-410, the general support automatic test equipment, will be initiated. Hardware and software development of PLRS will be completed. Batteries, maintenance, and spares will be purchased, and training for OT II will begin. Preliminary Qualification Tests by the contractor (PQT-C) and PQT-Government will begin with the delivery of two master units and 64 user units. Development will be completed on the Battery Computer System (Project D289) and Mortor Fire Control Calculation (Project A570) and production will be initiated in FY80 and FY81, respectively.

Program Element: 06.47.27.A
DOD Mission Area: 0254 - Tactical Command and Control

Title: Command and Control
Budget Activity: 04 - Tactical Programs

3. (U) FY 1981 Planned Program: Complete the TCS/TCT Integrated Logistic Support (ILS) contract in first half fiscal year. Finalize/solidify all TCS/TCT DT II testing. Complete software programming of the USM-410. Validate production engineering package (PEP) Data. Establish initial production posture and initiate transition phase. Full-scale development of both the LED and LASER displays will be initiated for the TDS. It is planned to develop and fabricate a total of seven (7) Engineering Development (ED) models for DT/OT II testing. The summary effort for PLRS will be on DT/OT II which will thoroughly test the Engineering Development system. The Project Manager will complete required planning leading to the request for proposal for production. Automatic Test equipment software development will begin, and prototype refurbishment will be accomplished. Militarization of a PLRS portable test unit will be accomplished.

4. (U) FY 1982 Planned Program: For the TDS, full-scale development of the LED and LASER displays will be continued. Contractor testing of the initial prototypes will commence. Automatic test equipment for PLRS will continue to be developed. Support efforts will concentrate on production engineering and product assurance. Development of Skill Performance Aids (SPA) will be initiated and planning for follow-on evaluation will be completed. Automatic test equipment will conclude with a finished EQUATE program integration. The Development Acceptance In-Process Review (DEVA IPR) will be conducted and production will begin. A Development Acceptance In-Process Review (DEVA IPR) for the TCS/TCT will be conducted.

5. (U) Program to Completion: It is planned to complete the full-scale development of the Tactical Display System in FY 1983. Skill Performance Aids for PLRS will be completed, and a follow-on evaluation will be conducted if required. Support of the transition phase and engineering efforts of TCS/TCT applications will be maintained.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #DC98 Title: Position Location Reporting System (PLRS)
Program Element: #6.47.27.A Title: Command and Control
DOD Mission Area: #254 - Tactical Command & Control Budget Activity: #4 - Tactical Programs

A. (U) DETAILED BACKGROUND AND DESCRIPTION: The Position Location Reporting System (PLRS) is a joint US Army and US Marine Corps development that will provide combat commanders in the 1980's with automatic, near-realtime, precise location of their field forces on the battlefield, regardless of terrain, weather, or geographical location. The system will augment conventional communications on the battlefield, provide reliable navigation information to friendly forces, and enhance the Commander's ability to effectively control his maneuver elements. The Army requires a realtime positioning/navigation command and control capability in a highly mobile environment to enable Commanders to accurately and rapidly navigate, and position weapons systems and maneuver elements to ensure rapid employment of combat power. This will allow for exploitation of technical superiority and act as a force multiplier to assist in defeating an enemy with a numerical advantage and greater fire power. The system employs a master unit located at or near Division Command Post with an alternate master unit located near Division Artillery for 100% backup to insure system survivability and continuity of operations during rapid command post displacements. The truck or air transportable master unit provides the commander with computer-controlled network management and dynamic situation display of lightweight (15-17 lbs) user units in manpack, vehicle, and airborne configurations distributed throughout the division's combat maneuver and fire support elements. Each user unit automatically transmits a self-identifying signal burst on a precision time-ordered schedule, measures time-of-arrival of designated user unit transmissions and automatically relays these measurements to the master unit. The master unit computes and continuously updates the position of each user unit. Units equipped with PLRS obtain their location in UTM coordinates, range and bearing to other friendly locations, the UTM coordinate locations of other user units, an alarm indication when entering a predesignated boundary area such as a minefield and the ability to exchange abbreviated digital data messages. Airborne users are provided position location, altitude, corridor guidance around obstacles/danger zones, and range and bearing information to locations of ground users or designated coordinate locations for typical combat missions such as medical evacuation, air mobile operations, resupply extraction, and operations requiring voice radio silence. The system is crypto-secure and offers a high degree of resistance to jamming and electronic vulnerability in a hostile electromagnetic environment. The network automatically utilizes surface/airborne user unit integral relays to achieve over-the-horizon transmission and overcome terrain obstruction to line of site communications. PLRS entered full-scale engineering development in 1976. Two master units and 64 user units in various configurations are scheduled for delivery and government testing in FY80. The Development Acceptance In-Process Review (IPR) is scheduled for First Quarter FY 1982, and the Initial Operational date is First Quarter FY 1984.

B. (U) RELATED ACTIVITIES: The US Marine Corps is funding 40% of the PLRS development under Program Element #6.47.19.M, Other Marine Corps Development (Engineering). A 60/40 (US Army/USMC) sharing ratio will be applied to shared costs. The basic

Project: #DC98 Title: Position Location Reporting System (PLRS)
Program Element: #6.47.27.A Title: Command and Control
DOD Mission Area: #254 - Tactical Command & Control Budget Activity: #4 - Tactical Programs

requirements and specifications for PLRS are stated in a 1976 USA/USMC Joint Services Operational Requirement. The Army plans to continue the development of PLRS with the Marine Corps to achieve an FY84 Initial Operational Capability (IOC). The Army is investigating, through the use of a testbed, a PLRS/Joint Tactical Information Distribution System (JTIDS) hybrid under PE 6.37.07. The hybrid, which would be fielded a few years after PLRS, will consist of a slightly modified PLRS integrated with JTIDS. Also, the hybrid is intended to satisfy the Army's urgent requirements for secure, jam-resistant battlefield data distribution among command and control intelligence surveillance and target acquisition systems that will be fielded in the 1985 timeframe. The hybrid will continue to provide position/location information.

C. (U) WORK PERFORMED BY: Project Manager, Position Location Reporting System/Tactical Information Distribution System (PLRS/TIDS), under Program Manager Army Tactical Data Systems (ARTADS). US Army Communications Research and Development Command (CORADCOM), Fort Monmouth, NJ. Primary contractor is Hughes Aircraft Company, Fullerton, CA.

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1.(U) FY 1979 and Prior Accomplishments: To date, the contractor has conducted a trade-off analysis, and issued a Design Plan and a System Technical Description. Contractor tests of the Master Unit software programs began, and fifteen Large Scale Integration (LSI) chips were completed. An additional six-month development effort was anticipated to complete the contractor effort. The internal PLRS Development Plan was updated to include a Joint Integrated Logistics Support Plan, and Procurement and Transmission Plans. Electronic Warfare and TEMPEST test plans were reviewed. The development of a jammer for use during Development Testing/Operational Testing II (DT/OT II) was completed. Two User Units were completed and the majority of the master unit software was developed. Prototype Qualification Tests were initiated. Frequency Propagation Tests were initiated at Eglin Air Force Base, FL.

2.(U) FY 1980 Program: Hardware and software development will be completed. Batteries, maintenance, and spares will be purchased, and training for OT II will begin. Preliminary Qualification Tests by the contractor (PQT-C) and PQT-Government will begin with the delivery of two master units and 64 user units.

3.(U) FY 1981 Planned Program: The summary effort will be on DT/OT II which will thoroughly test the Engineering Development system. The Project Manager will complete required planning leading to the request for proposal for production. Automatic Test equipment software development will begin, and prototype refurbishment will be accomplished. Militarization of a PLRS portable test unit will be accomplished.

Project: #DC98 Title: Position Location Reporting System (PLRS)
Program Element: #6.47.27.A Title: Command and Control
DOD Mission Area: #254 - Tactical Command & Control Budget Activity: #4 - Tactical Programs

4. (U) FY 1982 Planned Program: Automatic test equipment will continue to be developed. Support efforts will concentrate on production engineering and product assurance. Development of Skill Performance Aids (SPA) will be initiated and planning for follow-on evaluation will be completed. Automatic test equipment will conclude with a finished EQUATE program integration. The Development Acceptance In-Process Review (DEVA IPR) will be conducted and production will begin.

5. (U) Program to Completion: Skill Performance Aids will be completed, and a follow-on evaluation will be conducted if required.

6. (U) Major Milestones:

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1980 Submission
Development Acceptance (DEVA) In-Process Review	1st Qtr FY82	4th Qtr FY81
Initial Operational Capability (IOC)	1st Qtr FY84	4th Qtr FY83

Slippage in IOC and DEVA IPR is the result of insufficient funding in FY79. Initial estimates were revised once the contractor submitted his final proposal to the government.

7. (U) Resources ($ in thousands):

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	3350	8700	11968	9755	16089	67564
Funds (as shown in FY 1980 submission)	7400	8700	10600	-	10000	46785

Project: #DC98
Program Element: #6.47.27.A
DOD Mission Area: #254 - Tactical Command & Control

Title: Position Location Reporting System (PLRS)
Title: Command and Control
Budget Activity: #4 - Tactical Programs

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
Quantities (current requirements)					2 Master Units 64 User Units	
Quantities (as shown in FY 1980 submission)					2 Master Units 64 User Units	

FY79 Difference due to internal Army reprogramming to a higher priority program. Differences in FY81 are due to inflation. Differences in Additional To Complete and Total due to differences in what was required in FY79 and what was programmed and inflation in 1981 and beyond.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D183 Title: Tactical Display System (TDS)
Program Element: #6.47.27.A Title: Command and Control
DOD Mission Area: #254 - Tactical Command and Control Budget Activity: #4 - Tactical Program

A. (U) DETAILED BACKGROUND AND DESCRIPTION: The Tactical Display System (TDS) is a joint research and development project between the United States and German Armies. The Armies of the United States and the Federal Republic of Germany have many common requirements in the area of automatic data processing and display for command and control in the field. The primary requirement for the situation display is the annotation of standard military maps in near real time in order to access large volumes of data available in the data bases of tactical automated systems. A one-meter by one-meter display forms the vital man-machine interface for tactical automated systems. The US Army entered into an agreement with the German Army in January 1975 for a cooperative research and development project in the area of tactical displays. This has resulted in the award of competitive development contracts. The Data Systems Division of Litton Systems, Inc., developed the TDS using light-emitting diodes (LED's) to achieve a multi-color, flat panel display. Control Data Corporation used a gas plasma display panel for the TDS. The result of the two-year advanced development program indicated that (1) the LED technology is feasible and that work should now continue that is primarily aimed at the producibility of a low-cost LED module; and (2) serious technical problems with large size plasma panels (1 m^2) still remain, and therefore this display approach has been abandoned. In FY 79, the US and German Armies agreed to continue to pursue a competitive development approach of the TDS in addition to the LED project. A Memorandum of Understanding was negotiated permitting the joint development of laser technology, the Tactical Laser Display System (TLDS), by a German firm - Elektro-Spezial, a division of Philips of the Netherlands. Both the LED and LASER costs are equally shared between the US and Germany.

B. (U) RELATED ACTIVITIES: None.

C. (U) WORK PERFORMED BY: The United States and German Armies have negotiated two separate agreements to pursue cooperative R&D projects for the Tactical Display System. The first agreement is for the development of the LED display system with Litton Systems Inc., Van Nuys, CA., and the second for the development of the Laser Display System with Elektro-Spezial, Bremen, W. Germany. Center for Tactical Computer Systems (CENTACS), US Army Communications Research and Development Command (CORADCOM), Ft Monmouth, NJ, is responsible for the technical, administrative and financial controls on the US contractor - Litton Systems, Inc., Van Nuys, California. The Bundesamt Fur Wehrtechnik and Beschaffung (BWB), Koblenz, Germany, is responsible for the technical, administrative, and financial controls on the German contractor - Elektro-Spezial Bremen, W. Germany.

Project: #D183 Title: Tactical Display System (TDS)
Program Element: #6.47.27.A Title: Command and Control
DOD Mission Area: #254 - Tactical Command and Control Budget Activity: #4 - Tactical Program

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: The prime contractor (Litton) has developed the detailed design for the development of the TDS LED modules aimed at establishing multiple sources to produce quantities of high reliability modules at an affordable cost. Both Hughes and Teledyne's microelectronic divisions have been selected to produce the modules in production quantities. The German contractor (Elektro-Spezial) conducted a critical component investigation and breadboarded the high voltage switches, digital deflection unit, lasers, optics and mirrors. They established the feasibility of folding the optics sufficiently such that the display will be capable of installation in a shelter or expandable van.

2. (U) FY 1980 Program: Actions this year are to continue competitive efforts at both the subsystem and LED module level. Two contractors will be qualified to produce and logistically support the LED display modules. The Tactical Laser Display System (TLDS) provides a competitive alternative to meet the TDS requirements. Development of the hardware and software for a stand-alone TLDS mounted in a shelter will be conducted.

3. (U) FY 1981 Planned Program: The full scale engineering development of the TDS will be initiated early in FY 81. The LED and LASER technologies will provide the competitive approaches to a Tactical Display System. The engineering development effort proposed will result in at least seven (7) TDS models including the necessary training, integrated logistics support, Production Engineering Package (PEP), and system test and evaluation. All necessary experimental work will be performed, and the proposed system will be ready for full scale development.

4. (U) FY 1982 Planned Program: Two (2) ED models of the Tactical Display System will be developed and utilized for contractor and government developmental testing as well as three (3) ED models for operational testing. An additional two (2) display panels will be subjected to concurrent, accelerated Reliability, Availability Maintainability (RAM), and Integrated Logistics Support (ILS) testing. The necessary software and interface kits will be developed to test and evaluate the TDS integrated into a division and battalion fire direction centers. They will also be tested in a configuration to evaluate the TDS as an automated assist to the G2/G3 staff elements of the Tactical Operations Center.

5. (U) Program to Completion: Development Test II and Operational Test II testing will be conducted in FY 83. A Development Acceptance In-Process Review (DEVA-IPR) will be held late in FY 83.

Project: #D183 Title: Tactical Display System (TDS)
Program Element: #6.47.27.A Title: Command and Control
DOD Mission Area: #254 - Tactical Command and Control Budget Activity: #4 - Tactical Program

6. (U) Major Milestones:

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1980 Submission
Development Acceptance (DEVA) In-Process Review	4th Qtr FY83	Not Shown

7. (U) Resources ($ in thousands):

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	2511	3639	5111	1933	3282	16478
Funds (as shown in FY 1980 submission)	2911	3649	4500	Continuing	Continuing	Not Applicable

The additional funds in FY 81 are to recover a portion of the program's delay due to the late negotiating of the second Memorandum of Agreement with Germany for the Tactical Laser Display System. The decrease in FY80 was due to a general reduction by Congress. The decrease in FY79 was due to reprogramming of funds for higher priority Army programs.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D184
Program Element: #6.47.27.A
DOD Mission Area: #254 - Tactical Command and Control

Title: Tactical Computer System/Tactical Computer Terminal (TCS/TCT)
Title: Command and Control
Budget Activity: #4 - Tactical Programs

A.(U) DETAILED BACKGROUND AND DESCRIPTION: The Tactical Computer Terminal (TCT) fulfills a universal need for a basic, intelligent input/output device for receipt, review, and distribution of tactical information. The Tactical Computer System (TCS) is a militarized minicomputer which provides a set of flexible hardware modules which can be tailored for use with any command, control, or communications system. The TCS/TCT will initially be fielded as the maneuver control subsystem of the Operations Control and Command Support System. The Army initiated development of the Tactical Computer System (TCS) primarily as an intelligent terminal for the Tactical Operations System (TOS). Subsequent to the TCS program initiation, the need for a smaller terminal in TOS resulted in the expansion of the program to include the Tactical Computer Terminal (TCT). It became apparent during the TCS/TCT development and testing efforts that these equipments not only satisfied the requirements of TOS, but similar requirements in many other systems as well. The need for a standard set of fully qualified automated data processing equipments has been recognized by the Army and, for the long term, the Army is committed to a Military Computer Family (MCF) to satisfy that need. For the near term, TCS and TCT have similar general applicability and the Army is seeking to capitalize on this by making these equipments available to any system developer whose needs they can satisfy. Operationally the TCS/TCT may be utilized as a stand alone system or as a subsystem of a major system. It is compact and fully militarized thus enabling it to be employed in the M-577 armored command post carrier in the field at various echelons or in other shelter/van environments. The modular structure of the TCS and TCT permit these devices to be product improved as requirements, technology changes, and life cycle cost consideration dictate. This structure further increases the flexibility these equipments have for satisfying diverse system requirements as well as longer range adaptability to emerging Military Computer Family (MCF) equipments. Without the availability of TCS and TCT, the Army would be forced to continue the proliferation of individual unique terminal and processor systems for each system under development. Not only would this result in unacceptable duplication of R&D costs and increased development time, but more important, it would create an intolerable logistics and training burden for multiple ADP equipments and greatly restrict the Army's capabilities for realizing improved continuity of operations by sharing critical ADP resources when the need arises under adverse conditions.

B.(U) RELATED ACTIVITIES: None

C.(U) WORK PERFORMED BY: Project Officer, Tactical Computer System/Tactical Computer Terminal (TCS/TCT), under Project Manager, Tactical Operations System/Operations Intelligence Tactical Data Systems (PM, TOS/OITDS), US Army Communications Research and Development Command (CORADCOM), Fort Monmouth, NJ. Primary contractor is the Singer Co, Librascope Division, Glendale, California.

Project: #D184 Title: Tactical Computer System/Tactical Computer Terminal (TCS/TCT)
Program Element: #6.47.27.A Title: Command and Control
DOD Mission Area: #254 - Tactical Command and Control Budget Activity: #4 - Tactical Programs

D.(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: Not applicable. These devices were developed under the TOS program in FY 1979. The TCS/TCT program upon satisfactory completion of Development Test I (DT I) and subsequent successful validation in Process Review (IPR), July 1978, proceeded into engineering development. The full Integrated Logistics Support (ILS) contract, to include Skill Performance Aids (SPA) manuals, training and logistics, was awarded in January 1979 as a Cost Plus Incentive Fee (CPIF) type contract. In February 1979, a separate hardware contract, Fixed Price Incentive Fee (FPIF) type, was awarded for the engineering development hardware. Development testing (DT) commenced on the TCT at Ft Huachuca during the latter half of FY 79.

2.(U) FY 1980 Program: Congressional approval of a $9.0 million reprogramming action will be required to support the continuation of the ILS effort and the hardware engineering developments effort. TCT development testing (DT II) will be continued and TCS DT II testing, and full communications testing of the TCT/TCT at Ft Huachuca will be initiated. The Maintenance Engineering Evaluation (MEE) and the individual and small group trials will be completed. Software programming on the USM-410, the general support automatic test equipment, will be initiated.

3.(U) FY 1981 PLANNED PROGRAM: Complete the integrated logistic support (ILS) contract in first half of FY. Finalize/solidify all TCS/TCT DT II testing. Complete software programming on the USM-410. Validate Production Engineering Package (PEP) data. Efforts in this FY will complete the basic development on these devices.

4.(U) PROGRAM TO COMPLETION: A Development Acceptance In-Process Review (DEVA-IPR) will be conducted in 1QFY82. In addition, support of the transition phase and engineering efforts in support of TCS/TCT applications will be maintained.

5.(U) MAJOR MILESTONES:

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1980 Submission
Development Acceptance (DEVA) In-Process Review	1QFY1982	N/A

Project: #D184 Title: Tactical Computer System/Tactical Computer Terminal (TCS/TCT)
Program Element: #6.47.27.A Title: Command and Control
DOD Mission Area: #254 - Tactical Command and Control Budget Activity: #4 - Tactical Programs

6.(U) RESOURCES ($ in Thousands):

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	None	9000	7936	2421	0	19357
Funds (as shown in FY 1980 submission)			Not Shown			

No funds were shown in the FY 1980 submission for this project as these devices were being developed as a part of the Tactical Operations System (TOS), PE 6.37.22.A. The FY 1980 Authorization Bill deleted the request for authorization of RDTE funds without prejudice. Accordingly, the Army has terminated all contractual efforts relating to TOS with the exception of these devices. Due to the general purpose nature of these equipments and their current development status, it is a prudent business decision to complete their development. A Required Operational Capability (ROC) is projected for 3QFY80.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.28.A Title: FAMECE
DOD Mission Area: #216 - Land Combat Service Support Budget Activity: #4 - Tactical Programs

A. (U) RESOURCES (PROJECT LISTING): ($ in Thousands)

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
D808	FAMECE	1933	0	0	0	0	30000

B. (U) BRIEF DESCRIPTION OF PROJECT: This program consisted of a family of military engineer construction equipment (FAMECE) that is wheeled, airmobile, air droppable, and designed to perform construction tasks required of combat engineers-dozing, scraping, loading, grading, compacting, excavating, hauling, and spreading. It consists of a standard power section with eight work sections. FAMECE enables combat engineers to perform their assigned missions within the time constraints of the current and future battlefield.

C. (U) EXPLANATION OF CANCELLATION OR DEFERRAL: The Army's requirements have changed since the program was initiated. In addition, due to funding constraints, the FAMECE was limited to airborne/airmobile units. The FAMECE is not cost effective in quantities less than "total force" density. Furthermore, the FAMECE hardware tested did not meet minimum reliability, availability, and maintainability requirements. The program was terminated by the Army on 19 October 1979.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.30.A
Title: Remotely Piloted Vehicles (RPVs)
DOD Mission Area: #255 - Tactical Surveillance, Reconnaissance and Target Acquisition
Budget Activity: #4 - Tactical Programs

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional To Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	18599	49341	54189	62350	Continuing	Not Applicable See para I.1.
	QUANTITIES						
D040	Remotely Piloted Vehicle	18599	49341	54189	44487	13060	179676
D041	Mission Payloads	0	0	0	17863	Continuing	To be determined

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program provides for Full Scale Engineering Development (FSED) of a Remotely Piloted Vehicle (RPV) System to fill the requirement for unmanned aerial target acquisition, target location, artillery adjustment, laser designation, and battlefield post-strike reconnaissance. Laser designation will be provided for a family of laser seeking weapons including cannon launched guided projectiles (COPPERHEAD) and helicopter launched missiles (HELLFIRE). The RPV is required to extend the eyes of Brigade and Division Combat elements to the range of their direct support artillery weapons where ground based systems cannot see and the risk to manned observation aircraft is high. This system multiplies the effectiveness of field artillery by providing target acquisition, artillery adjustment and laser designation at the full range of the field artillery. By limiting the amount of ammunition required per target, the RPV assists in overcoming the numerical superiority of a potential enemy. The user has established a high priority on fielding this system.

C. (U) BASIS FOR FY 1981 RDTE REQUEST: Funds requested provide for the development of an RPV system with an anti-jam data link. The RPV program for a daylight, target acquisition, and reconnaissance system is in the third year of a 43-month contract. The data link is a jointly funded development under a separate contract that provides a common modular system for the stand-off Target Acquisition System (SOTAS), United States Air For.. guided bombs and the RPV. In-house support will include monitoring contractor performance using design reviews and controlling cost, technical work, and schedule.

Program Element: #6.47.30.A
Title: Remotely Piloted Vehicles (RPVs)
DOD Mission Area: #255 - Tactical Surveillance, Reconnaissance and Target Acquisition
Budget Activity: #4 - Tactical Programs

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1980 Submission
1st Flight of Prototype	3Q CY81	None Shown
OT Testing	4Q CY82	
Production Award	2Q CY83	

D. (U) BASIS FOR CHANGE BETWEEN FY 1981 and FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1979	FY 1980	FY 1981	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)					
D040	18599	49341	54189	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	18203	49400	29440	Continuing	Not Applicable

FY 1979 funds were reprogramed to fully fund the start of Full Scale Engineering Development. The decrease in FY80 was a result of a general Congressional reduction applied to this program. FY 1981 increase is based on the negotiated FSED Contract, new inflation figures, higher sensor and data link estimates, and includes training and integrated logistics support costs. The integrated logistic support costs incorporate the Army AN/USM-410 electronic test set into the RPV System.

E. (U) OTHER APPROPRIATION FUNDS: Procurement planned to start in FY 1983, funded in Other Procurement, Army Appropriation.

Program Element: #6.47.30.A Title: Remotely Piloted Vehicles (RPVs)
DOD Mission Area: #255 - Tactical Surveillance, Reconnaissance and Target Acquisition Budget Activity: #4 - Tactical Programs

F. (U) DETAILED BACKGROUND AND DESCRIPTION: This program will accomplish the Full Scale Engineering Development (FSED) of the RPV System for employment by the Army which began in FY 1979. The system parameters have been defined based upon the results of the AQUILA System Technology Demonstrator program testing completed under Program Element (PE) 6.37.25.A, Remotely Piloted Vehicles/Drones, in FY 1978. The contract for the anti-jam data link was awarded in May 1979. The 1st generation RPV effort will provide a target acquisition, artillery adjustment, laser designation, and reconnaissance capability. It is a daylight system with an anti-jam data link. Modular payloads and command and control improvements currently in development under PE 6.37.25.A will add a night and limited adverse weather capability approximately 16 months after the daylight system becomes operational. The production decision will be made through the Defense System Acquisition Review Council Process.

G. (U) RELATED ACTIVITIES: The RPV was funded during Exploratory Development and Advanced Development in FY 1975 - 1978 under PE 6.27.32.A, Remotely Piloted Vehicle Supporting Technology and 6.37.25, Remotely Piloted Vehicles. Development of different interchangeable payloads such as night and adverse weather sensors, jammers, and radio relay will continue under these two PEs. The Air Force RPV programs consisting of PE 6.37.39.F, Advanced Drones/RPVs, and PE 6.47.46.F, Expendable Drones, are being monitored to utilize applicable technology, as appropriate, and eliminate duplication of effort. The Marine Corps is developing a similar requirement and is expected to participate in production buys of RPVs. The Army and Air Force RPV program managers also meet periodically to preclude duplication of effort between the services.

H. (U) WORK PERFORMED BY: United States Army Aviation Research and Development Command, St. Louis, MO; Combat Surveillance Target Acquisition Laboratory, US Army Electronics Research and Development Command, Fort Monmouth, NJ; Night Vision and Electro-Optics Laboratory, US Army Electronic Research and Development Command, Fort Belvoir, VA; Research and Technology Laboratories, Aero Mechanics Laboratory, Moffett Field, CA; Applied Technology Laboratory, Fort Eustis, VA; and the US Army Mobility Equipment Research and Development Command, Fort Belvoir, VA. Contracts were awarded to Lockheed Space and Missiles Company, Sunnyvale, CA, for system development and to Harris Corporation, Melbourne, FL, for the Modular Integrated Communication Navigation System (MICNS), the anti-jam data link.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: The full scale engineering development (FSED) program was started in FY 1979, following the successful Systems Technology Demonstrator (AQUILA) program accomplished under PE 6.37.25.A Remotely Piloted Vehicles/Drones, from FY 1975 through 1978. All experimental work required before moving into FSED was completed in the AQUILA program and parallel technology efforts. An anti-jam data link was flight tested in FY 1978 in both a manned aircraft and the AQUILA. By the beginning of FY 1979, all necessary pre-engineering development work was completed for a daylight, target

acquisition, laser designation and reconnaissance system. Source selection activities were conducted and a contract was awarded for MICNS on 1 May 1979. Source selection was conducted and the RPV system development contract was awarded 31 August 1979. The contract requires the design and fabrication of 22 air vehicles, 4 ground control stations, 3 launch and recovery systems and 18 daylight sensor systems. The contractor began design and engineering late in FY 1979. The FSED contract is for a period of 43 months.

2. (U) FY 1980 Program: Continue the FSED program initiated in FY 1979. Complete preliminary design of the hardware and software during this period. Conduct Preliminary Design Review. Construct mockups and conduct mockup review. Initiate testing of components and subsystems. Long lead items for FSED will be ordered to meet RPV schedules. In-house support will continue to monitor contractor's efforts controlling the cost, technical, specifications, and schedule.

3. (U) FY 1981 Planned Program: Continue the FSED program initiated in FY 1979. Complete design of hardware and software. Conduct Critical Design Review. Fabrication of hardware and software will be initiated and initial systems will be completed. Receive and integrate subcontractor hardware into first RPV System. The 1st flight of the system in late FY 1981 will mark the beginning of developer total system testing which will continue well into FY 1982.

4. (U) FY 1982 Planned Program: Contractor flight testing will be completed and government engineer and development tests will be conducted. Training and maintenance requirements will be established preparatory to operational testing in FY 1983. In addition, Full Scale Engineering Development (FSED) of the Forward Looking Infra-red (FLIR) Sensor will begin at this time. All experimental work required before moving into FSED will have been completed.

5. (U) Program to Completion: The FSED program will continue into FY 1983, with a production decision expected 2nd Quarter FY 1983. The FLIR FSED program will be entering the second year. Five FLIR payloads, which will be interchangeable with the daylight sensor payload, will be designed, fabricated, and integrated into the RPV system.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.40.A
Title: Tactical Surveillance System
DOD Mission Area: #255 - Tactical Surveillance, Reconnaissance, and Target Acquisition
Budget Activity: #4 - Tactical Programs

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional To Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	978	2201			Continuing	Not Applicable
	QUANTITIES						Not Applicable
D662	Tactical Surveillance System	978	2201			Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program 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. To make such essential intelligence/information rapidly available to the tactical commander, the TENCAP program applies advanced techniques to exploit information collected from a variety of strategic surveillance sensors; information which, in general, is not otherwise obtainable.

C. (U) BASIS FOR FY 1981 RDTE REQUEST: Continue engineering development work on hardware/software interfaces between existing strategic sensor systems and Army tactical exploitation systems.

Program Element: #6.47.40.A Title: Tactical Surveillance System
DOD Mission Area: #255 - Tactical Surveillance, Reconnaissance, and Target Acquisition Budget Activity: #4 - Tactical Programs

D. BASIS FOR CHANGE BETWEEN FY 1981 and FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1979	FY 1980	FY 1981	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	978	2201		Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	978	2201		Continuing	Not Applicable

(U) The FY 1981 change is based on a change in program direction to redirect the effort and to include, on a different basis, theater assets. These figures include additional funding in response to OSD directive for additional mission.

E. (U) OTHER APPROPRIATION FUNDS: Not Applicable

Program Element: #6.47.40.A Title: Tactical Surveillance System
DOD Mission Area: #255 - Tactical Surveillance, Reconnaissance, and Target Acquisition Budget Activity: #4 - Tactical Programs

F. (U) DETAILED BACKGROUND AND DESCRIPTION: This program supports the Army's Tactical Exploitation of National Capabilities (TENCAP) program engineering development (ED) work which is directed towar 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 numerically 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 nature of 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 strategic surveillance sensors which, in general, is not otherwise obtainable. The objective is to 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.

G. (U) RELATED ACTIVITIES: Techuological 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, Tactical Surveillance Systems, D560. This work is closely monitored by appropriate offices at the national level to preclude duplication of effort.

H. (U) WORK PERFORMED BY: RCA Corp., Camden, NJ; TRW, Los Angeles, CA; Aerospace Corp., El Segundo, CA; Electromagnetic Systems Laboratories, Sunnyvale, CA; Ford Aerospace Corp., Palo Alto, CA; US Army Communication Development and Readiness Command (CORADCOM), Fort Monmouth, NJ.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 197. and Prior Accomplishments: This was the first year for the Enginering Development effort. The major accomplishment was in preparation for support to the Battlefield Exploitation and Target Acquisition (BETA) test bed. The available funds have been used for exercise support, overhead, and related training activities.

Program Element: #6.47.40.A Title: Tactical Surveillance System
DOD Mission Area: #255 - Tactical Surveillance, Reconnaissance, and Target Acquisition Budget Activity: #4 - Tactical Programs

2. (U) FY 1980 Program: Continue engineering development (ED) of software, interface equipment, communications links, and training necessary to provide national input to the BETA demonstration. All necessary experimental work will have been performed.

3. (U) FY 1981 Planned Program: Begin ED of an advanced data exploitation system. All necessary experimental work will be performed and the proposed system will be ready for prototype development.

4. (U) FY 1982 Planned Program: Continue engineering development (ED) of an advanced data exploitation system. Initiate prototype development for field evaluation.

5. (U) Program to Completion: This is a continuing program.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.45.A Title: Tactical Electronic Support Measures Systems
DOD Mission Area: #255 - Tactical Surveillance Reconnaissance & Target Acquisition Budget Activity: #4 - Tactical Programs

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	14141	8428			Continuing	Not Applicable
	QUANTITIES						Not Applicable
D909	Tactical Electronic Surveillance Systems	5841	4228			Continuing	Not Applicable
D926	Tactical Electronic Warfare and Intelligence Command and Control Systems	8300	4200			Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program element encompasses the Army's Tactical Exploitation of National Capabilities (TENCAP) initiatives and non-signals intelligence (SIGINT) Tactical Electronic Warfare/Intelligence Command and Control Systems for use by Division, Corps, and echelon above Corps commanders. The scope of the program is to perform all necessary experimental work and initiate the engineering development phase of selected systems/projects having successfully completed advanced development. The past decade has witnessed major technical advances and the introduction of increasingly sophisticated intelligence gathering and weapons systems into the strategic and tactical operations of military forces--both friendly and opposing force. Army commanders at all echelons must have an intelligence system which will provide early detection, identification, and location of these enemy critical nodes in order to employ our own forces and weapons for effective enemy attrition. The systems in this program provide for the development of strategic intelligence collection interfaces with tactical operations; and the development of automated management, control, and analysis systems for generation of timely and effective combat intelligence and electronic warfare information.

C. (U) BASIS FOR FY 1981 RDTE REQUEST: Continue evaluation of the joint Army, Air Force, Navy, Marine Corps, and the Defense

Program Element: #6.47.45.A Title: Tactical Electronic Support Measures Systems
DOD Mission Area: #255 - Tactical Surveillance Reconnaissance & Target Acquisition Budget Activity: #4 - Tactical Programs

Advanced Research Agency (DARPA) Battlefield Exploitation and Target Acquisition (BETA) program to develop and demonstrate the utility of automated correlation and display of strategic and tactical sensor derived information to support near realtime target nomination and battle management. Return the BETA Corps-level testbed to CONUS upon completion of European field test and refurbish; obtain a Division-level BETA correlation center (test bed); participate in selected joint exercises for evaluation/refinement of functional capabilities; and continue simulation development. Continue Engineering Development (ED) of modifications to selected strategic surveillance systems to enhance utility to the tactical commander.

D. BASIS FOR CHANGE BETWEEN FY 1981 AND FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1979	FY 1980	FY 1981	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	14141 1/	8428 2/		Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	13141	17133		Continuing	Not Applicable

1/ Increase in FY 1979 was due to internal reprogramming to meet increased Battlefield Exploitation and Target Acquisition (BETA) requirement (Project D926).
2/ Decrease in FY 1980 reflects the transfer of funds for the AN/TSQ-109 Automatic Ground-Transportable Emitter Location and Identification System (ACTELIS) and the Communications High-Accuracy Airborne Location System (COMM HAALS) to the National Foreign Intelligence Program by the Congress (D906), and Congressionally directed reduction in scope of effort in FY 1980 budget decision (D909).
3/ Increase in FY 1981 reflects new requirement to retain the BETA system (D926) after completion of overseas testing for use as a software testbed within the Army's Training and Doctrine Command (TRADOC), and expansion of efforts in exploiting national surveillance assets for the tactical commander (D909).

E. (U) OTHER APPROPRIATION FUNDS: ($ in thousands) In late FY 1979 Congress approved an FY79 reprogramming request for $21.6 million to procure five Technical Control and Analysis Centers (Division) (TCAC(D)).

Program Element: #6.47.45.A Title: Tactical Electronic Support Measures Systems
DOD Mission Area: #255 - Tactical Surveillance Reconnaissance & Target Acquisition Budget Activity: #4 - Tactical Programs

F. DETAILED BACKGROUND AND DESCRIPTION: The objective of this program is to provide for full-scale development/engineering development of projects in three functional areas: tactical electronic support measures (D906), tactical electronic surveillance (D909), and tactical electronic warfare intelligence (EWI) command and control (D926). All items are Intelligence Related Activities (IRA). Although there is no FY 1981 development effort, project D906 is concerned mainly with collection, analysis, and location of Electro-Optical emitters and their associated weapons and/or units. Project D909 includes the development of equipment and systems which collect, process, and disseminate intelligence/information from a variety of strategic and tactical electronic surveillance sensors to locate and identify enemy units, activity, and targets. Project D926 encompasses development of automated, centralized tactical facilities/systems for analysis, integration, and reporting of the collection from and management

G. (U) RELATED ACTIVITIES: Related developments are conducted by the other military departments and the National Security Agency (NSA). Coordination between the Services and NSA is conducted 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 and NSA. 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 3.58.85G, Tactical Cryptologic Program.

H. (U) WORK PERFORMED BY: Major contractors are: TRW Incorporated, Redondo Beach, CA; BDM Incorporated, McLean, VA; Bunker-Ramo Corporation, Westlake Village, CA; Aerospace Corporation, El Segundo, CA; Electromagnetic Systems Laboratories, Sunnyvale, CA; and RCA Corporation, Burlington, MA. In-house development and contract monitoring is conducted by US Army Electronics Research and Development Command (ERADCOM), Adelphi, MD; US Army Communications Research and Development Command (CORADCOM), Ft Monmouth, NJ; US Army Materiel Development and Readiness Command (DARCOM), Alexandria, VA; Program Manager Control and Analysis Centers, Vint Hill Farms, Warrenton, VA; and the BETA Joint Project Office, Adelphi, MD.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

Program Element: #6.47.45.A Title: Tactical Electronic Support Measures Systems
DOD Mission Area: #255 - Tactical Surveillance Reconnaissance & Target Acquisition Budget Activity: #4 - Tactical Programs

1. FY 1979 and Prior Accomplishments: Fabrication and engineering development of two prototype Interim Tactical Electronic Intelligence (ELINT) Processing (ITEP) systems was initiated. First prototype was fielded for operational evaluation and producibility engineering. A joint service and Defense Advanced Research Projects Agency (DARPA) Program, Battlefield Exploitation and Target Acquisition (BETA) was initiated to develop and demonstrate the feasibility of automated correlation and display of tactical and strategic sensor derived information to support near realtime target nomination and battle management at Corps, Division, and in the Air Force Tactical Air Control Center. (Due to funding constraints, the division correlation center was slipped to FY81). Specifications were prepared and approved for fabrication of division level Technical Control and Analysis Centers on a Quick Reaction Capability (QRC) basis to provide an interim, semi-automated signals intelligence/electronic warfare control and analysis capability, pending fielding of the All-Source Analysis System (currently scheduled).

2. (U) FY 1980 Program: A contract for procurement of the Technical Control and Analysis Centers has been awarded and Government-furnished equipment delivered to the prime contractor. Fabrication has begun. Development of project BETA will continue with delivery of a testbed (with corps-level correlation center) for initial user shakedown and joint Army/Air Force/Navy/Marine Corps evaluation and field tests in Europe. Fabrication and deployment of the second prototype Interim Tactical Elint Processing (ITEP) system will be completed.

3. FY 1981 Planned Program: Fabrication of the Technical Control and Analysis Centers will be completed and testing will be accomplished.

Overseas joint testing of BETA will be completed and results of the testing will be used to support engineering development of the All-Source Analysis System. BETA will continue developmental efforts in simulation to enhance modeling of correlation centers and refine and exercise software development and configuration control. The Corps BETA testbed will be returned to the United States, refurbished, and turned over to US Army Training and Doctrine Command (TRADOC) for use in the Army's automated testbed. A BETA division-level correlation center will be fabricated. Development of Tactical Electronic Surveillance Systems to interface with national collection assets will continue.

4. (U) FY 1982 Planned Program: BETA simulation and software development will continue to permit loading of correlation center testbeds to achieve near wartime levels not achievable in operational exercises environment. Additionally, BETA testbed and methodology will be used in joint service exercises to evaluate techniques, procedures, and benefits of multiservice sensor data distribution and correlation. All necessary experimental work will be performed and the All-Source Analysis System will

be prepared to enter engineering development in FY82. Development of strategic Electronic Surveillance System interfaces will continue.

5. (U) Program to Completion: This is a continuing program. Developments will normally have been transferred from Program Element 6.37.45.A., Tactical Electronic Support Measures Systems.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D909 — Title: Tactical Electronic Surveillance System
Program Element: #6.47.45.A — Title: Tactical Electronic Support Measures Systems
DOD Mission Area: #255 - Tactical Surveillance, Reconnaissance and Target Acquisition — Budget Activity: #4 - Tactical Programs

A. (U) 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 strategic and tactical electronic surveillance sensors must be transmitted to central field processing 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 program.

B. (U) 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, tactical identification and positioning, and data reduction and filtering. 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 national level to avoid duplication of effort.

C. (U) 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. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: Initiated fabrication and engineering development of two prototype Interim Tactical Electronic Intelligence (ELINT) Processing (ITEP) systems. These will be utilized for operational evaluation and producibility engineering. Delivered the first ITEP to Europe where it was immediately used in a tactical exercise. All necessary experimental work was completed under Program Element 6.37.45.A, D907, Tactical Electronic Surveillance System.

Project: #D909 Title: Tactical Electronic Surveillance System
Program Element: #6.47.45.A Title: Tactical Electronic Support Measures Systems
DOD Mission Area: #255 - Tactical Surveillance, Reconnaissance and Target Acquisition Budget Activity: #4 - Tactical Programs

2. (U) FY 1980 Program: Complete fabrication and deployment of second prototype system to be delivered to 18th Abn Corps early in FY80. Initiate software upgrade program to insure continued prototype compatibility with rapidly evolving strategic sensor systems feeding the system. Continue Engineering Development (ED) of modifications to selected strategic electronic surveillance systems to enhance utility to the tactical commander.

3. (U) FY 1981 Planned Program: Continue software upgrade program. Continue ED of modifications to selected strategic sensor systems. Funding level reflects initiation of engineering development for interface with two strategic communications intelligence systems. All necessary experimental work is being done under Program Element 6.37.45.A, D907, Tactical Electronic Surveillance System.

4. (U) FY 1982 Planned Program: Continue software upgrade program. Initiate ED work of ITEP interface with new strategic systems. Continue ED of modifications to selected strategic sensor systems. All necessary experimental work will have been completed under P.E. 6.37.45 D907 and the proposed system will be ready for full scale development.

5. (U) Program to Completion: This is a continuing program.

6. (U) Major Milestones: Not applicable.

7. Resources ($ in thousands):

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	5841	4228	-	-	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	5841	6933	-	-	Continuing	Not Applicable

Project: #D909 Title: Tactical Electronic Surveillance System
Program Element: #6.47.45.A Title: Tactical Electronic Support Measures Systems
DOD Mission Area: #255 - Tactical Surveillance, Reconnaissance and Target Acquisition Budget Activity: #4 - Tactical Programs

The FY 1980 Appropriation Bill reduced PE 6.47.45/Project D909 by $2.545 million. The increase in FY 1981 request is due to inflation.

	1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total FY Estimated Cost
Other Appropriations:						
Other Procurement, Army						
Funds (current requirements)	4700	0	1800	5200	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	4700	0	1600	-	Continuing	Not Applicable
Quantities (current requirements)				Not Applicable	Not Applicable	Not Applicable
Quantities (as shown in FY 1980 submission)						Not Shown

Increase in FY81 of 200 thousand in procurement is due to inflation.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

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

Program Element: #6.47.45.A Title: Tactical Electronic Support Measures Systems

DOD Mission Area: #255 - Tactical Surveillance and Reconnaissance and Target Acquisition Budget Activity: #4 - Tactical Programs

A. DETAILED BACKGROUND AND DESCRIPTION: The objective of this project is to verify preliminary design and engineering efforts, validate and test prototype modeling and commence engineering development of tactical electronic warfare intelligence command and control systems. The past decade has witnessed major technical advances and the introduction of increasingly sophisticated intelligence gathering and weapons systems into the strategic and tactical operations of military forces - both friendly and opposing force. Army commanders at all echelons must have an intelligence system which will provide early detection, identification, correlation, and location of these enemy critical nodes in order to employ our own forces and weapons for effective enemy attrition. The tasks being developed in this project provide the mechanism for attaining this capability and are interrelated. They are project BETA and the All Source Analysis System (ASAS). Project BETA (Battlefield Exploitation and Target Acquisition) is a joint service/Defense Advanced Research Projects Agency effort established by OSD to develop, procure, demonstrate, and evaluate test beds to determine the utility of automated correlation and display of strategic and tactical sensor-derived information to support near-realtime target nomination and battle management. Corps and division level correlation center prototypes will be used to validate operational concepts which employ computer-assisted information handling; develop procedures and processes to integrate and correlate multi-echelon sensor inputs in near-realtime; and determine requirements for systems to provide timely target nomination and related information to commanders (includes NATO interface). Results from the BETA effort will be incorporated into the development of an All-Source Analysis System (ASAS). The ASAS will provide a highly automated, centralized mechanism for analysis, integration, and reporting of the collection from and management

To provide the Army with an interim, semiautomated signals intelligence (SIGINT)/EW management capability, a Quick Reaction Capability (QRC) was approved in FY 1979 (See Para D. below).

B. (U) RELATED ACTIVITIES: Project BETA is a joint service/Defense Research Projects Agency (DARPA) program. OUSDRE memorandum dated 7 September 1977, subject: Tactical Echelon Fusion Center, directed the development of a joint Army/Air Force/DARPA project with Army lead. The pertinent directive is the BETA project plan dated 12 April 1979 (revised 8 May 1979). The director of the BETA Joint Project Office (JPO) is responsible to a General Officer-level Steering Committee chaired by Commander, Electronic Systems Division, Air Force Systems Command with representation from the Army, Air Force, Navy, and

Project: #0926 Title: Tactical Electronic Warfare Intelligence Command and Control Systems

Program Element: #6.47.45.A Title: Tactical Electronic Support Measures Systems

DOD Mission Area: #255 - Tactical Surveillance and Reconnaissance and Target Acquisition Budget Activity: #4 - Tactical Programs

Marine Corps, DARPA, National Security Agency, and the US European Command (EUCOM). The steering committee also maintains cognizance of related activities among participating activities to minimize duplication of effort and insure the interchange of technical data. Following related services/agencies program elements (PE) apply: 2.74.31.F, Tactical Air Intelligence System Activities; 6.47.10.F, Reconnaissance/Electronic Warfare Equipment; 6.27.11.E, Experimental Evaluation Major Innovative Technology; and 6.37.17.N, Command and Control Systems.

C. (U) WORK PERFORMED BY: *Major contractors are: TRW, Incorporated,* Redondo Beach, CA; BDM, Incorporated, McLean, VA; Bunker-RAMO Corporation, Westlake Village, CA; and RCA Corporation, Burlington, MA. In-house development and contract monitoring is conducted by US Army Material Development and Readiness Command (DARCOM), Alexandria, VA; the BETA Joint Project Office, Adelphi, MD; and Program Manager, Control and Analysis Centers, Vint Hill Farms, Warrenton, VA.

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1979 and Prior Accomplishments: A joint service, and Defense Advanced Research Projects Agency (DARPA) Program, Battlefield Exploitation and Target Acquisition (BETA) was initiated to develop and demonstrate the feasibility of automated correlation and display of sensor-derived information to support near realtime target nomination and battle management at Corps, Division, and in the Air Force Tactical Air Control Center. (Due to funding constraints, the division correlation center was slipped to FY81). Specifications were prepared and approved for fabrication of division level Technical Control and Analysis Centers (TCAC(D)) on a Quick Reaction Capability (QRC) basis to provide an interim semi-automated signals intelligence/electronic warfare control and analysis capability pending fielding of the All Source Analysis System (currently scheduled).

2. (U) FY 1980 Program: Ongoing efforts will continue. A contract for procurement of the Technical Control and Analysis Centers has been awarded and government-furnished equipment delivered to the prime contractor. Fabrication has begun. Development of BETA will continue with delivery of a test bed (with corps-level correlation center) for initial user shakedown and joint Army/Air Force/Navy/Marine Corps evaluation and field tests in Europe.

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

Program Element: #6.47.45.A Title: Tactical Electronic Support Measures Systems

DOD Mission Area: #255 - Tactical Surveillance and Reconnaissance and Target Acquisition Budget Activity: #4 - Tactical Programs

3. FY 1981 Planned Program: Fabrication of the Technical Control and Analysis Centers will be completed and testing will be accomplished.

Overseas joint testing of BETA will be completed and results of the testing will be used to support engineering development of the All Source Analysis System. BETA will continue developmental efforts in simulation to enhance modeling of correlation centers, and refine and exercise software development and configuration control. The corps BETA test bed will be returned to the United States, refurbished, and turned over to US Army Training and Doctrine Command (TRADOC) for use in the Army's automated test bed. A BETA division correlation center will be fabricated.

4. (U) FY 1982 Planned Program: BETA simulation software development will continue to permit loading of correlation center test beds to achieve near wartime levels not achievable in operational exercise environment. Additionally, BETA test bed and methodology will be used in joint-service exercises to evaluate techniques, procedures, and benefits of multiservice sensor data distribution and correlation. All necessary experimental work will be performed and the All Source Analysis System will be ready to begin engineering development in FY 1982.

5. (U) Program to Completion: This is a continuing program. Development will normally have been transferred from Program Element 6.37.45.A, Tactical Electronic Support Measures Systems.

6. (U) Major Milestones: Not Applicable.

7. Resources ($ in thousands):

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

Program Element: #6.47.45.A Title: Tactical Electronic Support Measures Systems

DOD Mission Area: #255 - Tactical Surveillance and Reconnaissance and Target Acquisition Budget Activity: #4 - Tactical Programs

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	8300 1/	4200	[redacted]	[redacted]	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	7300	4200			Continuing	Not Applicable
Quantities (current requirements)		Not Applicable				
Quantities (as shown in FY 1980 submission)		Not Applicable				

Other Appropriations: In late FY 1979, Congress approved an FY79 reprogramming request for $21,600K to procure five Technical Control and Analysis Centers (Division) (TCAC(D))'s.

1/ Increase of $1.0 million in FY 1979 was due to reprogramming to meet increased BETA requirement.
2/ Increase of $3.406 million in FY 1981 reflects new requirement to retain BETA after European testing as a new software testbed facility for the Army's Training and Doctrine Command (TRADOC).

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.48.A Title: Standoff Target Acquisition System (SOTAS)
DOD Mission Area: #411 - Battlefield Surveillance Budget Activity: #4 - Tactical Program

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT QUANTITIES	36396	66430	55050	21289	-	128816
D1/1	Standoff Target Acquisition System	36396	66430	55050	21289	-	218816

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The US Army lacks the capability to locate moving targets beyond ground line of sight because the speed of modern combat makes it critically important that the Division Commander have a responsive, realtime capability to detect, locate, and monitor moving formations out to beyond the Forward Edge of the Battle Area, in order to concentrate his own combat power at critical times and places, and employ his firepower.

SOTAS is an Army program to develop an airborne target acquisition system which will provide this critically needed capability. SOTAS will locate moving targets at extended ranges during the day or night, under most weather conditions. It is specifically designed to perform successfully in the severe air defense environments forecast for the timeframe. By scanning moving targets in the division's opposing sector every 15 seconds, SOTAS will provide the motion history analysis necessary to determine the enemy's tactical development and to allow estimation of his intentions in time to position friendly forces and firepower to engage him. Display of SOTAS' video data at ground stations to the division, brigade, and division artillery command posts, as well as at the division tactical command post, permits the efficient and timely use of the information. During the Advanced Development phase, the program successfully used off-the-shelf hardware to extensively field test the concept, and ensure that the requirements are well defined. Data gathered from the testbed emulation radar and design analyses by four major radar firms concluded that the advanced design radar system which will meet the operational requirement can be built with minimal technical risk.

C. (U) BASIS FOR FY 1981 RDTE REQUEST: In FY 1981 significant emphasis will be placed on the integration of subsystems (radar, data link, YEH-60B helicopters and ground processing stations) into total SOTAS systems, and on beginning Development

Test II and Operational Test II (DT II/OT II). One of the significant objectives of SOTAS Engineering Development (ED) program is to compress the system acquisition schedule by eliminating the need for Development Test III and Operational Test III (DT III/OT III) following initial production. To accomplish this task requires that additional testing be conducted during the ED program.

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1980 Submission
Army Systems Acquisition Review Council (ASARC) II	2QFY78	2QFY78
Defense Systems Acquisition Review Council (DSARC) II	4QFY78	4QFY78
Initiate Engineering Development (ED)	4QFY78	4QFY78
Development Test (DT) II	4QFY81	1QFY81
Operational Test (OT) II	4QFY81	3QFY81
ASARC III/DSARC III	2QFY82	4QFY81
Basic Production	2QFY82	1QFY82
Initial Operational Capability (IOC)		

The major differences between this submission and the FY 1980 submission result from the deferral of award of the Engineering Development contract from March until June 1979, as reported in the 31 March 1979 Selected Acquisition Report. The impact of this delay on subsequent milestones is under review by the Project Manager, and will be reflected in future Selected Acquisition Reports.

D. BASIS FOR CHANGE BETWEEN FY 1981 AND FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1979	FY 1980	FY 1981	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	36396	66430	55050	21289	218816
Funds (as shown in FY 1980 submission)	36883	66460	50165	19766	211126

Program Element: #6.47.48.A Title: Standoff Target Acquisition System (SOTAS)
DOD Mission Area: #411 - Battlefield Surveillance Budget Activity: #4 - Tactical Program

The additional funding specified in the current submission results from: (1) increased inflation in FY 1981 and FY 1982 ($6.408 million) and (2) $1.312 million added by reprogramming FY 1978 and FY 1979 funds to cover (a) unanticipated increases in the cost of the Source Selection Evaluation Board (SSEB) for the engineering development contract award and (b)

[1] The decrease in FY 1980 funds is the result of general Congressional reduction.

E. OTHER APPROPRIATION FUNDS: ($ in thousands)

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional To Completion	Total Estimated Cost
Aircraft Procurement, Army:						
Funds (current requirements)	0	0	0	7600	671000	678600
Funds (as shown in FY 1980 submission)	0	0	0	0	1089600 [c]	1089600 [a]
Quantities (current requirements)	0	0	0	0		
Quantities (as shown in FY 1980 submission)	0	0	0	0		

The FY 1981 submission reflects the Army's decision to limit the procurement objective to those necessary to support the active forces. The eight additional systems shown in the FY 1980 submission were intended for the reserve forces.

Program Element: #6.47.48.A Title: Standoff Target Acquisition System (SOTAS)
DOD Mission Area: #411 - Battlefield Surveillance Budget Activity: #4 - Tactical Program

F. DETAILED BACKGROUND AND DESCRIPTION: The Standoff Target Acquisition System (SOTAS) consists of an airborne moving target indicator (MTI) radar, a position location system, a data link, and ground data processing/data display vans. The advanced development model of the system has demonstrated the capability to detect and accurately locate moving targets at ranges well beyond ground line-of-sight under most weather conditions. A significant feature of the concept, which has been verified, is its ability to store ground reference radar imagery and to display that data at high data rates (time-compression). This enhances the probability of target detection and minimizes the probability of false targets. The system being developed will detect moving targets

Because of its realtime detection and location capability, SOTAS will provide the data necessary for the effective engagement of targets located beyond the ground line-of-sight by both Army and Air Force organic weapons systems and permit the Division Commander to mass his own combat power at critical times and places.

G. (U) RELATED ACTIVITIES: Initial development efforts of SOTAS were funded in Program Element (PE) 6.37.19.A, Project DK72, Radars. These development efforts were transferred to PE 6.37.36.A, Standoff Target Acquisition Systems, Project D171, in FY 1976 to separate funding of the Standoff Target Acquisition System from other radars. 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 Standoff 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. Advanced Development (AD) was completed in FY 1978, and the program was transitioned to Engineering Development (ED) in PE 6.47.48.A, Standoff Target Acquisition System. There is no duplication of effort for a SOTAS-like moving target indicator capability with the Army or in the Department of Defense. The SOTAS incorporates a data link currently being developed under the Modular Integrated Communication and Navigation System (MICNS) program. The MICNS program is developing common data link components for the Remotely Piloted Vehicle (RPV) program and the USAF Precision Emitter Location and Strike (PELSS) system. This use of a common data link will significantly enhance logistic supportability in the field (common spares, training, and depot support) and reduce the unit procurement price. The aerial platform for the SOTAS is the EH-60B helicopter, a modification of the UH-60 BLACKHAWK utility helicopter now in production. The SOTAS will use the KG-45 Data Link Encryption Device, a standard encryption system presently in production by the National Security Agency, and the AN/AYK-14A computer, developed by the US Navy, for both the airborne and ground elements of the system.

H. (U) WORK PERFORMED BY: A project manager has been designated by the US Army Electronics Research and Development Command at Ft Monmouth, NJ, and Adelphi, MD. Additional supporting organizations are the US Army Communications Research and Development Command, Ft Monmouth, NJ; the Communication and Electronics Materiel Readiness Command, Ft Monmouth, NJ; the Office of the Project Manager, BLACKHAWK, St Louis, MO; the US Army Aviation Research and Development Command, St Louis, MO; the Troop Support and Aviation Readiness Command, St Louis, MO; the US Army Flight Test Activity, Lakehurst, NJ; and the Army Edwards

Flight Activity, Edwards AFB, CA. The prime contractor for SOTAS, Government Electronics Division of Motorola, Tempe, AZ, was selected as a result of a competitive solicitation with contract award on 19 June 1979. The other four major contractors are: Sikorsky Division of United Technologies, Stratford, CN; Harris Corp., Melbourne, FL; Honeywell, Inc, Minneapolis, MN; and Technology Services Corporation, Santa Monica, CA. There are eight other contractors with a total dollar value of $3,550K.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1979 and Prior Accomplishments: FY 1974 and prior accomplishments consisted of establishing the technical feasibility of subsystem elements of the Standoff Target Acquisition System (SOTAS). In FY 1975 the fabrication of the initial SOTAS system was begun and successfully completed. The SOTAS was then tested in an instrumented tactical environment at the US Army Combat Development Experimentation Center (CDEC), Fort Ord, CA. 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. This joint service test provided significant technical and conceptual command and control data on closed loop detection, location, and strike of Moving Target Indicator (MTI) detected targets. Systems studies, man/machine simulations, and analyses were conducted. A successful demonstration of the SOTAS in Korea was accomplished in FY 1976. In FY 197T, an Advanced Development (AD) model SOTAS was tested in REFORGER '76, a US Army Europe division level field exercise. The assessment by the 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 197T.

a ground test version of the radar was fabricated in FY 1977. Tests conducted with this emulation radar verified many of the advanced capabilities specified for the Engineering Development (ED) SOTAS radar. Analyses of these test results and of independent design studies prepared by four major radar design firms concluded that the ED SOTAS radar could be built with minimal technical risk. The Required Operational Capability (ROC) for SOTAS was formally staffed and approved. A Cost and Operational Effectiveness Analysis (COEA), conducted in FY 1978, showed that SOTAS

The SOTAS Engineering Development (ED) program was approved at an Army Systems Acquisition Review Council (ASARC) II in March 1978 and at a Defense Systems Acquisition Review Council (DSARC) II in August 1978. At the request of Commander, US Army Europe, for an interim capability, Headquarters, Department of the Army, directed in FY 1978, that the Advanced Development (AD) SOTAS be hardened to reduce maintenance, and a second system fabricated. These systems, designated Interim-Interim ($I^{\frac{1}{2}}$) SOTAS, were deployed to Europe for service there until prototypes of the full-scale ED system become available. The first $I^{\frac{1}{2}}$ SOTAS system was delivered to the Third Armored Division in Europe in August 1978, and participated successfully in REFORGER 78. The second $I^{\frac{1}{2}}$ SOTAS arrived in the First Armored Division in December 1978,

permitting both I^2SOTAS to participate in REFORGER 79. During FY 1979, the contracts for Engineering Development (ED) of the SOTAS were awarded. These are described in paragraph H above. The initial NATO Rationalization, Standardization, and Interoperability (RSI) plan was submitted to Office, Secretary of Defense.

2. FY 1980 Program: In FY80, the SOTAS prime contractor will demonstrate that his design approach meets the milestone prior to initiation of hardware fabrication. The Preliminary Design Review (PDR) and the Critical Design Review (CDR) will be completed to insure that the ED design configuration selected represents one that fully meets the performance, maintenance, and cost objectives of the program. The software development facility will be established to insure that software is well documented. The USM-410 Automated Test Equipment (ATE) will be delivered to assist in the development of the SOTAS maintenance program. The initial interactive radar test equipment will be delivered to the SOTAS prime contractor in checkout of the developmental radar.

3. (U) FY 1981 Planned Program: In FY 1981 significant emphasis will be placed on the integration of subsystems (radar, MICNS data link, YEH-60B helicopters and ground processing stations) into total SOTAS systems. One of the significant objectives of the SOTAS Engineering Development (ED) program is to compress the system acquisition schedule by eliminating the need for Development Test (DT) III and Operational Test (OT) III following initial production. To accomplish this task requires that extensive testing be conducted during the development program. During FY 1981 aircraft system training will be initiated to train Army operators for DT II and OT II.

4. (U) FY 1982 Planned Program: In FY 1982, testing will be completed. Successful completion of the test phase will lead to the Army Systems Acquisition Review Council (ASARC) III/Defense Systems Acquisition Review Council (DSARC) III decision point.

5. Program to Completion: Production of the initial Army package (10 operational plus 2 training systems) will be initiated leading to IOC in

Program Element: # 6.47.48.A
DOD Mission Area: # 255 - Tactical Surveillance, Reconnaissance & Target Acquisition

Title: *Standoff Target Acquisition System*
Budget Activity: # 4 - Tactical Programs

J. (U) TEST AND EVALUATION DATA:

1. (U) Development Test and Evaluation:

a. (U) Development Test (DT) I was accomplished in four phases using Advanced Development (AD) hardware. The first phase, conducted in 4th quarter FY 1975 at Hunter-Liggett, CA, consisted of measurements of parameters, such as accuracy as a function of range, in a "mini-war." This phase tested the system's capability to function in a simulated tactical environment. The second phase was conducted in a joint Army-Air Force exercise at White Sands, NM. In this test, the system functioned as a target locator and passed the information to the Air Force's Advanced Location Strike System (ALSS), which directed an inert GBU-15 guided glide bomb to the designated target. The third phase, accomplished in Europe in FY 1977, was a test of the system's capability to operate in a tactical environment. The AD system supported the 1st Armored Division during REFORGER 76. DT II is scheduled to be conducted prior to Army and Defense Systems Acquisition Review Council III, to determine the system's readiness for transition into production and deployment.

b. (U) DT I results, which are summarized in the table of System Characteristics in paragraph J3 below, concluded that the system could detect and locate moving tactical ground targets in real time, in an operational environment. In conjunction with technical data obtained separately on an emulation test bed radar, and comprehensive design analyses from four major design houses, these tests demonstrated that the full-scale, advanced design system was achievable at minimal technical risk.

c. (U) The Advanced Development (AD) system tested in DT I was constructed from available components to be functionally similar to the final system. It consisted of a helicopter-mounted moving target indicator (MTI) radar, a mobile ground display station, a data link to transmit radar imagery from the helicopter to the ground station, and a positioning system to locate the helicopter in space. The Engineering Development (ED) system which will be tested in DT II will be a full-scale, completely militarized prototype of the production system. It will incorporate the advanced design Moving Target Indicator (MTI) radar, the EH-60B BLACKHAWK helicopter, the Modular Integrated Communication Navigation System (MICNS) data link and the primary and secondary ground stations developed in the ED program. Present schedules provide for all system components to be available for DT II.

d. (U) Motorola Government Electronics Division is the ED prime contractor. Sikorsky is the contractor for the EH-60B BLACKHAWK helicopter. Harris Corporation will develop the MICNS. The Project Manager is COL Wayne B. Davis. Agencies

Program Element: # 6.47.48.A
DOD Mission Area: # 255 - Tactical Surveillance, Reconnaissance & Target Acquisition

Title: Standoff Target Acquisition System
Budget Activity: #4 - Tactical Programs

having interest in both Development and Operational testing are members of the Test Integration Working Group (TIWG), chaired by the Project Manager. Primary participants in the development test include the Army Systems Analysis Agency (AMSAA) and the Test and Evaluation Command (TECOM).

e. (U) Development Test (DT) II is scheduled to be conducted at Fort Riley, KS. Testing at Fort Riley will use personnel from the 1st Infantry Division. Testing and evaluation will be completed in time for the Army and Defense Review Councils III (ASARC/DSARC III).

f. (U) Assets available for testing will include 8 YEH-60B BLACKHAWK helicopters, each equipped with an advance design coherent X-band radar, four Primary Ground Stations (PGS), four Secondary Group Stations (SGS), four secure data links, and four helicopter positioning systems. Aircraft and equipment used in Development Test (DT) II will be scheduled among these assets in such a manner to permit concurrent environmental and operational training and testing to continue on schedule.

g. (U) A spectrum of environmental qualification testing is scheduled. These tests will verify the system's ability to operate in a wide range of climatic conditions (including moderate icing), measure shock and vibration performance, and establish that electromagnetic interference, electromagnetic compatibility, and nuclear survivability specifications are met.

2. (U) Operational Test and Evaluation:

a. (U) During the Advanced Development (AD) phase of the program, representatives of the Operational Test and Evaluation Agency (OTEA) served as observers in all fieldings of the system. The subsequent deployment of AD systems to USAREUR and their participation in REFORGER 77, 78, and 79 were also monitored by OTEA or by other user agencies. Operational Test (OT) II will be conducted at Fort Riley, KS. The objective of OT II will be to determine the system's military utility, operational effectiveness, and operational suitability, in the hands of typical user operators.

b. (U) The system's performance during the REFORGER exercises has been received favorably by the user community. A primary deficiency noted to date has been the inability of the Advanced Development system, which uses the UH-1H helicopter, to operate in moderate icing conditions. The BLACKHAWK helicopter, which will be utilized in the Engineering Development program, can operate in moderate icing conditions. The BLACKHAWK also offers greater endurance and survivability at less life-cycle

cost than the UH-1H. All components to be tested in OT II will be components scheduled for the production system. All subsystems and support equipment are scheduled to be available for OT II.

c. (U) Motorola Government Electronics Division is the Engineering Development prime contractor, and Sikorsky is the contractor for the EH-60B BLACKHAWK helicopter. Harris Corporation will develop the Modular Integrated Communications Navigation System (MICNS). The Project Manager is COL Wayne B. Davis. Agencies having interest in both Development and Operational testing are members of the Test Integration Working Group (TIWG) chaired by the Project Manager. The US Army Operational Test and Evaluation Agency will have overall responsibility for the conduct of OT II. All tests and evaluations will be completed in time for the Army and Defense System Acquisition Review Councils (ASARC/DSARC) III to render a production decision.

e. (U) A Reliability, Availability, and Maintainability (RAM) subcommittee, under the Test Integration Working Group (TIWG) will be formed to establish appropriate weighting values by which RAM data from all phases of development and operational testing can be assembled into a single data base. Since systems tested in Development Test (DT) II and Operational Test (OT) II are intended to be the same as systems received from production, RAM data from all phases of testing (including contractor tests) are candidates for inclusion in the overall data base.

f. (U) The Advanced Development (AD) System has been involved in an extensive series of operational tests (see 2a). In addition, two Interim-Interim (I^2) systems, which utilize AD hardware, have been furnished to the 3rd and 1st Armored Division in Europe to meet an urgent operational requirement. These systems continue to provide valuable insight into the organizational and operational aspects of the system. The extensive testing to date, combined with an option with the Engineering Development (ED) contractor to produce the first 12 production systems, provides the best planning choice to have a successful operational test while achieving the desired early production and fielding.

Program Element: # 6.47.48.A
DOD Mission Area: # 255 - Tactical Surveillance, Reconnaissance & Target Acquisition

Title: Standoff Target Acquisition System
Budget Activity: #4 - Tactical Programs

3. System Characteristics:

Operational/Technical Characteristics	Objectives	Demonstrated Performance (Feasibility Model DT I/OT 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	Tanks, Trucks, Helicopter
Target Velocity		
Type of Scan	X-band coherent mechanical and/or electronic scan	Mechanical Scan
Rain Performance	Essentially rain independent	Quantified field test not conducted
Electronic Counter-Countermeasure (ECCM) Capability	Defense Intelligence Agency threat responsive	Tests conducted on the emulation test-bed radar show that proposed ECCM will be effective.

Program Element: # 6.47.48.A
DOD Mission Area: # 255 - Tactical Surveillance, Reconnaissance & Target Acquisition

Title: Standoff Target Acquisition System
Budget Activity: # 4 - Tactical Programs

Operational/Technical Characteristics	Objectives	Demonstrated Performance (Feasibility Model DT I/OT I)
Reliability, Availability, Maintainability (RAM) goals:		
Probability of system completing 2-hr mission	0.9	Formal, quantified tests not conducted. During the concept demonstration/ Advanced Development phase, the ground station demonstrated 97.9% operational availability during REFORGER 76. The airborne system also performed well. However, this data is not conclusive since specialized contractor maintenance support was available.
Probability of Primary Ground Station Completing 12-hour mission	0.9	See note above
Mean Time Between Maintenance Failures (Airborne Equipment)	27.0 hrs	See note above.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.50.A
Title: Tactical Electronic Countermeasures Systems
DOD Mission Area: #257 - Electronic Warfare & Counter-C3I
Budget Activity: #4 - Tactical Programs

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	4462	25351			Continuing	Not Applicable
	QUANTITIES						Not Applicable
DL12	Division Tactical Electronic Countermeasures Systems	4462	23551			Continuing	Not Applicable
DL13	Corps Tactical Electronic Countermeasures Systems	0	1800				
D540	Protective Electronic Warfare Systems	0	0	0		Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program encompasses the development of electronic countermeasures equipment and systems mounted in both ground vehicles and aircraft. 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 a future land battle since the enemy can be expected to have weapons generally as effective as our own, and 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 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 since they

C. BASIS FOR FY 1981 RDTE REQUEST: Continue development of the AN/MLQ-33, jammer (CAS ECM), and expendable jammers. Begin engineering development of product improvements to AN/GLQ-3 and AN/TLQ-15 Jammer which will increase the effectiveness of their jamming modulations. Complete analysis of AN/ALQ-143

jammer test data. Continue conversion of the AN/ALQ-151 (Quick Fix II) system from the EH-1 helicopter to the EH-60 helicopter.

D. BASIS FOR CHANGE BETWEEN FY 1981 AND FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1979	FY 1980	FY 1981	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	4462*	25351**	***	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	4928	10851		Continuing	Not Applicable

* Decrease in FY 1979 is due to reprogramming to meet higher priority requirement.

** Increase in FY 1980 is due to Congressionally directed transfer of funds requested for AN/ALQ-151 (Quick Fix II) platform conversion from the Aircraft Procurement, Army (APA) appropriation to the Research, Development, Test and Evaluation, Army (RDTE,A) Appropriation (Project DL12), and decrease in Project DL13 due to termination of the AN/ALQ-150 (CEFIRE TIGER) Program.

*** Increase in FY 1981 is due to Congressionally directed transfer of AN/ALQ-151 (Quick Fix II) platform conversion from the APA to the RDTE, A appropriation (an increase to project DL12 in FY 1981), an increase to Project DL12 to accelerate development of expendable jammers, a decrease to Project DL13 reflecting the termination of the AN/ALQ-150 (CEFIRE TIGER) program, and a decrease in Project D540 due to budgetary constraints, which preclude funding of desired efforts in this project.

E. OTHER APPROPRIATION FUNDS: ($ in thousands)

Program Element: #6.47.50.A
DOD Mission Area: #257 - Electronic Warfare & Counter-C3I

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

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional To Completion	Total Estimated Cost
Other Procurement, Army#						
Funds (current requirements)	0	0	0	0		
Funds (as shown in FY 1980 submission)	0	0				
Quantities (current requirements)	0	0	0	0		
Quantities (as shown in FY 1980 submission)	0	0	9			

Funds/Quantities shown are for AN/MLQ-33 (CAS ECM). Increased estimated total cost is due to two-year delay in procurement, better definition of costs as a result of award of full-scale development contract, and inflation due to delay (see paragraph 6, Major Milestones, in Descriptive Summary for PE 6.47.50.A, Tactical Electronic Countermeasures Systems, project DL12, Division Tactical Electronic Countermeasures Systems)..

NOTE: See PE 6.37.55.A, Tactical Electronic Countermeasures Systems, for details of Quick Fix II associated procurement.

Program Element: #6.47.50.A
DOD Mission Area: #257 - Electronic Warfare & Counter-C3I

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

F. DETAILED BACKGROUND AND DESCRIPTION: The objective of this program is to conduct full-scale development of tactical 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. Developments include: an airborne mounted jammer (CAS ECM); heliborne Multiple Target Electonic Warfare System (MULTEWS), Jammer (TACJAM), quick-erectable antenna masts and jamming system (QUICKFIX); Tactical Army assemblies; automated test equipment software development for all systems; expendable jammers, warning devices as self-protection measures for tactical vehicles and installations; and countermeasures to

G. (U) RELATED ACTIVITIES: Related electronic 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; and 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 ensure 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.

H. (U) WORK PERFORMED BY: Major contractors are: United Technology Laboratory, Greenville, TX; ESL Incorporated, Sunnyvale, CA; Collins Telecommunications (Division of Rockwell International) Dallas, TX; and GTE-Sylvania, Mountain View, CA. 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, Vint Hill Farms Station, Warrenton, VA; and the product manager for special electronic Mission Aircraft, St Louis, MO.

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1979 and Prior Accomplishments: AN/GLQ-3 and AN/TLQ-15 (jammers) were developed and fielded. The AN/TLQ-17 (transportable jammer) completed development and was fielded. Development of the AN/ALQ-143, Multiple Target Electronic Warfare System (MULTEWS - Airborne), completed development and began development and operational testing.

Program Element: #6.47.50.A
DOD Mission Area: #257 - Electronic Warfare & Counter-C3I

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

The AN/ALQ-150 jammer (CEFIRE TIGER) completed the validation phase. A contract for FSED of the AN/MLQ-33 (CAS ECM) system was awarded in September 1979.

Program Element: #6.47.50.A Title: Tactical Electronic Countermeasures Systems
DOD Mission Area: #257 - Electronic Warfare & Counter-C3I Budget Activity: #4 - Tactical Programs

2. FY 1980 Program: A program is being initiated to convert the AN/ALQ-151 (Quick Fix II) heliborne jamming system from its current EH-1 platform to the EH-60 BLACKHAWK. Funds for this effort which were requested in the Aircraft Procurement, Army (APA) appropriation were transferred to the Research, Development, Test and Evaluation, Army (RDTE, A) appropriation by the FY 1980 Appropriations Act. The testing of the AN/ALQ-143 System has revealed both major design problems and serious questions of operational suitability. Although operational testing Type II (OTII) will be completed in order to acquire data for subsequent analyses, the AN/ALQ-143 program will be terminated. Engineering development of the AN/MLQ-33 countermeasures system will continue. Engineering development of expendable jammers has begun. The AN/ALQ-150 (CEFIRE TIGER) Program has been terminated and the requirement for a jammer is being readdressed.

3. FY 1981 Planned Program: The program to convert the Quick Fix II system from the EH-1 to the EH-60 helicopter will continue. As directed by the FY 1980 Appropriations Act, this program is requested in RDTE, A in FY 1981. Analyses of AN/ALQ-143 test data will be completed. Engineering development of the AN/MLQ-33 and expendable jammers will continue. Engineering development of a product improvement to increase the modulated effectiveness of currently fielded jammers, such as the AN/GLQ-3 and AN/TLQ-15, will begin; all necessary experimental work will have been performed, and the proposed product improvement will be ready for full-scale development.

4. FY 1982 Planned Program: Conversion of the Quick Fix II system from the EH-1 to the EH-60 helicopter will be completed. Engineering Development of the AN/MLQ-33 will continue; the system will complete prototype fabrication and enter the testing stage. A product improvement program to increase the jamming effectiveness of currently deployed Jammers will be continue.

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

FY 1981 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: # 257 Electronic Warfare & Counter-C^{3}I Budget Activity: #4 - Tactical Programs

A. DETAILED BACKGROUND AND DESCRIPTION: The objective of this project is to conduct the engineering development, testing and type classification action for tactical electronic countermeasures (ECM) equipment and systems to assist the Brigade and Division commander in denying, destroying, disrupting, and deceiving hostile command and control communications and radars associated with weapons systems, maneuver forces, and other threats of immediate value to the commander. Overcoming current equipment deficiencies

is of prime importance to the Army tactical commander. This project provides for the orderly development of future systems to counter a changing threat and to replace systems now fielded, and provides for tactical systems which, by exploiting technical superiority, will serve as force multipliers to assist in offsetting Warsaw Pact numerical, mobility and firepower superiority. A complementary mix of airborne and high-survivability ground assemblies will provide twenty-four hour, all-weather coverage in depth.

B. (U) 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. (U) WORK PERFORMED BY: Major contractors are: United Technology Laboratory, Greenville, TX; ESL Incorporated, Sunnyvale, CA; Collins Telecommunications (Division of Rockwell International), Dallas, TX; and GTE-Sylvania, Inc., Mountain View, CA. In-house development and contract monitoring is accomplished by the US Army Signals Warfare Laboratory, Warrenton, VA; the US Army Electronic Warfare Laboratory, Ft Monmouth, NJ; and the Product Manager for Special Electronic Mission Aircraft, St. Louis, MO.

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1979 and Prior Accomplishments: AN/GLQ-3 (jammer) was developed, tested, procured and fielded. The AN/ALQ-143, Airborne Multiple Target Electronic Warfare System (MULTEWS-AIR),

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was subjected to development testing (DT II) and Operational Testing Type II (OT II) began[FY] Engineering development of the AN/MLQ-33, a | was initiated in September 1979.

2. FY 1980 Program: Conversion of the AN/ALQ-151 (QUICK FIX II) Heliborne Jamming System from the EH-1 to the EH-60 Helicopter will begin. Funds for this program requested in the Aircraft Procurement, Army (APA) appropriation in FY 1980 were transferred to the Research, Development, Test and Evaluation, Army (RDTE,A) appropriation by the FY 1980 Appropriations Act. Testing of the AN/ALQ-143 has revealed both major design problems and serious questions of operational suitability. Although Operational Testing Type II (OT II) will be completed in order to acquire data for subsequent analyses, the AN/ALQ-143 program will be terminated. Engineering development of a | expendable jammer will be initiated. Engineering Development of the AN/MLQ-33 countermeasures system will continue.

3. FY 1981 Planned Program: Conversion of the AN/ALQ-151 (QUICK FIX II) Heliborne Jamming System from the EH-1 to the EH-60 Helicopter will continue; as directed by the FY 1980 Appropriations Act, this effort is requested in the Research, Development, Test and Evaluation (RDTE,A) Appropriation in FY 1981. Engineering development of the AN/MLQ-33 will continue. Analysis of AN/ALQ-143 test data will be completed. Engineering development of an expendable, jammer will continue. A product improvement to improve the modulation effectiveness of currently fielded, jamming systems will begin; all necessary experimental work will have been performed, and the product improvement will be ready for full-scale development.

4. FY 1982 Planned Program: Conversion of the QUICK FIX II System from the EH-1 to the EH-60 Helicopter will be completed. The AN/MLQ-33 fabrication will be completed and Developmental and Operational Testing - Type III (DT/OT III) will begin. Engineering development of the expendable jammers will be continued. Development of a product improvement to improve the modulation effectiveness of current | jammers will continue.

5. (U) Program to Completion: This is a continuing program. Tasks will normally progress from advanced development Program Element 6.37.55.A (Tactical Electronic Countermeasures Systems), Project DK12 (Division Tactical Electronic Countermeasures Systems).

6. Major Milestones:

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Task Name	Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1979 Submission
AN/ALQ-143 (MULTEWS-AIR)	Type Classification	Terminated*	1 Qtr FY 1980

*AN/ALQ-143 System was terminated due to continuing technical problems.

AN/MLQ-33	Type Classification	1 Qtr FY 1983	4 Qtr FY 1981

Delay in AN/MLQ-33 development was to incorporate changed requirements for system physical configuration (tracked versus wheeled vehicle mounting) and to readdress the system requirement in light of changing concepts and doctrine. This was accomplished and the requirement reconfirmed.

7. Resources ($ in thousands):

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
RDTE,A						
Funds (current requirements)	4462	23551*			Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	4515	9051			Continuing	Not Applicable

Quantities: Not Applicable

*Increase in FY 1980 is due to congressionally-directed transfer of funds for QUICK FIX II platform conversion from the Aircraft Procurement, Army (APA) to the RDTE,A Appropriation.
**Increase in FY81 is due to acceleration of expendable jammer effort, to increase to accommodate industrial funding, and to congressionally-directed transfer of funds for QUICK FIX II platform conversion from APA to RDTE,A.

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	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
Other Appropriations***						
Other Procurement, Army						
Funds (current requirement)	0	0	0	0		
Funds (as shown in FY 1980 submission)	0	0				
Quantities (current requirement)	0	0	0	0		
Quantities (as shown in FY 1980 submission)	0	0				

***Funds/Quantities shown are for AN/MLQ-33. Increased estimated total cost is due to two-year delay in procurement (see paragraph 6, Major Milestones), inflation, and better definition of costs as a result of award of full-scale development contract.

NOTE: Procurement data associated with QUICK FIX II is detailed in PE 6.37.55.A, Tactical Electronic Countermeasures Systems.

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

DOD Mission Area: #254 - Tactical Command and Control Budget Activity: #4 - Tactical Programs

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	13521	29329	23200	42072	Continuing	Not Applicable
	QUANTITIES						
D298	JINTACCS (NATO)	2000	2000	2310	3919	Continuing	Not Applicable
D309	JINTACCS (ARMY)	4321	15152	9566	19748	Continuing	Not Applicable
D310	JINTACCS (Executive Agent)	7200	12177	11324	18405	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: 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 all funds for accomplishment of Army responsibilities in the JINTACCS Program. 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 six operational systems. The JINTACCS Program, formerly the Ground and Amphibious Military Operations (GAMO) Program, was established to meet this requirement for all other tactical systems of the Services and for future systems and to assume the TACS/TADS responsibilities when a full test capability is attained by the JINTACCS Program. 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 and coordinating US/North Atlantic Treaty organization (NATO) interoperability requirements for tactical command and control systems.

C. (U) BASIS FOR FY 1981 RDTE REQUEST: During FY 1981 the Executive Agent will complete Intelligence Compatibility and Interoperability (C&I) testing, and begin Air Operations C&I testing. The Intelligence Operational Effectiveness Demonstration (OED) will be conducted during FY 1981. The JINTACCS Program will assume the responsibility for the Configuration Management (CM) of the Tactical Air Control System/Tactical Air Defense System (TACS/TADS) Program in FY 1981. The effort will continue to implement the JINTACCS NATO Support Plan to include: support for US delegates to NATO committees dealing with Tactical Command and Control System (TC2S) interoperability matters, provide comments on NATO TC2S issues, and develop and implement systems and procedures to support NATO TC2S activities.

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

DOD Mission Area: 254 - Tactical Command and Control Budget Activity: 4 - Tactical Programs

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1980 Submission
Begin compatibility and interoperability testing of intelligence segment	July 1979	July 1979
Begin compatibility and interoperability testing of air operaions segment	January 1981	January 1981
Begin compatibility and interoperability testing of operational segment	January 1982	January 1982
Begin compatibility and interoperability testing of amphibious/fire support segment	July 1983	July 1983

There has been no change between the FY 1980 and the FY 1981 Congressional Descriptive Summaries.

D. (U) BASIS FOR CHANGE BETWEEN FY 1981 AND FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1979	FY 1980	FY 1981	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	13521	29329	23200	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	13520	29997	30216	Continuing	Not Applicable

The differences between the FY 1980 and FY 1981 Congressional Descriptive Summaries are due to: a decrease of $668,000 for FY 1980 that was part of a general Congressional reduction for overtime and travel. The decrease in FY 1981 funding was due to

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reductions ($4469K for D309 and $2857K for D310) during the Army budgeting process due to rearrangement of funding priorities (D298 gained $310K). Redistribution of funds has been accomplished within the new levels to insure all critical actions will be completed on schedule.

E. (U) OTHER APPROPRIATION FUNDS: ($ in thousands): Not Applicable.

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DOD Mission Area: #254 - Tactical Command and Control Budget Activity: #4 - Tactical Programs

F. (U) 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. 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. This strengthening of the management structure was completed.

G. (U) 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.

H. (U) WORK PERFORMED BY: Overall coordination and management of the joint aspects of the program are accomplished by the JINTACCS Program Director and the JINTACC System Architecture/Engineering Office which are located within the Office, Assistant Chief of Staff for Automation and Communications (OACSAC), of the Army Staff. The JINTACC System Architecture/ Engineering Office is supported by the JINTACCS Service/Agency Support Office (JSASO) which consists of full-time representatives from each Service and from the National Security Agency (NSA) and the Defense Intelligence Agency (DIA). Joint coordination is accomplished by the JINTACCS Service/Agency Support Office. 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 will continue over the next year. The initial increment to establish a staff capable of performing joint testing was assembled during FY 1978. Management of the JINTACCS (Army) program is provided by the Communications Research and Development Command (CORADCOM), Fort Monmouth, NJ.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 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 (PM) No. 99, outlining the Ground and Amphibious Military

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Operations (GAMO) program, was prepared and approved, and a generalized Technical Interface Plan was prepared. In February 1976, the GAMO program was redirected to achieve a joint testing capability as early as possible by dividing the interfaces into five functional groups (Intelligence, Air Operations, Amphibious, Fire Support, and Operations Control) and by placing priorities on these groups for testing. During 1976, the Technical Interface Concepts Document was revised, a Joint Interface Test Center (JITC) site selection study completed, other Ground and Amphibious Military Operations (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 (PM) 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. In 1977, Congress deleted all but $1.000 million from the FY 1978 program pending reorganization of the GAMO program into the Joint Interoperability of Tactical Command and Control Systems (JINTACCS) program with permission for reprogramming, once the reorganization was accomplished. Reorganization was completed in 1977 and reprogramming action for additional FY 1978 funds was completed in January 1978. Based on a program level of $2.900 million ($1.000 million basic and $1.900 million reprogrammed), the following work was accomplished: The Joint Interface Test Force (JITF) staff was expanded by the Services/Agencies, and an initial procurement of equipment to support Intelligence Compatibility and Interoperability (C&I) testing was begun. All program documentation was revised to reflect the reorganization of the program. Work on Building 1209 at Fort Monmouth, NJ, was started to provide the facility for the Joint Interface Test Center (JITC). Test plans were prepared for Intelligence C&I testing. Policies and procedures were developed and directives issued to cover restructuring the program from GAMO to JINTACCS. Development of message standards for JTIDS was continued. JINTACCS involvement in NATO standardization activities was examined. In FY 1979 the JITC was activated and began C&I testing of Intelligence in July. The JINTACCS NATO Support Plan was approved and distributed in March 1979. The Tactical Air Control Systems/Tactical Air Defense Systems (TACS/TADS) transition plan was initiated. Revision of the JINTACCS Management Plan, the JINTACCS Data Element Dictionary were initiated. PM 99 revision was completed and submitted to Joint Chiefs of Staff/Office of the Secretary of Defense (JCS/OSD) for approval.

2. (U) FY 1980 Program: Completion and release of the Operations Control and Fire Support Technical Interface Design Plan - Test Edition (TIDP-TE), continue refinement and updating of the Intelligence, Air Operations and Amphibious TIDP-TE's. Continue Compatibility and Interoperability (C&I) testing for Intelligence, and prepare for C&I testing of Air Operations. Continue preparations for the assumption of the Tactical Air Control Systems/Tactical Air Defense Systems (TACS/TADS) configuration management task.

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3. (U) FY 1981 Planned Program: Air Operations Compatibility and Interoperability (C&I) testing will begin in January 1981 and will continue throughout the year. The Operational Effectiveness Demonstration (OED) for Intelligence is scheduled for May 1981. Configuration Management for Tactical Air Control Systems/Tactical Air Defense Systems (TACS/TADS) will begin in October 1980. Continue refinement and updating of the Intelligence, Air Operations, Amphibious, Operations Control and Fire Support Technical Interface Design Plans - Test Edition. Operations of the JINTACCS Architecture/Engineering Office, the JINTACCS Service/Agency Support Office, the Joint Interface Test Force, joint technical working groups, and JINTACCS participation in NATO interoperability committees and working groups will continue.

4. (U) FY 1982 Planned Program: Continue Air Operations Compatibility and Interoperability (C&I) testing. Initiate Operations Control C&I testing and continue it throughout the fiscal year. Continue refinement and updating of the Intelligence, Air Operations, Amphibious, Operations Control and Fire Support Technical Interface Design Plan - Test Editions. Operations of the JINTACCS Architecture/Engineering Office, the JINTACCS Service/Agency Support Office, the Joint Interface Test Force, joint technical working groups, and JINTACCS participation in NATO interoperability committees and working groups will continue.

5. (U) Program to Completion: This is a continuing program.

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Project: #D309 Title: Joint Interoperability of Tactical Command and Control Systems (Army)

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

DOD Mission Area: #254 - Tactical Command and Control Budget Activity: #4 - Tactical Programs

A. (U) DETAILED BACKGROUND AND DESCRIPTION: The objective of this Office of Secretary of Defense/Joint Chiefs of Staff (OSD/JCS) directed program for Joint Interoperability of Tactical Command and Control Systems (JINTACCS) is to improve the overall tactical effectiveness of the US Armed Forces in joint service/agency operations. Specifically, the JINTACCS program was established for the purpose of insuring compatibility and interoperability (C&I) of tactical command and control systems used in joint tactical battlefield operations. NATO tactical command and control requirements will be considered. The Army, as one of the participating services and agencies, is tasked to provide support to the JINTACCS Program, and to program and budget funds necessary to accomplish its portion of the program. The Army also is executive agent for the JINTACCS Program. The tasks and resources required for Army participation in JINTACCS are described below; the tasks and resources for the executive agent activities are described in the JINTACCS descriptive summary for Program Element (PE) 6.47.79/D310 (JINTACCS (Executive Agent)). As a participant, the Army will provide operational facilities such as the Tactical Operations Center, Fire Direction Center, Fire Support Element, Army Air Defense Command Post (there are 26 such Army facilities), and supporting automated systems (consisting of the Tactical Fire Direction System, Missile Minder, PATRIOT, All Source Analysis System, and Tactical Operational Center (Automated) System), all to be configurated to exchange tactical information with other service/agency operational facilities and systems. The JINTACCS program has been developing information exchange requirements, message formats and data elements, communications parameters, interface points, and interface operating procedures to achieve compatibility and interoperability among joint tactical facilities and systems. Each JINTACCS participating Army facility and system must be designed or modified to utilize JINTACCS message standards. To evaluate the achievement of compatibility and interoperability, testing started in the fourth quarter of FY79. The C&I tests will be conducted in an iterative manner on each of five JINTACCS functional groups (Intelligence, Air Operations, Amphibious Operations, Fire Support Operations, and Operations Control) over a period from FY79 through FY84. Following each functional group's C&I tests, an Operational Effectiveness Demonstration (OED) will be conducted concurrently with annual joint exercises (e.g., SOLID SHIELD 81) to demonstrate the enhanced capabilities of an interoperable US joint tactical force. The JINTACCS program is a highly complex undertaking by the US, but one that will ultimately lead to joint standardization and provide force multiplier effects contributing to the US defense posture.

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B. (U) RELATED ACTIVITIES:

1. The JINTACCS program was known as the Ground and Amphibious Military Operations (GAMO) program until June 1977 when Congress recommended restructuring of the management and staffing of the GAMO program. The GAMO program was funded under Program Element 6.47.12.A as the Joint Advanced Tactical Command, Control, and Communications Program (now titled Tactical Data System Interoperability).

2. Program Element 6.47.12.A Tactical Data System (TDS) Interoperability, project D324 USA/NATO TDS Interoperability. The objective of this program is to define Army-NATO tactical data systems interoperability. This program is related to the JINTACCS (Army) Program in that the fundamental purpose of both programs is to achieve tactical Command and Control System interoperability to improve overall multinational tactical combat operations. As NATO tactical command and control requirements are considered in the JINTACCS (Army) Program (D309), JINTACCS requirements are being considered in the US/NATO TDS Program.

3. Program Element 6.47.12.A Tactical Data System (TDS) Interoperability, project D323 US Army Tactical Data Systems Interoperability. This program has been established to increase the operational effectiveness within the Army's own battlefield automated systems through interoperability. The JINTACCS program is both influenced by and influences the design, implementation, and testing of Army systems participating in this Intra-Army interoperability program.

4. Communications Research and Development Command (CORADCOM) Interoperability Management Division of the Center for Systems Engineering and Integration (CENSEI) has developed a management plan which describes the responsibilities for accomplishing specific coordination actions under each of the programs enumerated above and provides the necessary guidance to Army agencies to preclude duplicate efforts within the Army.

C. (U) WORK PERFORMED BY: Contractors: System Development Corporation, Eatontown, NJ; Control Data Corporation, Shrewsbury, NJ; Computer Sciences Corporation, Red Bank, NJ; MITRE Corporation, Fort Monmouth NJ. In-house organization: US Army Communications Research and Development Command (CORADCOM), Fort Monmouth, NJ.

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D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: CORADCOM manages the Army's participation in JINTACCS, funding support by Army Project Managers, laboratories, test activities, and contractors, as related to the following: Update and refine the JINTACCS Army Management Plan (JAMP); Review JINTACCS Technical Interface Concept (TIC); Assist in preparation of JINTACCS Technical Interface Design Plans; Activate the Army Test Unit; Review JTIDS Technical Interface Concept; Review JINTACCS Test Documents; Develop Army plans for Intelligence C&I testing; Start development of Army plans for Air Operations C&I testing; Implement JINTACCS Configuration Management Plan; Assist in preparation of JINTACCS Message Element Dictionary/Catalog of Keyword Data Sets (MED/CAT); Assist in preparation of JINTACCS Interface Design Handbook; Contribute to development of JINTACCS-NATO AD HOC (JINAG) Management Plan; Support Battlefield Exploitation and Target Acquisition (BETA) implementation of JINTACCS messages; Provide Army input to Program Memorandum 99 for System Costs and Schedules; Provide full time US Army Materiel Development and Readiness Command (DARCOM) representative to JINTACCS Service/Agency Support Office (JSASO); Provide full time Army representatives to JINTACCS Joint Interface Test Force; Plan for Army Tactical Air Control System/Tactical Air Defense System (TACS/TADS) transition into JINTACCS; Assist in preparation of plans for JINTACCS Operational Effectiveness Demonstration (OED); Provide for conceptual support for: (1) JINTACCS System Engineering; (2) Emulation System Engineering; (3) Emulator Expansion; (4) Army Test Unit, Federal Contract Resource Center (FCRC); Provide technical support to the JINTACCS communications analysis and design; Coordinate with Army Project Managers and TRADOC System Managers to provide for timely integration of JINTACCS standards into participating Army systems; Provide for operational facility/system training program for Army support of JINTACCS C&I testing.

2. (U) FY 1980 Program: CORADCOM Interoperability Management Division of CENSEI is managing and assisting in the Army's participation in JINTACCS and provides funding support to Army Project Managers, laboratories, system managers, test activities and contractors as related to the following: Tasks Continuing Through FY 1981 - ATU participates in Intelligence C&I testing and collection of Army-oriented test data; Initiate Army test site survey for JINTACCS Operations Control C&I testing; conduct training for ATU support personnel and Operational Facility/system team personnel for Intelligence and Air Operations C&I testing; conduct Army test site survey for Operations Control. Tasks Continuing Through FY 1982 and Beyond - Update and refine the JINTACCS Army Management Plan (JAMP); Review JINTACCS Technical Interface Concept (TIC); assist in preparation and configuration control of JINTACCS Technical Interface Design Plans; Manage and operate the Army Test Unit (ATU); Review JTIDS Technical Interface Concept (TIC); review JINTACCS Test Documents; develop Army plans for Operations Control C&I testing; develop Army plans for Air Operations C&I testing, Implement JINTACCS Configuration Management Plan; assist in preparation of

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JINTACCS Message Element Dictionary; assist in preparation of JINTACCS Interface Design Handbook; contribute to development of JINTACCS-NATO Management Plan; support Battlefield Exploitation of Target Acquisition (BETA) implementation of JINTACCS messages; provide Army inputs to Program Memorandum 99 for Service costs and schedules; provide full time US Army Materiel Development and Readiness Command (DARCOM) representatives to JINTACCS Service/Agency Support Office (JSASO); provide full time Army representatives to JINTACCS Joint Interface Test Force (JITF); assist in preparation of JINTACCS Operational Effectiveness Demonstrations (OED) plans; provide for contractual support for: (1) JINTACCS Systems Engineering; (2) Emulation System Engineering; (3) Emulation Expansion/Teleprocessing Design Center; (4) Army Test Unit, Federal Contract Resource Center (FCRC); provide technical support for JINTACCS communications analysis and design; coordinate with Army Project Managers and Training and Doctrine Command (TRADOC) System Managers to provide for timely integration of JINTACCS standards into participating Army systems; begin modifications to the Tactical Fire Direction System (TACFIRE) system to interface with the Marine Corps Integrated Fire and Air Support System (MIFASS).

3. (U) FY 1981 Planned Program: Communications Research and Development Command (CORADCOM) Interoperability Management Division of Center for System Engineering and Integration (CENSEI) will manage and assist in the Army's participation in JINTACCS and will provide funding support to Army Project Managers, laboratories, system managers, test activities and contractors as related to the following: continuation of efforts begun in FY80 and earlier which are of a continuing nature and for which final completion will not yet have been accomplished. Tasks That Will Be Completed During FY81 - Participate in the continuation of Intelligence Compatibility and Interoperability (C&I) testing and the collection of Army-oriented test data using Army Test Unit (ATU) resources; conduct Operational Effectiveness Demonstrations (OED) testing for Intelligence functions. Tasks Continuing Through FY82 - Finalize Army plans for Operations Control C&I testing. Tasks Being Performed in FY81 and Continuing Through FY82 and Beyond - Assist in the configuration control over the JINTACCS Technical Interface Design Plan - Test Edition (TIDP-TE), the Message Element Dictionary, and Interface Design Handbook; coordinate with Army Project Managers and TSM's in the integration of JINTACCS standards into participating Army Operational Facility systems; start Air Operations C&I testing using ATU resources; planning for the combined Intelligence and Air Operations OED; review, evaluate, and recommend possible changes to Army systems based on the integration of Tactical Air Control System/Tactical Air Defense System (TACS/TADS) into the JINTACCS program; initiate the conduct of training for ATU support personnel and operational facility/system team personnel for participation in Operations Control C&I testing; develop plans for site survey for Amphibious and Fire Support C&I testing; provide preliminary planning for Amphibious and Fire Support C&I testing; initiate plans for technical interface design changes to develop preliminary tactical command and control systems selected to interoperate; plans for C&I testing of JTIDS Message Standards.

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

DOD Mission Area: #254 - Tactical Command and Control Budget Activity: #4 - Tactical Programs

4. (U) FY 1982 Planned Program: CORADCOM Interoperability Management Division of CENSEI will manage and assist in the Army's participation in JINTACCS and will provide funding support to Army Project Managers, laboratories, system managers, test activities, and contractors as related to the following: continuation of efforts begun in FY81 and earlier which are of a continuing nature and for which final completion will not yet have been accomplished. Tasks That Will Be Completed During FY82 - complete final test report detailing the results of the Intelligence OED; incorporate technical interface design system test modification for ASAS and AN/TSQ-73/PATRIOT. Tasks Continuing Through FY83 - participate in the continuation of Air Operations C&I testing; develop plans for Air Operations OED; finalize plans for Combined Intelligence and Air Operations OED; complete preliminary and initiate final plans for Amphibious and Fire Support C&I testing; complete preliminary and initiate final plans for JTIDS Message Standards C&I testing; initiate training of ATU personnel on employment of JTIDS Message Standards; compile Army-oriented test data for Air Operations C&I testing. Tasks Being Performed in FY82 and Continuing Beyond FY83 - Participate in Operations Control C&I testing using ATU resources; initiate the conduct of training for ATU support personnel and Operational Facility/system team personnel for participation in Amphibious and Fire Support C&I testing; compile Army-oriented test data for Operations Control C&I testing using ATU resources.

5. (U) Program to Completion: This is a continuing program. The period after FY 1982 will include continued modification of Army systems and compatibility and interoperability testing of all JINTACCS functional segments and Operational Effectiveness Demonstrations. By 1985 this program will submit to the Joint Chiefs of Staff, for approval, the Final Edition of the JINTACCS Technical Interface Design Plan which when approved will become the Joint Interface Design Standard for developing tactical data systems. It is planned that new automated systems will be introduced and that those in the field will be changed/updated; therefore, there will be a continuing need for interoperability configuration management, post deployment support, and testing for developmental and operational systems.

6. (U) Major Milestones:

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1980 Submission
Data Communication Specification	2QFY80	2QFY80

Project: #D309 Title: Joint Interoperability of Tactical Command and Control Systems (Army)

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

DOD Mission Area: #254 - Tactical Command and Control Budget Activity: #4 - Tactical Programs

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1980 Submission
Joint Tactical Information Distribution System (JTIDS)- Message Standards	3QFY80	1QFY80
Interface Design	4QFY80	2QFY79
Operational Facility/System Implementation	4QFY80 - 2QFY84	4QFY80 - 2QFY84
Compatibility and Interoperability Testing	3QFY79 - 1QFY85	4QFY79 - 3QFY83
Configuration Management Testing	3QFY81 - 3QFY85	2QFY80
Operational Effectiveness Demonstrations	3QFY81 - 3QFY85	3QFY81 - 3QFY85
Army Test Unit (ATU) Expansion	3QFY79 - 3QFY85	1QFY79

The milestone slippages identified above are based upon funding and resources limitations resulting from an increase in JINTACCS requirements with no subsequent increase in funding. These new requirements in concert with the shortfalls now present are due to funding cuts identified in paragraph 7 below.

7. (U) Resources ($ in thousands):

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	4321	15152	9566	19748	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	4320	15805	14035	Continuing	Continuing	Not Applicable

Project: #D309 Title: Joint Interoperability of Tactical Command and Control Systems (Army)

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

DOD Mission Area: #254 - Tactical Command and Control Budget Activity: #4 - Tactical Programs

The differences in FY 1981 funding profiles between the Congressional Descriptive Summary submissions for FY 1981 are caused by a decrease in planned activity for the Army in the JINTACCS Program. The decrease is the result of cancellation of the Tactical Operational System (TOS) Program, its potential JINTACCS interface design, and the attendant emulation of TOS for JINTACCS testing at Ft Monmouth, NJ. The decrease in FY 1980 is due to a general Congressional reduction.

FY 1981 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 (Executive Agent)

DOD Mission Area: #254 - Tactical Command and Control Budget Activity: #4 - Tactical Programs

A. (U) 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. 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, and 38 different tactical facilities of the Services and Agencies, 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. This strengthening of the management structure was completed.

B. (U) RELATED ACTIVITIES: This program is related to the Tactical Data System Interoperability program which is funded under Program Element 6.47.12.A, whose goals complement the JINTACCS program (interoperability among Services) by striving for interoperability within the Army. Close liason precludes duplication of effort.

C. (U) WORK PERFORMED BY: Overall coordination and management of the joint aspects of the program is accomplished by the JINTACCS Program Director and the JINTACC System Architecture/Engineering Office which are located within the Office, Assistant Chief of Staff for Automation and Communications (OACSAC), of the Army Staff. The JINTACC System Architecture/Engineering Office is supported by the JINTACCS Service/Agency Support Office (JSASO) which consists of full-time representatives from each Service and from the National Security Agency (NSA) and the Defense Intelligence Agency (DIA). Joint coordination is accomplished by the JINTACCS Service/Agency Support Office. 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 will continue over the next year. The initial increment to establish a staff capable of performing joint testing was assembled during FY 1978. Management of the JINTACCS (Army) program is provided by the Communications Research and Development Command, Fort Monmouth, NJ.

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 (Executive Agent)

DOD Mission Area: #254 - Tactical Command and Control Budget Activity: #4 - Tactical Programs

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: The 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 (PM) No. 99 outlining the GAMO program was prepared and approved, and a generalized Technical Interface Test Plan was prepared. In February 1976, the Ground and Amphibious Military Operations (GAMO) program was redirected to achieve a joint testing capability as early as possible by dividing the interfaces into five functional groups (Intelligence, Air Operations, Amphibious 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 No. 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. In 1977, the Ground and Amphibious Military Operations program was reorganized into the Joint Interoperability of Tactical Command and Control Systems (JINTACCS) program in response to Congressional direction. The Joint Interface Test Force (JITF) staff was expanded by the Services/Agencies and an initial procurement of equipment to support Intelligence Compatibility and Interoperability (C&I) testing was begun. All program documentation was revised to reflect the reorganization of the program. Work on Building 1209 at Fort Monmouth, NJ, was started to provide the facility for the Joint Interface Test Center (JITC). Test plans were prepared for Intelligence C&I testing. Policies and procedures were developed and directives issued to cover restructuring the program from GAMO to JINTACCS. Development of message standards for JTIDS was continued. JINTACCS involvement in NATO standardization activities was expanded. In FY 1979 the JITC was activated and began C&I testing of Intelligence in July. The JINTACCS NATO Support Plan was approved and distributed in March 1979. The Tactical Air Control Systems/Tactical Air Defense Systems (TACS/TADS) transition plan was initiated. Revision of the JINTACCS Management Plan, and the JINTACCS Data Element Dictionary were initiated. The JITF organizational plan was completed and approved. PM 99 revision was completed and submitted to JCS/OSD for approval.

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 (Executive Agent)

DOD Mission Area: #254 - Tactical Command and Control Budget Activity: #4 - Tactical Programs

2. (U) FY 1980 Program: Completion and release of the Operations Control and Fire Support Technical Interface Design Plan - Test Edition (TIDP-TE), continue refinement and updating of the Intelligence, Air Operations and Amphibious TIDP-TEs. Continue Compatibility and Interoperability (C&I) testing for Intelligence. Continue preparations for the assumption of the Tactical Air Control Systems/Tactical Air Defense Systems (TACS/TADS) configuration management

3. (U) FY 1981 Planned Program: Air Operations Compatibility and Interoperability (C&I) testing will begin in January 1981 and will continue throughout the year. The Operational Effectiveness Demonstration (OED) for Intelligence is scheduled for May 1981. Configuration Management for Tactical Air Control Systems/Tactical Air Defense Systems (TACS/TADS) will begin in October 1980. Continue refinement and updating of the Intelligence, Air Operations, Amphibious, Operations Control and Fire Support Technical Interface Design Plans - Test Editions. Operations of the JINTACCS Architecture/Engineering Office, the JINTACCS Service/Agency Support Office, the Joint Interface Test Force, and joint technical working groups.

4. (U) FY 1982 Planned Program: Continue Air Operations Compatibility and Interoperability (C&I) testing. Initiate Operations Control C&I testing and continue it throughout the fiscal year. Continue refinement and updating of the Intelligence, Air Operations, Amphibious, Operations Control and Fire Support Technical Interface Design Plan - Test Editions. Operations of the JINTACCS Architecture/Engineering Office, the JINTACCS Service/Agency Support Office, the Joint Interface Test Force, and joint technical working groups.

5. (U) Program to Completion: This is a continuing program.

6. (U) Major Milestones:

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1980 Submission
Begin compatibility and inter-operability testing intelligence segment	July 1979	July 1979

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 (Executive Agent)

DOD Mission Area: #254 - Tactical Command and Control Budget Activity: #4 - Tactical Programs

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1980 Submission
Begin compatibility and interoperability testing air operations segment	January 1981	January 1981
Begin compatibility and interoperability testing operations control segment	January 1982	January 1982
Begin compatibility and interoperability testing amphibious/fire support segment	July 1983	July 1983

There has been no change between the FY 1980 and FY 1981 Congressional Descriptive Summaries.

7. Resources ($ in Thousands):

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	7200	12177	11324	18405	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	7200	12192	14181	-	Continuing	Not Applicable
Quantities (current requirements)						Not Applicable
Quantities (as shown in FY 1980 submission)						-

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 (Executive Agent)

DOD Mission Area: #254 - Tactical Command and Control Budget Activity: #4 - Tactical Programs

The difference between the FY 1981 current requirements and those shown in the FY 1980 Congressional Descriptive Summary is due to reductions made when funding priorities were rearranged during the Army budget process. Redistribution of funds has been accomplished within the new levels to insure that all critical actions will be completed on schedule. FY80 difference is the result of a general Congressional reduction.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.57.10.A
DOD Mission Area: #215 - Land Combat Support

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

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional To Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	650	674	1081	1357	Continuing	Not Applicable
D049	Joint Chemical/Biological Contact Point and Test	650	674	1081	1357	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Potential adversaries (Russian and Warsaw Pact) have significant chemical-biological (CB) equipment and practice CB offensive and defensive procedures to develop proficiency for operating in a CB environment. United States (US) forces must also be able to survive and accomplish their mission in a chemical environment. To do this, the United States must operationally test and evaluate a variety of CB defensive equipment and procedures to assure maximum effective utilization of available assets and provide feedback for development of new equipment and employment doctrine. In 1973 the Department of Defense (DOD) directed the Army to establish a Research, Development, Test and Evaluation (RDTE) program to support Unified Commanders and Services' identified needs for testing CB equipment and procedures used in support of their operations. This program succeeded Project Deseret which was a DOD Joint Services program for operational testing of existing chemical warfare and chemical and biological defense (CW/CBD) equipment. The current Army program continues to provide a means for commanders of US forces to test nondevelopmental equipment, conduct appropriate supporting studies, and adopt operating procedures to provide quick solutions to some of its CB needs while awaiting the results of longer term research and development efforts. This data also supports development of CB requirements documents and tactical doctrine by users. Dugway Proving Ground (DPG) is the only DOD facility possessing the specialized personnel, equipment, and facilities (including real estate) to provide the broadrange of CB tests and studies support necessary to satisfy the stated user needs. This program covers direct costs incurred by DPG in supporting operational tests, investigations and/or studies for Unified Commanders and Services; provides for the publication and maintenance of CB technical data source books; and supports accomplishments of the Army's Executive Agency responsibilities in RDTE support of development of chemical weapons and chemical and biological defense (CW/CBD) for the Services.

C. (U) BASIS FOR FY 1981 RDTE REQUEST: Five operations research studies, four tests on CB operational matters, and one technical data source book will be in progress and/or completed. The program will include studies on airfield decontamination

Program Element: #6.57.10.A
DOD Mission Area: #215 - Land Combat Support

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

equipment; effectiveness of chemical warhead missiles against ships; medical support of battalion amphibious operations in a toxic environment; chemical defense operations in extreme cold; and the effects of threat agents on aircraft crews at various altitudes. Tests will include chemical agent simulant selection and evaluation; aircraft operations in a toxic environment; and evaluation of collective protective systems for expeditionary and medical operations.

D. (U) BASIS FOR CHANGE BETWEEN FY 1981 and FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1979	FY 1980	FY 1981	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	650	674	1081	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	781	824	1039	Continuing	Not Applicable

The decrease in FY79 is the result of higher priority programs taking precedence for available dollar resources. The decrease in FY80 is due to a general congressional reduction applied to this program. The increase in FY 1981 is due to inflation.

E. (U) OTHER APPROPRIATION FUNDS: Not Applicable

Program Element: #6.57.10.A
DOD Mission Area: #215 - Land Combat Support

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

F. (U) 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 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 nondevelopmental data on chemical weapon systems and chemical/biological defense materiel, and will determine whether tested items and/or systems meet the military technical characteristics required by the user. Joint contact point accomplishes the publication and maintenance of CB technical data source books and provides data evaluation studies in support of CB data inquiries. In addition to providing quick solutions to critical operational requirements, data from the studies and tests also provide a significant input for defining and clarifying concepts being developed in Basic Research (6.1) through Engineering Development (6.4).

G. (U) RELATED ACTIVITIES: The Department of the Army (DA), as the DOD Executive Agent for research, exploratory development, and advanced development for chemical warfare and chemical and biological defense (CW/CBD) systems, is responsible joint operational tests, investigations and/or studies for Unified Commanders and the Services. Work is coordinated and duplication of effort precluded 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 Working Group (QWG), The Technical Cooperation Program (TTCP), and with the North Atlantic Treaty Organization (NATO).

H. (U) WORK PERFORMED BY: In-house efforts are conducted at Dugway Proving Ground, UT. No contract work is performed in this program.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: From the program initiation in FY 1976 through FY 1978 a total of eight tests, six operation research studies and ten technical data source books have been completed and reports published. During FY 1979, four tests, three studies and one data source book were initiated and/or completed. The tests and studies support the development of improved chemical and biological defense materiel and procedures. The data obtained and evaluated provide the basis for a critical operational evaluation of how well chemical warfare/chemical-biological defense items and/or systems meet the technical characteristics required by the user.

2. (U) FY 1980 Program: Seven tests, seven studies, one technical data source book, and an addendum to a previously published source book are scheduled for FY 1980. All efforts are in response to validated requirements submitted by the Unified Commanders and Services. Priority for the sequence of conducting the planned effort was established at a joint services coordination meeting. The test will evaluate simulants for field testing, a West German decontaminant, the chemical

Program Element: #6.57.10.A
DOD Mission Area: #215 - Land Combat Support

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

logistics burden, decontamination of electronic equipment, mission degradation associated with chemical protection, and helicopter operations in a toxic environment. Effects of chemical weapons, defensive measures, casualties under various field conditions, enemy CW capabilities, assessment of the operational impact of a toxic environment, aircraft vulnerability to CBR and an assessment of chemical weapon integrity during storage and handling will be the subject of the studies. Work will be initiated on a data source book on thickened agents.

3. (U) FY 1981 Planned Program: Four operational tests, five studies, and publication of one technical data source book are scheduled for FY 1981. Operational concepts of using collective protection shelter systems will be tested. Studies will address airfield decontamination, medical support in a toxic environment, chemical defense operations in extreme cold, and the effectiveness of chemical missiles against ships.

4. (U) FY 1982 Planned Program: Six tests, one study, and one source book are planned for initiation, and/or completion in FY 1982. The tests will evaluate the effects of a toxic environment on various combat and combat support operations. The study will address the effectiveness of a specific type of aerial delivered CW weapon. Detection and Warning Devices will be the subject of the data source book.

5. (U) Program to Completion: This is a continuing program.

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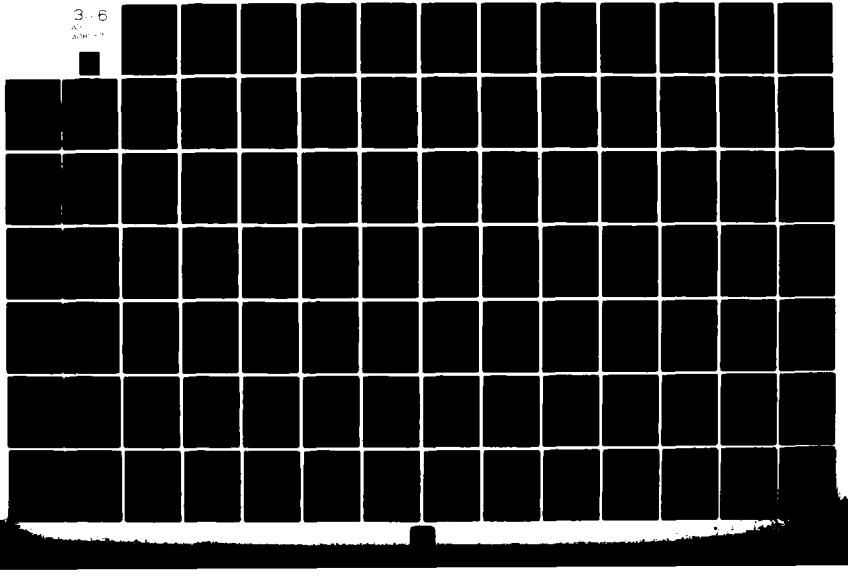

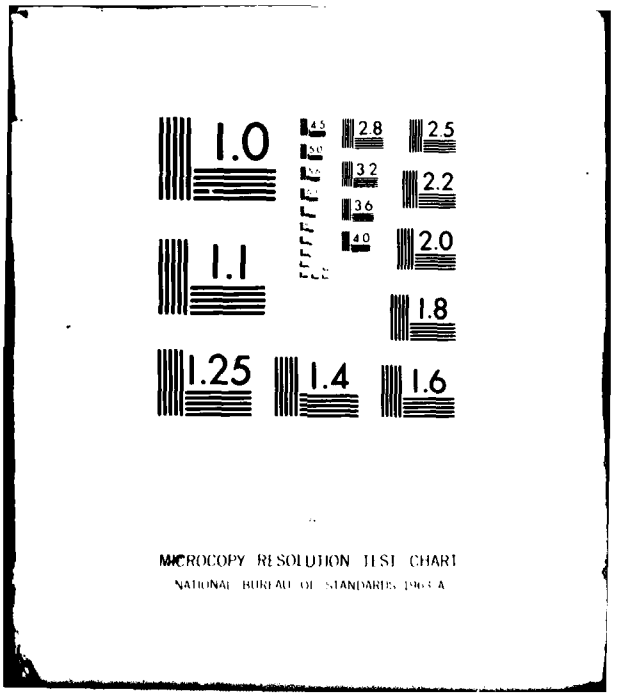
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FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.57.13.A
Title: Battlefield Systems Integration
DOD Mission Area: #254 - Tactical Command and Control
Budget Activity: #4 - Tactical Programs

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional To Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	3000	0	3300	4661	10500	29595
DF26	Battlefield Systems	3000	0	3300	4661	10500	29595

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Battlefield Systems Integration Directorate, Headquarters, US Army Materiel Development and Readiness Command (DARCOM), provides for the continuing analysis and overview of Army materiel systems development by examining the Army in the field as a total battlefield system with the battlefield subsystems in each mission area (fire support, tactical communications, close combat, etc.) configured to maximize the combat capability of the force. The process of insuring effective integration of groups of battlefield systems requires a clear definition of proposed systems, the postulation of interface requirements for maximizing the synergism between battlefield systems and sensitivity analyses and assessments of the impact of a single system on its related group and on the Army as a single battlefield system. This process is supported by analysis which provides a credible and orderly procedure to identify and quantify trade-offs between near term improvements, changes in doctrine and organization, and modifications to existing systems or definition of new battlefield systems requirements. The Battlefield Systems Integration Directorate enhances the affordable modernization of Army forces by facilitating the development of effectively integrated groups of battlefield systems.

C. (U) BASIS FOR FY 1981 RDTE REQUEST: FY 1981 will complete the effort to upgrade the battlefield systems integration data base (BSIDB) for the 1986 target year. The BSIDB is an automated catalog of battlefield systems characteristics and interrelationships. The BSIDB takes the basic characteristics of each battlefield system and relates them to how that system interfaces with other battlefield systems. FY 1981 program will continue to identify and define systems gaps and overlaps and recommend program adjustments, based on validated concepts, to maximize effectiveness through synergism on the integrated battlefield.

Program Element: #6.57.13.A Title: Battlefield Systems Integration
DOD Mission Area: #254 - Tactical Command and Control Budget Activity: #4 - Tactical Programs

D. (U) BASIS FOR CHANGE BETWEEN FY 1981 and FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1979	FY 1980	FY 1981	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	3000	0	3300	15161	29595
Funds (as shown in FY 1980 submission)	3000	3300	5300	Continuing	Not Applicable

The current FY 1981 estimate is reduced as a result of a transfer of funds to higher priority programs, a reduction in the scope of the overall contractual effort, and a refocus of efforts after a year of unfunded staff work which precluded contractor support. The decrease in FY80 is due to Congressional action.

E. (U) OTHER APPROPRIATION FUNDS: Not Applicable.

Program Element: #6.57.13.A Title: Battlefield Systems Integration
DOD Mission Area: #254 - Tactical Command and Control Budget Activity: #4 - Tactical Programs

F. (U) DETAILED BACKGROUND AND DESCRIPTION: The 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 analyzes broad mission areas and assesses programs, taking into account evolving operational concepts in the *effort to identify and close gaps* in Army battlefield capabilities, provide guidance in the formative stages of systems development, expose 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 developed by the US Army Training and Doctrine Command (TRADOC).

G. (U) RELATED ACTIVITIES: DSBI is not duplicative of any other organization within DOD, but is complementary to other services' organizations (e.g., USAF Project VANGUARD). Initial exploratory work involving analysis of existing capabilities in the areas of communications links, data processing, and response transmission was accomplished in FY 1976 under contractural 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 Activity (AMSAA), also in FY 1976.

H. (U) WORK PERFORMED BY: Private research contracts (contractors as yet undetermined) are planned but have not yet been awarded. In-house work is performed by the US Army Materials and Mechanics Research Center (AMMRC) in Watertown, MA; US Army Materiel Systems Analysis Activity (AMSAA), in Aberdeen, MD; and the Research and Development Commands and other laboratories of US Army Materiel Development and Readiness Command (DARCOM).

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: Reviews and analyses were accomplished in the areas of Target Acquisition, Communication, Command and Control (C), Weapon Engagement, Aviation, Tactical Nuclear, Close Combat Systems, Intelligence, Surveillance, Command Systems, Air Defense, Fire Support, Electronic Warfare (EW), US Army Operations in the Soviet EW Environment, Corps Echelon Integration and Experimentation, and Zone II Interdiction. *As a result of these reviews and analyses, mission areas and functional groups of systems have been defined and approved by Headquarters, Department of Army. These are now in use Army-wide as the standard capabilities categories (CAPCAT) and are used as the basis for planning and analysis. To improve the management of Research and Development (R&D) toward integrated systems, the Systematic Planning for Defense Engineering and Research (SPIDER) charting technique was established. The SPIDERCHART is prepared annually in catalog form to display the DARCOM technology base projects in relation to prioritized requirements for systems capabilities. This relational catalog display, at the work unit level, shows the technology base related to Army Mission Areas and Functional Groups of Systems by specific capabilities, and provides the basis for continuous data exchange between TRADOC schools and DARCOM laboratories. The*

Program Element: 06.57.13.A Title: Battlefield Systems Integration
DOD Mission Area: 0254 - Tactical Command and Control Budget Activity: 04 - Tactical Programs

analyses of Counterfire and Suppression of Enemy Air Defense (SEAD) served to identify critical materiel integration issues and focus Army attention on the need to resolve, in the case of SEAD, responsibility to formulate doctrine. A low-cost antenna to enhance communications in built-up areas Resulted from a study of such operation while other communications analyses provoked the update of the Integrated Tactical Communications System (INTACS) with emphasis on data distribution, position navigation, multichannel systems, Tactical Satellite Communications (TACSATCOM), Combat Net Radio and Mobile subscriber voice systems. The Military Systems Handbook was published, providing a comprehensive compendium of DOD present and planned electronic warfare (EW) and surveillance systems capabilities and characteristics, to assist field operating personnel in the planning and execution of fully integrated military operations. An automation experiment was sponsored and applications workshops held to demonstrate the feasibility of pursuing tactical realtime integration of intelligence operations and information. This intelligence preparation of the battlefield experiment provided functional specifications for graphics and software and has been adopted by TRADOC for future development. A model evaluation methodology was developed that will allow the DBSI to estimate the worth of numerous materiel solutions to battlefield system deficiencies identified in system area investigations. A prototype Army battlefield systems integration data base was developed and several functional areas (Fire Support, Intelligence, Surveillance, and Target Acquisition) were reviewed to insure they accurately represent the Army battlefield systems architecture. Methodologies for applying the prototype data base in these functional areas and a final design for the Army battlefield system data base were developed. This design will be the basis for development of the Battlefield Systems Integration Data Base (BSIDB) through in-house experimentation during FY 1980 and expansion in future years.

2. (U) FY 1980 Program: The Directorate for Battlefield Systems Integration (DBSI), HQ, DARCOM, in the absence of FY 1980 funding to support contractural analyses, will focus efforts on establishing integration as a key consideration in materiel development planning and decisionmaking, analyzing and implementing prior year efforts and planning a concentrated effort for FY 1981. In support of the Mission Area Analysis study process, Science and Technology (S&T) plans will be developed to show the related technology direction, identify voids in technology programs and provide direction for future systems development efforts. DBSI will direct and oversee the development of comprehensive S&T plans with Fire Support as the prototype. This plan will cut across traditional functions of communications, mobility, logistics, etc., and examine the interrelated development programs which should result in a totally integrated fire support capability. Efforts will be focused on SPIDERCHARTS, produced in prior years, to instill an active dialogue between the US Army Training and Doctrine Command (TRADOC) schools and US Army Materiel Development and Readiness Command (DARCOM) laboratory and make the charts a more effective laboratory management tool. The chemical and biological subsystems architecture study completed in FY 1979 will be used as a primary resource to focus attention on the lack of cohesion in that program, both from a policy and programmatic standpoint. The objective is an integrated nuclear, biological, and chemical research and development plan which integrates NBC actions into actual force plans. Logistics, intelligence, communications, and data processing personnel will focus attention on the distribution of these functions amongst automated systems such as Executive Command and Control, All Source

Program Element: #6.57.13.A Title: Battlefield Systems Integration
DOD Mission Area: #254 - Tactical Command and Control Budget Activity: #4 - Tactical Programs

Analysis System (ASAS), and Battlefield Exploitation Target Acquisition (BETA), etc., to determine Army functional capability to fully integrate automation into the battlefield. The result expected is an integrated, practical, and achieveable approach to near-term battlefield data programs. Efforts will be made to bring into focus the development impact of force structure decisions such as Light Division 86 to guide subsequent efforts while current adjustments are implemented. Critical combat problems which transcend specific branch/school/laboratory interests (i.e., counter C^3, air space management, etc.) will be brought into focus by participation in and chairing of work groups so that detailed work plans for FY 1981, when prepared, will address key issues from the perspective of joint and intra-Army systems interoperability. Concurrently with the outlined management tasks, a program will ensue to revise appropriate Army regulations to insure that consideration and planning for integration of systems be an inherent part of the Army combat and materiel development process.

3. (U) FY 1981 Planned Program: As a general approach to the operation, Battlefield Systems Integration (BSI) will (1) analyze mission and functional capabilities, to determine what equipment is required; (2) synthesize programs to resolve the voids between plans and requirements; and (3) define the means necessary to put required programs into a meaningful whole which is tied to a battlefield system of people, equipment, and operations. The areas of emphasis for FY 1981 are: (a) combat logistics support extending through Corps and Echelons Above Corps (EAC) with emphasis on efficiencies to be gained by specific systems interoperability enhancements to minimize handling and maximize throughput; (b) airspace management concepts and systems to identify midterm materiel solutions to implement evolving concepts and exploit planned systems capabilities; (c) development alternatives to integrate Army and Air Force systems in the effective conduct of counter C^3 missions; (d) update BSI data base with consideration of obscurants and countermeasures as they affect various systems architectures; (e) enhancement of command and control and functional interface at the battalion/brigade level in target servicing; (f) interface between the functional architectures, existing development programs, SPIDERCHARTS, and the BSI data base; and (g) continuing analysis of SPIDERCHARTS for FY 1982 Research, Development, Test and Evaluation (RDTE) technology programs.

4. (U) FY 1982 Planned Program: The BSI data base will be updated with respect to the US Army Training and Doctrine Command (TRADOC) Force Structure Study (Corps/Division 86) based on evolving concepts and new systems requirements for the time period extending into the 1990's. This effort will include a reexamination of each mission and functional task and preparation of the necessary data input. SPIDERCHARTS, resulting from analyses of 1981 versions, Science and Technology (S&T) Plans and BSI program analysis, will be published for FY 1983 programs. The inclusion of foreign technology programs, particularly those resulting from "two-way street" and "family of weapons" initiatives will be introduced into SPIDERCHARTS. Detailed analysis of integration issues identified during FY 1981 basic functional analyses and focus studies will be conducted. These will focus on the task areas of Air Defense, Surveillance/Fusion, Interdiction and Force Mobility with an objective of definitive identification of integration steps which can be achieved by evolutionary adjustment in existing programs.

Program Element: #6.57.13.A Title: Battlefield Systems Integration
DOD Mission Area: #254 - Tactical Command and Control Budget Activity: #4 - Tactical Programs

5. (U) Program to Completion: Efforts will focus on exercising the data base to identify integration gaps, overlaps, and expansion of the data base to permit ready access by the Army community as a whole and ready correlation with other data bases for increased utility. Critical multifunctional integration problems will be addressed mutually with TRADOC centers including ongoing programs proposed for development will be compared to the data base to insure all anticipated system interfaces and impacts have been identified and planned for at each step of progression. All integration analyses will be performed through Army laboratories to insure the technologists are infused with the awareness of the relationship of current and future operational needs and concepts to evolving technologies. At the conclusion of the funded program, it is envisioned that "battlefield systems integration" will be an institutional part of the systems development process and the Directorate for Battlefield Systems Integration at HQ DARCOM will become an element of the integrated RDTE management team without a requirement for special analyses and funding.

FY 1981 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. (U) RESOURCES (PROJECT LISTING): ($ in thousands)

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	10400	26192	20776	16459	0	447404
	QUANTITIES						
D336	Heavy Antitank/Assault Weapon System (TOW)	10400	26192	20776	16459	0	447404

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: In accordance with the Mission Element Need Statement (MENS) approved in January 1978, there exists a need for a long-range infantry antitank/assault weapon to complement other battlefield antiarmor weapons systems. There will be times in the highly chaotic and fluid modern battlefield when infantry will be confronted with masses of enemy armor and will be able to obtain limited or no antiarmor firepower from supporting arms. On these occasions when infantry must fight in isolated independent actions, it must have firepower available to defeat the heaviest armor. The TOW provides the infantry this capability of defeating enemy armor at great (3000-meter) ranges.

C. BASIS FOR FY 1981 RDTE REQUEST: Complete development of the full caliber warhead and the electronics and software for the countermeasure hardening.

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1980 Submission
5" improved warhead IOC		Not Applicable
6" warhead IOC		

D. (U) BASIS FOR CHANGE BETWEEN FY 1981 AND FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

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

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

	FY 1979	FY 1980	FY 1981	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	10400	26192	20776	16459	447404
Funds (as shown in FY 1980 submission)	17200	26200	17700	0	196084

The increases in the current estimate over the FY80 estimate in FY81 and "to completion" funds reflect the August 1979 decision to improve the TOW system. FY80 decrease is the result of a general Congressional reduction. The FY79 funds estimate shown in the FY80 submission was incorrect. The 10,400 actually funded in FY79 consists of an original funding of 3,500 plus a FY79 supplement of 5,000 and a reprogramming of 1900.

E. (U) OTHER APPROPRIATION FUNDS: ($ in thousands)

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional To Completion	Total Estimated Cost
Missile Procurement, Army (MIPA)						
Funds (current requirements)	42300	28700	80400	94000	297700	1406800
Funds (as shown in FY 1980 submission)	42251	58200	61400	3000	-	1221500
Quantities (current requirements)	9600	6260	12000	12000	36000	210530
Quantities (as shown in FY 1980 submission)	9600	12865	12735	0	0	169870

The FY80 procurement was reduced by Congress to the minimum sustaining rate (12,000 missiles per year) considering all customers (i.e., US Army and FMS production). The funding and production levels submitted last year were predicated on the TOW

system being replaced in the mid- to late-80's. The Army 79 decision to improve the TOW system to extend its life into the early 90's requires an increased asset posture to maintain combat readiness over that extended period.

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

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

F. DETAILED BACKGROUND AND DESCRIPTION: The TOW (Tube-launched, Optically tracked, Wire-command link) guided missile system, a member of the family of antitank weapons, was designed to defeat armored vehicles out to ranges of 3,000 meters. 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's task is limited to keeping the crosshairs of the optical sight on the target until missile impact. Recent intelligence information and a technical evaluation by the Army Ballistics Research Laboratory (BRL) indicate that
In addition, the current TOW system guidance link will not penetrate battlefield obscurants to the extent of the night sight. Thus the gunner cannot predetermine whether a missile can be guided to a target he can see with his night sight. The guidance link
has been shown in field tests. Since a number of TOW systems were lost in Vietnam, it is suspected that the system has been compromised. The Soviets have the technical capability to evaluate the TOW system and develop countermeasures. A retrofit program is underway to increase warhead lethality and improve the operation of the guidance system in obscurants. The guidance retrofit including modifications to the missile, launcher, night sight, and guidance electronics will harden the guidance link against countermeasures. The warhead improvements will be applied as a retrofit to existing and new production TOW missiles beginning in 1981.

G. (U) RELATED ACTIVITIES: The TOW night sight was the pilot program for developing common components for manportable night vision devices based on imaging infrared technology. Components developed for the TOW night sight are also used in such systems as the Medium Antitank Assault Weapon (DRAGON) night tracker (Program Element (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.A, 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. A modified M113A1 armored personnel carrier is being fielded to provide a TOW crew with armor protection and tracked vehicle mobility (Improved TOW Vehicle, ITV, M901) (PE 6.36.26.A). The TOW System is also being mounted on the COBRA helicopter (PE 6.42.12.A) and Fighting Vehicle Systems (PE 6.46.16.A and 6.46.29.A.).

H. (U) 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 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

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1979 and Prior Accomplishments: The basic weapon system development is completed, and first units were fielded in 1970. A competition for the night sight ED between Texas Instruments (TI) and Hughes Aircraft Company was won by TI. The TOW Manportable Common Thermal Night Sight (MCTNS) entered production in 1979. Nine night sights were fabricated during Research and Development Acceptance Testing (RDAT) conducted in March 1975. A solid state track link (SSTL) electronic counter-countermeasure (ECCM) development program was completed in FY 1977 to provide TOW with a low susceptibility to electronic countermeasures (ECM). The SSTL program was terminated in FY 1977 when it was determined that the SSTL beacon-tracker data link would not match the performance of the night sight (AN/TAS-4) in penetrating battlefield obscurants (smoke, dust, etc.). During FY79, an accelerated program was begun to improve the warhead lethality by retrofitting both a probe (to increase warhead functioning standoff distance) and an improved warhead using antiarmor warhead technology developed in the HELLFIRE and VIPER programs. A contractor (Hughes Aircraft with Texas Instruments as a major subcontractor) was selected to develop a retrofitable modification to the guidance link to improve its performance in obscurants to match the night sight performance and to reduce the system susceptibility to Countermeasures.

2. (U) FY 1980 Program: Begin production of improved 5" warheads for retrofit to existing missile stocks and new production missiles. Continue the accelerated 6" warhead and guidance development efforts for a system retrofit and application to new production missiles to include flight tests against fixed and moving targets.

3. FY 1981 Planned Program: Continue retrofitting 5" warheads and complete the development of the improvements. Award contracts for production of 6" warhead missiles and launcher retrofit kits.

4. (U) FY 1982 Planned Program: Produce 6" warhead missiles and launcher retrofit kits, begin retrofitting existing launchers.

5. (U) Program to Completion: All launchers are planned to be modified, and the total missile inventory will be an improved configuration by retrofit and new production program planned for completion in FY85.

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

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

6. Major Milestones:

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1980 Submission
Improved Warhead Flight Test	2QFY80	2QFY80
Begin 5" Warhead Production	4QFY80	-
DT/OT II 6" Warhead and CM hardening	3QFY81	-
IOC 5" retrofit		-
IOC 6" warhead and CM hardening		-

7. (U) Resources ($ in thousands):

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	10400	26200	20800	16500	0	210100
Funds (as shown in FY 1980 submission)	17200	26200	17700	0	0	196084
Quantities (current requirements)						898
Quantities (as shown in FY 1980 submission)						857

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #2.37.26.A
DOD Mission Area: #212 - Fire Support

Title: TACFIRE Modular Improvement Program
Budget Activity: #4 - Tactical Programs

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	-	-	3527	5127	Continuing	Not Applicable
	QUANTITIES						4
D322	TACFIRE Modular Improvement Program	-	-	3527	5127	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Within the broad mission of US Land Forces, which is to defeat the enemy by combat operations, the fire support mission area specifically encompasses the functions of providing continuous and timely target servicing, counterfire, and interdiction fires to the maneuver forces. The Tactical Fire Direction System (TACFIRE) is the automated command and control system that greatly increases the effectiveness of our numerically smaller forces. TACFIRE, as it stands today, is substantially more effective and efficient than the manual/FADAC system. However, to enable the system to maintain its effectiveness into the 1990s, the capability of selected TACFIRE subsystems must be expanded and new technology inserted in order to improve communications management, provide distributed processing capability at remote locations, and increase system mobility and survivability. Improvements to TACFIRE will evolve from the current TACFIRE hardware and software system design. The Army will capitalize on the modularity of TACFIRE hardware and software through the gradual replacement of TACFIRE components/subsystems in a manner which is responsive to the user's needs and priorities. This approach will limit turbulence within the training and logistics bases and maximize the operational capability of this artillery command and control system at any given time.

C. (U) BASIS FOR FY 1981 RDTE REQUEST:

1. (U) A system engineering contractor will devise a detailed communications management implementation plan and the communfcations subsystem specifications considering user needs, projected technology, and evolving communication/interoperability standards and systems planned for fielding in the late 1980/1990 timeframe.

2. (U) The initial program objective is to eliminate communication traffic limitations during high-intensity scenarios by fully automating the communications management function using concept plans now under development.

Program Element: #2.37.26.A
DOD Mission Area: #212 - Fire Support

Title: TACFIRE Modular Improvement Program
Budget Activity: #4 - Tactical Programs

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1980 Submission
Mission Element Need Statement Approved	3Q80	Not Applicable
In Process Review (IPR) (Commo Sys)	1Q81	
Contract Award	3Q81	
Development Test (DT)/ Operational Test (OT) II	3Q84	
Development Acceptance In Process Review (DEVA IPR)	2Q85	
Initial Operational Capability (IOC) (Como Sys)	4Q86	
Army Systems Acquisition Review Council (ASARC) (Remote Devices)	4Q83	
Contract Award	1Q85	
DT/OT II	3Q85	
DEVA IPR	2Q89	
IOC	3Q91	
ASARC (Fire Direction Center (FDC) Upgrade)	4Q86	
Contract Award	3Q87	
DT/OT II	4Q89	
ASARC (FDC Production Decision)	4Q90	
IOC	3Q93	

D. (U) BASIS FOR CHANGE BETWEEN FY 1981 AND FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands). A Congressional Descriptive Summary was not submitted in FY 1980 for this program.

Program Element: #2.37.26.A
DOD Mission Area: #212 - Fire Support

Title: TACFIRE Modular Improvement Program
Budget Activity: #4 - Tactical Programs

E. (U) OTHER APPROPRIATION FUNDS: ($ in thousands)

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional To Completion	Total Estimated Cost
Other Procurement, Army:						
Funds (current requirements)	-	-	-	-	482100	482100 1/
Funds (as shown in FY 1980 submission)	Not Applicable					
Quantities (current requirements)	-	-	-	-	73	73 2/
Quantities (as shown in FY 1980 submission)	Not Applicable					
Military Construction, Army						
Funds (current requirements)	-	-	-	$475	-	$475 3/
Funds (as shown in FY 1980 submission)	Not Applicable					

1/ This cost is based on upgrading the TACFIRE equipment already procured.

2/ This is the number of TACFIRE sets procured. The complement of subsystems and remote devices varies depending on the type of unit involved.

3/ The Military Construction, Army funds shown cover a requirement for construction of a secure climatized vault for classified disks/tapes, etc. as well as construction of laboratory type space for 90 additional personnel. The space and vault are necessary for the TACFIRE Software Support Group at Ft. Sill, OK.

Program Element: 62.37.26.A
Title: TACFIRE Modular Improvement Program
DOD Mission Area: 6212 - Fire Support
Budget Activity: 64 - Tactical Programs

F. (U) DETAILED BACKGROUND AND DESCRIPTION: TACFIRE consists of a set of hardware and software components/modules which automate the field artillery command and control system. TACFIRE has provided a significant improvement in the accuracy, responsiveness and management of artillery assets on the battlefield over that obtainable with the manual system. Further enhancements of the capabilities provided by TACFIRE can be accomplished through an evolutionary incorporation of user required improvements to the system. The user has identified three specific improvements to the existing system which must be made in order to meet new functional requirements and to increase the flexibility and effectiveness of the current system. These improvements, in order of priority, are; (1) better communications management, (2) the availability of processing capability at remote locations, and (3) a reduction in the size and weight of the fire direction center subsystems and the elimination of existing environmental restrictions. These three improvements represent the three steps of the planned modular improvement program. The TACFIRE communications management hardware has proven to be a limiting factor of the current system. To provide the required improvement, a new communications control system will be developed to replace the current system. The new system will put all message structures under software control in a front end processor, and will provide for the expansion of the communication net capability beyond the seven that are currently available. The new system will also allow the operator of the Fire Direction Center to program any input/output terminal to match the subscribing communication system, thereby eliminating the current need for hardware adapters to efficiently match new communications systems. The increased data receipt and distribution capability of this new system will contribute significantly to the effective use of target information, the speed of response, and the neutralization of enemy targets. TACFIRE remote device processing capability is another improvement required to support more effective artillery operations. At the present time, TACFIRE remote devices do not possess the data base or the processing capability needed to optimally support the various using artillery elements. It is planned to provide the Fire Support Officers (FSO) with an intelligent terminal to replace the current Variable Format Message Entry Device (VFMED). With this new terminal, the FSO will be able to accomplish many of the Fire Direction Center processing functions at the FSO location. Functionally, the FSO has the responsibility for many of the calculations and decisions to support the combat mission. He currently uses the data base and processing power of the Battalion Fire Direction Center to accomplish his function. Advances in computer and memory technology permit automation of this function directly at the FSO's location. This would significantly improve system responsiveness and reduce reliance on a single Battalion Central processor, thereby reducing the vulnerability of the system to local attack. Remotable, briefcase size, input/output peripherals for the FSO device will permit the FSO to have ready access to the data base while he remains with the maneuver commander. Interactive graphics will contribute to the ease of operation and training retentivity. It is planned that the remote devices will utilize a subset of the previously developed communication control system hardware for communications management. The user has identified a need for improved system mobility and survivability. This requirement is satisfied in part, by the development effort planned for the remote devices. Improved mobility and reduced vulnerability of the Fire Direction Center (FDC) can be achieved through a reduction in the size of the FDC hardware and the installation of this hardware in vehicles that are common to the supporting forces. The development effort planned for the communications control system will significantly reduce the space required for

Program Element: #2.37.26.A
DOD Mission Area: #212 - Fire Support

Title: TACFIRE Modular Improvement Program
Budget Activity: #4 - Tactical Programs

the communications management hardware. Other development efforts currently underway, and the improved technology that will be available within 5 to 6 years will be used to reduce the size and improve the performance of the remaining TACFIRE first generation components. Replacement of the current TACFIRE FDC components with smaller, more rugged devices incorporating the latest technology will increase system mobility and survivability and contribute to the ease of operations and the retention of training. This modular improvement program accomplishes the required upgrading of each of the current subsystems of TACFIRE in order of user priority, and provides a system which will satisfy user requirements into the 21st century.

G. (U) RELATED ACTIVITIES: The following provides information on current US and foreign development efforts which may be applicable to this program:

1. (U) A standard, 32 bit militarized computer is being developed in Program Element (PE) 6.27.46.A, Project A094, Tactical ADP Technology, and PE 6.37.23.A, Command and Control, Project D101, Tactical Automation. This computer is scheduled to enter production in FY86 and, if available, will be used to replace the current TACFIRE processor (AN/GYK-12). Since no central processing unit will be developed under this PE, duplication of effort cannot occur.

2. (U) Under PE 6.47.27.A, Command and Control, Project D183, Tactical Display System, a cooperative development program is in progress between the US and the Republic of Germany for the development of a large screen, electronic, flat panel display. The technology being developed will support the replacement of two large displays in the current system with a single display. Duplication will be avoided through exchange of letters, reports, and visits.

3. (U) The Marine Corps is developing the Marine Integrated Fire and Air Support System (MIFASS). Because of differences in doctrinal and operational need, the total Marine Corps System is not expected to satisfy Army requirements. Subsystems of MIFASS will be evaluated by the Army, however, to determine whether these subsystems can be adapted to meet the improved TACFIRE system needs. Duplication will be avoided through close liaison between offices, through letters, visits, and analysis of technology and hardware as it is developed.

4. (U) Both the United Kingdom and Germany are developing systems which approximate the current functions of TACFIRE. Although doctrinal differences may result in the selection/development, by these countries, of equipment that is unsuitable for US Army needs, subsystems of these systems will be evaluated for potential use in the improved TACFIRE. Duplication will be avoided by frequent visits between offices, and analysis of technology and hardware as it is developed.

H. (U) WORK PERFORMED BY: Contractor effort will be initiated on this program in FY81. It is planned to competitively award separate contracts for the development of each of the subsystems of TACFIRE and for program support efforts such as systems

Program Element: #2.37.26.A
DOD Mission Area: #212 - Fire Support

Title: TACFIRE Modular Improvement Program
Budget Activity: #4 - Tactical Programs

engineering and verification and validation. A total of twelve contracts, ranging in value from $3 to $30 million, are currently anticipated. The in-house developing agency is the US Army Communications Research and Development Command (CORADCOM), Ft Monmouth NJ.

1. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: Not Applicable

2. (U) FY 1980 Program: Not Applicable

3. (U) FY 1981 Planned Program: The TACFIRE Modular Improvement program is planned to begin in FY81. A systems engineering contract will be awarded early in FY81 to analyze the user's needs, develop supporting rational for required functional and material changes to meet those needs, and define subsystem electrical and software interface requirements. The contractor will prepare technical documentation for individual subsystem improvements, starting with the subsystem for communications management improvement. A contract for the communication subsystem improvement will be awarded. System software modifications will be initiated to allow the TACFIRE program to accommodate the communication system improvement.

4. (U) FY 1982 Planned Program: The systems contractor will continue to analyze user needs, concentrating on the detailed functional characteristics of new intelligent terminals to improve system responsiveness to the commander's needs. The communication management subsystem contractor will begin assembly of a brassboard model to be incorporated in the present TACFIRE for test bed tests planned for mid FY83. A contract will be awarded for a verification and validation effort. This contractor will design adequate tests to identify any shortcomings of the brassboard design when tested in the test bed in FY83.

5. (U) Program to Completion: The systems contractor will continue to define the details of the functional and material improvements to be made to TACFIRE to allow the system to be fully responsive to the user's projected needs into the 21st century. Each of the improvements will be thoroughly tested in a test bed of operational TACFIRE hardware and software now coresident with the user at Ft Sill, OK. The user will be given the opportunity for hands on examination of the improvements prior to design finalization and subsequent formal tests. Additionally, selected subsystems will be evaluated in the interoperability test bed for automated systems scheduled to be operational at Ft Hood in 1981.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #2.37.30.A Title: CHAPARRAL
DOD Mission Area: #213 - Ground Air Defense Budget Activity: #4 - Tactical Programs

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	475	6052	20590	19003	13825	144145
	QUANTITIES						
	Fire Units						5
	Missiles						163
D697	CHAPARRAL	475	6052	20590	19003	13825	144145

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program provides for the development of missiles, ground support equipment and system improvements for the CHAPARRAL Air Defense Missile System. The CHAPARRAL system is a short range (SHORAD), self-propelled missile system which employs infrared homing guidance. The mission of the system is to provide low altitude air defense for the forward elements of the field army, including infantry, mechanized infantry and armored divisions, and the theater/corps rear area. The system has been operationally deployed since 1969. Although ROLAND will replace some CHAPARRAL systems in the theater/corps rear area in [redacted] CHAPARRAL is expected to be retained as the divisional SHORAD missile system into the 1990's. Because of this retention, certain critical system improvements are required to meet the threat. These improvements include the capability to engage targets at night and a much improved capability to engage targets

C. BASIS FOR FY 1981 RDTE REQUEST: Funds are requested to complete the development of a Forward Looking Infrared (FLIR) subsystem for the CHAPARRAL ground equipment and to initiate development of an improved guidance section for the CHAPARRAL missile. The FLIR subsystem will give the system a night firing capability, permitting needed round-the-clock protection for the forward area. The improved guidance section, which will be based upon the Passive Optical Seeker Technique (POST) Rosette Scan guidance concept under development for STINGER, will enable the system to operate against

Program Element: #2.37.30.A
DOD Mission Area: #213 - Ground Air Defense

Title: CHAPARRAL
Budget Activity: #4 - Tactical Programs

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1980 Submission
CHAPARRAL RDTE Program Initiated	February 1965	February 1965
Initial Operational Capability	November 1969	November 1969
System Type Classified	November 1970	November 1970
Improved CHAPARRAL Missile (less smokeless motor) Type classified standard	November 1974	November 1974
Initiated Identification, Friend or Foe (IFF) Development	July 1975	July 1975
Initiated Smokeless Motor Development	November 1975	November 1975
IFF Approved for Production	September 1977	September 1977
Smokeless Motor Approved for Production	March 1980	June 1978
Initial Operational Capability (IOC) for Improved CHAPARRAL Missile (less Smokeless Motor)	1QFY1979	1QFY1979
IOC Smokeless Motor		
IOC Identification Friend or Foe (IFF)		
IOC Forward Looking Infrared (FLIR) Subsystem		

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Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1980 Submission
Initial Operational Capability (IOC)		None
POST Rosette		

The change in the smokeless motor production decision and IOC results from a propellant embrittlement problem which appeared in several motors late in the government test program. A root cause analysis has been completed and a fix identified. Testing is underway to verify the adequacy of this fix. Full production release is expected in March 1980. The change in the Identification, Friend or Foe (IFF) IOC resulted from a delay in completing the initial buy contract negotiations and award. This was due primarily to an excessive contractor quotation. Contract award was made in June 1979. The change in IOC for the forward looking infrared (FLIR) subsystem is due to a projected second quarter FY 1980 development contract award rather than a first quarter FY 1980 award which was assumed in last year's budget submission.

D. (U) BASIS FOR CHANGE BETWEEN FY 1981 AND FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1979	FY 1980	FY 1981	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	475	6052	20590	32828	144145
Funds (as shown in FY 1980 submission)	100	6052	0	6000	96352

The increase in FY 1979 was caused by a requirement for additional development work on the smokeless motor to correct the propellant embrittlement problem. The increase in FY 1981 reflects $7.103M funds needed to complete FLIR development and $13.487M to initiate development of the Passive Optical Seeker Technique (POST) Rosette guidance section. The funds for completion of FLIR subsystem development represent an unfunded requirement from last year, a portion of which ($6.0M) was shown in the additional to completion line for the FY 1980 submission. The increase in the additional to completion reflects the funding requirement to complete development of the POST Rosette guidance section.

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E. (U) OTHER APPROPRIATION FUNDS: ($ in thousands)

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional To Completion	Total Estimated Cost
Missile Procurement, Army						
Funds (current requirements)	35096	3200	3400	3600	251400	713600
Funds (as shown in FY 1980 submission)	34700	3200	3200	3300	6700	464600
Quantities (current requirements)						
Missiles	850	0	0	0	3000	16320
Fire Units	0	0	0	0	0	500
Quantities (as shown in FY 1980 submission)						
Missiles	850	0	0	0	0	13320
Fire Units	0	0	0	0	0	500

The increase in FY 1979 funds represents a portion of a cost growth in the missile production program. The cause of this cost growth was due to two factors: (1) A schedule stretchout resulting from a printed circuit board conformal coating problem; (2) unforeseen difficulties with vendors supplying critical components for the missile. The conformal coating problem surfaced in the initial production contract for the Improved CHAPARRAL missile, which was a foreign military sales payback buy in FY 1976. This in turn caused schedule delays and accompanying cost growths in the follow-on missile buy contracts in FY 1977, FY 1978, and FY 1979. The problem has been completely resolved and production is proceeding smoothly. Increases in FY 1981 and FY 1982 reflect the application of new inflation indices to previous estimates. The increase in additional to completion funds results from the addition of 524 replacement rocket motors in FY 1985, the addition of 3000 CHAPPARAL missiles, and the application of new inflation indices to previous estimates in FY 1983 and FY 1984 for replacement rocket motors.

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F. 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 field 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 deployed 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 theater/corps rear areas, such as airfields and other 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, and a heavy smoke trail. 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, and blast fragmentation warhead. A smokeless missile motor, which may be utilized with either the basic or improved missile versions, is scheduled to enter production this year. The AN/DAW-1 Guidance Section provides an all aspect forward hemisphere firing capability, increases the system's close-in engagement capability, has improved producibility and gives the missile a significant capability against
The AN/DAW-1 is also capable of
The DIDO fuze has such and coupled with the new warhead, provides increased lethality for the missile. The smokeless missile motor 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 CHAPARRAL system currently relies on visual target identification; however, a crypto-secure Mark XII, Identification Friend or Foe(IFF) set has been developed for the system, is in production, and will begin reaching the field in The system still relies upon visual techniques for target detection and acquisition. Therefore, the engagement of targets is precluded at night and is limited under other conditions of reduced visibility such as haze. A development program for a thermal imaging Forward Looking Infrared (FLIR) subsystem was initiated in FY 1980 to alleviate this limitation. The FLIR subsystem will more than double the time the system is capable of operating. Studies performed by the user in 1979 concluded that CHAPARRAL will remain in the Division into the 1990's and that the Passive Optical Seeker Technique (POST) Rosette Scan guidance concept being developed for STINGER should be incorporated in the CHAPARRAL missile
A development effort is to be initiated in FY 1981 for this improvement.

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

H. (U) WORK PERFORMED BY: The CHAPARRAL ground support equipment was developed and procured through 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 through the Navy with the guidance section being contracted to Raytheon, Bedford, MA. The Improved CHAPARRAL Missile (MIM-72C) was developed and procured through Ford Aerospace. The contractor for the CHAPARRAL carrier, M730, which is provided as government furnished equipment to Ford Aerospace, is Food Machinery Corporation (FMC), San Jose, CA. Ford Aerospace will be the prime contractor for the FLIR and POST guidance section improvement efforts, with Texas Instruments Incorporated, Dallas, TX and General Dynamics Corporation, Pomona Beach, CA as major subcontractors respectively. The US Army Missile Command, Huntsville, AL is the in-house developing organization responsible for the program.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1979 and Prior Accomplishments: CHAPARRAL development began in February 1965. The first tactical CHAPARRAL unit was deployed in November 1969 and the system was type classified standard in November 1970. The Improved CHAPARRAL missile was developed to alleviate limitations in the basic missile, limitations which were known at the time the system was fielded. The improvements incorporated by the improved CHAPARRAL missile are the all-aspect AN/DAW-1 guidance section, Directional Doppler (DIDO) fuze and blast fragmentation warhead. The improved missile was type classified standard in November 1974. A program to develop a prototype target acquisition aid (TAA) to permit the system to engage targets at night was completed in December 1974. TAA would eventually become the foundation for development of FLIR common modules, which are being utilized in the current FLIR subsystem development program for CHAPARRAL. The AN/DAW-1 guidance section as originally designed was . In 1975 the US Army Missile Command (MICOM) conceived and evaluated a fix designated GOLDEN, which provided a significant capability against GOLDEN also provided some capability against Following a firing program and refinement of the design, GOLDEN was incorporated into the improved missile through engineering change proposal. Improved CHAPARRAL missiles incorporating GOLDEN were fielded in November 1978. An Identification Friend or Foe (IFF) Development program began in July 1975. The development concept called for integration of the IFF interrogator and programmer developed for STINGER (replacement of REDEYE), with an antenna, electronic controls and interconnections developed especially for the CHAPARRAL fire unit. The Identification Friend or Foe (IFF) was type classified standard and approved for

production in September 1977. Procurement began in FY 1979. A development program for a smokeless motor was initiated in November 1975 and is essentially complete. Production of this motor should begin in March 1980. 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 program was completed on schedule in July 1978.

2. (U) FY 1980 Program: The FY 1980 program will focus on the development of a night firing capability for the CHAPARRAL system. The current system is limited by the ability of the gunner to visually detect the target. This limitation is to be alleviated by the addition of a Forward Looking Infrared (FLIR) thermal imaging subsystem on the CHAPARRAL fire unit which will more than double the time during which the current system can operate. Design, development, and documentation of the FLIR subsystem, which includes optics, infrared sensor and imaging unit, controls, visual target display, autotrack circuit and system interfaces, will be initiated. Necessary changes to the system's field maintenance test equipment will be identified and the required design, development and documentation of these changes initiated. Fabrication, assembly and integration will be initiated for six prototype fire units with FLIR subsystems and six modification kits for the system's field maintenance test equipment. Contractor tests will be started. The logistics support and reliability and maintainability plans will be initiated. The plan for government test will be prepared.

3. (U) FY 1981 Planned Program: The development effort for the FLIR subsystem will be completed. Efforts will focus on testing of the FLIR hardware to determine its suitability for use and production. Testing will be conducted under a single integrated test program (SITP) which provides for a single test to satisfy contractor and government requirements. The government portion of the SITP will include sufficient aircraft acquisition and tracking missions and live missile firings to confirm system performance under field conditions. A development program will be initiated for a new guidance section for the CHAPARRAL missile. This development program will be based upon the Passive Optical Seeker Technique (POST) Rosette Scan concept employed in the STINGER-POST program. Contractor design efforts will be initiated for the guidance electronics necessary to adapt the POST concept to CHAPARRAL. Three breadboard electronics packages will be fabricated. Seventy-two POST Seeker heads will be procured for the fabrication of test missiles. The government will initiate the development of test plans and perform initial component and subsystem level testing.

4. (U) FY 1982 Planned Program: The design and development effort on the POST guidance electronics will be continued by the contractor. Contractor testing of the breadboard electronics will be completed. Fabrication and testing of the flight configuration electronics will be initiated. Government tests will be conducted to determine the compatability of the electronics with the missile fuze and existing guidance hardware to be retained. Limited environment tests will be performed by the government on the prototype hardware. The necessary targets, telemetry and support equipment for conducting development/operational testing will be procured.

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5. (U) Program to Completion: The development of the POSF guidance section improvement will be completed. The design manufacture, and test of the flight hardware will be completed by the contractor. The contractor will also complete the technical data package, prepare the engineering change proposal for submission to the government and support the Development Test II/Operational Test II (DTII/OTII). The major government effort will be to conduct the DTII/OTII. Simulation to include hardware-in-the-loop will be conducted as required to prove out the suitability of the hardware.

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J. (U) TEST AND EVALUATION DATA:

1. (U) Development Test and Evaluation:

a. A combined Engineering Design Test/Military Potential Test (EDT/MPT) of the CHAPARRAL system was initiated in March 1965 and was completed in August 1965. The major objectives of the test were to determine the technical feasibility of the CHAPARRAL system concept, to validate system performance, and to determine the military potential of the system as an interim forward area air defense weapon for deployment in Europe. The EDT/MPT concluded that it would be technically feasible, with low to moderate risk, to field the interim CHAPARRAL system within the established timeframe, which was activation of the first battalion by July 1967 and initial deployment to Europe by January 1968. Based on the favorable results achieved, the CHAPARRAL missile and associated test equipment were approved for limited production classification in September 1965. The fire unit and associated test equipment were approved for limited production in November 1965. The original system design concept called for an unsophisticated assemblage of the following off-the-shelf hardware slightly modified for the CHAPARRAL mission: M113 armored personnel carrier with minor structural modifications to support a mount on its roof, the M45 quad-50 machinegun mount modified to support and fire four missiles and provide environmental protection to the gunner, Navy 1AU-7A Launch rails installed on the M45 mount, and SIDEWINDER 1C missiles slightly modified to accommodate firing from the ground at zero initial velocity. Under the original test plan, the engineering design test program was to be conducted by the US Army Missile Command (MICOM) to produce a vehicle-mounted prototype system, which would then be subjected to military potential tests by the US Army Test and Evaluation Command. However, time constraints and technical problems with the vehicle led to the decision to conduct the combined EDT/MPT using a Navy-developed demonstration mount, which was transported to the various test sites on an M-20 trailer. Engineering design studies of a modified XM-548E1 logistics vehicle, as an alternative to the M113 vehicle, were conducted concurrently with EDT/MPT and resulted in the delivery of the prototype system in August 1965. Additional engineering design tests were conducted on this system during the subsequent two years, to include road test and environmental qualification. It was intended that the test hardware resemble as closely as possible the ultimate hardware configuration. However, with the limited time available, it was expected that changes would be required as a result of testing and that these changes would be incorporated and tested in subsequent test phases. The prime development contractor for CHAPARRAL was Ford Aerospace and Communications Corporation (formerly Aeronutronic Ford), Newport Beach, CA. The US Naval

Weapons Center (NWC), China Lake, CA, developer of the SIDEWINDER, provided technical support. Range facilities at NWC were used for the firing portion of EDT/MPT. Non-firing tests were conducted at NWC's Coso Range and at Dona Ana Range, NM. The Navy supplied missile hardware under military interdepartmental purchase request. Military personnel from the US Army Air Defense Board, Fort Bliss, TX, participated in all phases of MPT/EDT. Fourteen firings were conducted, five of which were fully successful. Four other firings were considered partially successful in that they were within an acceptable miss distance No reliability, availability, and maintainability goals had been established at the time of this test phase.

b. (U) Engineering Test (ET) and Service Test (ST) were initiated in May 1967. ST was completed in August 1969 and ET in April 1970. Initial Production Test (IPT) (service phase) was integrated with ST in January 1968 and completed therewith. A Tropic Environmental Test was conducted from July 1968 to February 1970, and an Arctic Environmental Test was conducted from October 1969 to February 1970. The objectives of these tests were to determine the suitability of the CHAPARRAL system for Army use and issue, including the Tropic and Arctic regions. These tests revealed three major deficiencies:

(1) (U) The canard restraining shear pins in the missile consistently failed; (2) the lefthand trigger assembly in the fire unit failed creating a safety hazard; (3) the reliability of the AN/DSM-79 missile test set was unacceptable. These deficiencies were subsequently corrected and fixes verified in follow-on testing. All of the major end items associated with the CHAPARRAL system were tested including the fire unit, missile, and support equipment. The equipment tested consisted of engineering models and early production models, and except for changes made to correct problems noted during testing, was the same hardware as that procured for tactical deployment. The prime development contractor for this test phase was Ford Aerospace and Communications Corporation, Newport Beach, CA. The Navy provided CHAPARRAL missiles and associated test equipment through military interdepartmental procurement request. Engineering Test (ET) was conducted at White Sands Missile Range, NM, by technical personnel. Service Test (ST) was conducted at Fort Bliss, TX, by military personnel from the Air Defense Board. Tropic Test and Arctic Test were conducted at the US Army Tropic Test Center, Fort Clayton, CZ, and US Army Arctic Test Center, Fort Greely, Alaska, respectively, by military personnel. A total of 11 CHAPARRAL systems (fire units) were involved in these tests, five engineering models and six production models. A special in-process review for the system was held in September 1969, and based upon testing completed at that time, the system was determined to be suitable for Army use and issue worldwide. A total of 79 missiles were fired during this test phase thirty-seven of which were successful. The engineering test included the following environmental qualification tests: low and high temperature operation and storage, humidity, thermal shock, vibration, electromagnetic radiation, and nuclear effects.

c. The MIM-72C Improved CHAPARRAL missile was developed to alleviate technical limitations in the MIM-72A basic version, limitations which were known at the time the system was designed. The improvements incorporated by the MIM-72C are the AN/DAW-1 guidance section, Directional Doppler (DIDO) fuze, and blast fragmentation warhead. Prototype and engineering

tests of the MIM-72C Improved CHAPARRAL missile were conducted from May 1971 through July 1973. Nine of 11 firings were successful, eight of which were contact hits on the target. A Product Improvement Test (PIT) equivalent to Development Test II (DT II), was conducted during the period November 1973 through December 1974. The objective of PIT was to determine the degree of improvement provided by the improved missile over the Basic CHAPARRAL missile. Testing did not reveal any major deficiencies. However, it was noted that the AN/DAW-1 guidance section, as designed,

A fix for this limitation was subsequently developed and is discussed below. The missile tested included the three components identified above (AN/DAW-1 guidance section, DIDO fuze and blast fragmentation warhead); rocket motor, safe and arm device and wing assembly which were unchanged from the basic CHAPARRAL missile; and a fin assembly from the Basic missile which was slightly modified to improve missile response. Testing was conducted with preproduction prototype missiles built with hard tooling. The development contractor for the improved missile was Ford Aerospace and Communications Corporation, Newport Beach, CA. The PIT included two phases, a service phase with troops by the US Army Air Defense Board, Fort Bliss, TX, and an engineering phase with technical personnel at White Sands Missile Range, NM. A Production Validation In-Process Review was conducted in November 1974, and based upon testing completed to that point, the improved missile was type classified standard and approved for production. The service test phase utilized 14 missiles. The engineering phase utilized 79 AN/DAW-1 guidance sections, 67 DIDO fuzes, and 36 blast fragmentation warheads. A total of thirty-nine missiles were fired in the test program. Thirty-six were successful. Two of the three failures were due to problems related to the production process and one was due to random component failure. All three problems were subsequently corrected. The reliability, availability, and maintainability (RAM) goal was to demonstrate that the improvements made to the missile did not degrade overall system RAM. In every case, improved missile RAM equaled or exceeded that of the basic missile. The items evaluated in development testing were the same as those used in operational testing and, except for the fix

were the same as the items procured. The engineering test phase included the following environmental qualification tests: high and low temperature operation and storage, thermal shock, vibration, humidity, rain, and dust. No major environmental deficiencies were noted.

d. A fix designed to provide the AN/DAW-1 guidance section with the capability to was developed and tested during the period January to December 1975. This fix was later to be designated GOLDEN I. The effort culminated with the successful firing of four CHAPARRAL missiles incorporating GOLDEN I against These firings confirmed that the GOLDEN I fix provided the CHAPARRAL with a throughout much of the launch boundary. During testing, it was found that GOLDEN I could be further optimized, and in April 1976 a development effort was undertaken for that purpose. Five additional firings were conducted by White Sands Missile Range in connection with this effort, four of which were successful and confirmed predictions of improved performance over GOLDEN I. The single failure resulted from the inner launch boundary being exceeded and was in no way connected with the AN/DAW-1 GOLDEN fix. Based upon these test results the optimized GOLDEN was incorporated into the improved missile through engineering change proposal.

e. An Initial Production Test (IPT) Test (equivalent to Development Test III/Operational Test III) for the improved missile was initiated in August 1977. The primary objective of the test was to determine if the improved missile was suitable for issue. However, a second objective was to confirm further the performance of the GOLDEN fix. Testing was suspended in December 1977 due to a printed circuit board conformal coating problem which was subsequently isolated to the production process. Following correction of this problem, the IPT was resumed in August 1978 and was completed in October 1978. No additional major deficiencies were noted. The missiles tested were production configuration versions of those described in the Product Improvement Test discussion. All subsystems and support equipment were available for the test. The prime contractor for development and production of the improved missile was Ford Aerospace and Communications Corporation, Newport Beach, CA. Testing was conducted by technical personnel at White Sands Missile Range, NM. A decision review was held November 1978, with the developer, user, tester, and Logistics Evaluation Agency participating, and based upon the test results, the improved missile was released for issue. A total of 22 missile firings were attempted during the IPT, of which were completely successful. of the remaining firings were classified as

This problem has been corrected, and all missiles being produced have the fix in them. ' The test included the complete range of environmental qualification tests.

f. (U) A development program was initiated November 1975 for a smokeless rocket motor. The objective was to reduce the CHAPARRAL system's battlefield signature and alleviate the gunner obscuration problem caused by residual smoke. The development test program was conducted under a single integrated test program (SITP) concept covering all phases of testing by the contractor and the government. The SITP provided for a contractor phase (Prototype Qualification Test-Contractor (PQT-C)), followed by a government phase (Prototype Qualification Test-Government (PQT-G)). For both phases, there was consultation in test planning, representation by each agency during test conduct and sharing of test data. Each agency, however, performed its own evaluation of the test data and prepared its own test report. The PQT-G, which was equivalent to a Development Test II (DT II), was conducted during the period October 1977 to October 1978. The objectives of the test were to determine: (1) the flight performance of the motor as compared with the old motor, (2) the motor's safety characteristics, (3) the compatibility of the motor with other missile components, (4) the smoke characteristics of the motor, and (5) the motor's reliability as compared to the old motor. Testing revealed one major deficiency, which was embrittlement of the propellant when subjected to low-temperature cyclic aging tests. The smokeless motor tested was identical in external appearance to the existing CHAPARRAL motor. The propellant formulation, nozzle, and igniter are new designs. Except for changes to correct the deficiency noted above, the motor tested was the same as what will be procured. There were no subsystems or support equipment unavailable for testing. The development contractor for the smokeless rocket motor was Hercules Incorporated, Cumberland, MD. A review of the

smokeless rocket motor program held in September 1978 concluded that the motor meets all requirements except for the propellant failure problem noted in low-temperature cyclic aging tests. A root cause analysis of this problem has been completed and a fix identified. Pending the outcome of a retest which is currently in progress, the motor will be released for full production in March 1980. A total of 52 motors were tested. Twenty-seven firings (17 static and 10 full-up) of the motor were conducted, all of which were successful. The reliability, availability, and maintainability goals were to demonstrate that the operational reliability and availability levels were equal to or greater than those for the basic motor, and that the maintainability requirements of the smokeless motor did not exceed those of the basic motor. These goals were met, and the point estimate of reliability for the smokeless motor was determined to be 100 percent. The motor was subjected to the complete range of environmental qualification tests, including high and low temperature storage, humidity, salt, thermal shock, and cyclic aging at low and high temperatures. Except for the embrittlement problem previously indicated, no problems were noted.

g. A product improvement program was initiated in July 1975 to provide an electronic identification friend or foe (IFF) capability for CHAPARRAL. testing was conducted under a single integrated test program (SITP) concept, in a manner similar to the smokeless motor test program. The government portion of the SITP, a Product Improvement Test-Government (PIT-G), was conducted during the period February-September 1977. The overall objective of the test was to determine if the IFF hardware design and performance were suitable for the initiation of production. Testing demonstrated that the IFF hardware meets the essential user requirements with the exception of

The hardware tested consisted of the complete IFF subsystem. The subsystem includes an interrogator, programmer and interrogator simulator developed for STINGER, and CHAPARRAL unique items consisting of an antenna and interconnecting cables. The test was conducted with engineering model hardware which was not significantly different from the procurement configuration hardware. There were no subsystems or support equipment unavailable for test. The development contractor for total effort was Ford Aerospace and Communications Corporation, Newport Beach, CA. Teledyne Electronics, Newbury Park, CA, developed the STINGER-common items. Engineering-oriented tests were done at Camp Pendleton, CA, Fort Huachuca, AZ, White Sands Missile Range, NM (WSMR), and Newport Beach, CA, primarily by technicians. User-oriented tests were conducted at Fort Bliss, TX, with troops. A decision review was held in September 1977 with the developer, user, tester, and Logistics Evaluation Agency participating. Based upon the test results, the decision was made to type classify the IFF as standard and place it into production. The test hardware included 17 interrogator units, four programmer units, five simulator units, and 10 kits of CHAPARRAL-peculiar hardware. The PIT-G included the following environmental qualifications test by WSMR: low temperature operation and storage, altitude, humidity, thermal shock, mechanical shock, and vibration. All hardware performed satisfactorily except for the interrogator which did not completely comply with the requirements for low temperature. The problem has since been corrected.

h. (U) 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 firing phase was conducted during March and April 1978 at White Sands Missile Range, NM, by government and contractor technical personnel. The demonstration hardware consisted of the current 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. A total of five adverse-weather CHAPARRAL missiles were fired against target drones in this program, all of which were successful. The program successfully demonstrated the feasibility of providing CHAPARRAL with an adverse-weather capability and was completed on schedule and within budget. However, the Army decided not to pursue further development of adverse-weather CHAPARRAL because ROLAND technical and funding problems had been essentially resolved.

i. (U) A product improvement program will be initiated in FY 1980 to add a Forward Looking Infrared (FLIR) subsystem to CHAPARRAL which will permit engagement of targets at night and during periods of reduced visibility. The development test program will follow a single integrated test program (SITP) concept, with a Product Improvement Test-Government (PIT-G) being conducted in mid-FY 1981. The major objectives of the PIT-G will be to: (a) determine the suitability of the FLIR subsystem for use; (b) confirm engineering performance characteristics; (c) determine hardware durability under field operating conditions and laboratory environmental conditions; (d) generate reliability, availability, and maintainability data; (e) determine the suitability of the man-machine interface. PIT-G will include a troop-oriented phase conducted by the US Army Air Defense Board, Fort Bliss, TX. The hardware utilized for testing will consist of engineering prototypes built as closely as possible to the final production configuration. All subsystems and support equipment are expected to be available for testing. Ford Aerospace and Communications Corporation, Newport Beach, CA, will be the prime development contractor. Texas Instruments Incorporated, Dallas, TX, will be a major subcontractor responsible for providing standard FLIR modules. The Army Project Manager is Colonel Harold E. Stubbs. A decision review will be held in fourth quarter FY 1981 to determine, based upon testing, whether the FLIR subsystem should be type classified standard and approved for production. The user, developer, tester and Logistics Evaluation Agency will be participants in this review. A total of six Forward Looking Infrared (FLIR) units will be built for testing. A minimum of four guided missile firings will be conducted. The reliability, availability, and maintainability (RAM) goal to be demonstrated is that the FLIR subsystem does not degrade overall CHAPARRAL system RAM. Environmental qualification tests will include high and low temperatures operation and storage, humidity, thermal shock, mechanical shock, and vibration.

j. (U) A development program will be initiated in FY 1981 for an improved guidance section for the CHAPARRAL missile. This improved guidance section will be based upon the Passive Optical Seeker Technique (POST) Rosette Scan guidance concept currently under development for STINGER. A Development Test II of the CHAPARRAL POST missile will be conducted during the period third quarter FY 1983 to third quarter FY 1984. The objectives of the test will be to:

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Budget Activity: #4 - Tactical Programs

(a) (U) Determine the suitability of the CHAPARRAL POST missile for use and production; (b) determine the performance of the CHAPARRAL POST missile relative to the MIM-72C improved CHAPARRAL missile in terms of engagement envelope, terminal accuracy, durability, reliability, maintainability, and handling characteristics; (c) evaluate the infrared countermeasures performance of the CHAPARRAL POST missile. The CHAPARRAL POST missile will essentially be an improved CHAPARRAL missile with redesigned guidance electronics and the POST seeker. The hardware tested will be engineering prototype configuration. However, except for changes to correct any problems noted during testing, the test hardware will be the same as what will be procured. It is expected that all subsystems and support equipment will be available for test. The prime development contractor will be Ford Aerospace and Communications Corporation. General Dynamics Corporation, Pomona Beach, CA, will be the contractor for POST Seeker head. Testing will be done at White Sands Missile Range by technical personnel. A total of 72 CHAPARRAL POST missiles will be built for testing. The firing program will consist of 42 firings. Test results from the STINGER-POST development test program will be utilized to the maximum extent possible. Testing by White Sands Missile Range will include the complete series of environmental qualification tests.

2. Operational Test and Evaluation: The US Army Operational Test and Evaluation Agency (OTEA) conducted Operational Test II (OT II) of the MIM-72C improved missile in two phases, a nonfiring phase in February 1974, and a firing phase in March 1974. The objective of OT II was to evaluate the operational effectiveness of the CHAPARRAL weapon system when equipped with improved missile. Testing concluded that the improved missile enhances the capability of the CHAPARRAL system to provide low-altitude air defense of the field Army and supported continuation of the product improvement program. The missile was determined to be [redacted] however, this problem was corrected by the incorporation of the GOLDEN modification discussed under development test and evaluation. The improved CHAPARRAL missile tested in OT II was the same as described above in the development test and evaluation. This missile was the same as the one procured with the exception of the GOLDEN modification and other minor changes to correct problems noted during testing. All subsystems and support equipment were available for testing except for the improved warhead which was not flown in operational firings due to a need to modify the design. Ford Aerospace and Communications Corporation, Newport Beach, CA, was the prime development contractor for the improved CHAPARRAL missile. The nonfiring portion of OT II was conducted at Fort Lewis, WA, and the firing phase was conducted at Fort Bliss, TX. Both phases were conducted by military personnel. The results of OT II were considered in the Production Validation In-process Review held in November 1974 for the improved CHAPARRAL missile. Based upon the results of DT II/OT II, the decision was made to classify the missile standard. The firing phase was planned to consist of 14 firings. Five of the first six firings were successful, and it was determined that sufficient data had been generated to satisfy firing phase objectives. Therefore, no further firings were deemed to be required. The following conclusions regarding reliability, availability, and maintainability were drawn: (1) Improved CHAPARRAL reliability will be improved over basic missile reliability; (2) the addition of the improved CHAPARRAL missile to the CHAPARRAL system does not adversely affect system maintainability; (3) system durability does not change as a result of the Improved CHAPARRAL missile product improvement.

Program Element: #2.37.30.A
DOD Mission Area: #213 - Ground Air Defense

Title: CHAPARRAL
Budget Activity: #4 - Tactical Programs

3. System Characteristics:

Operational/Technical Characteristics	Objectives	Demonstrated Performance 1/
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
Period of Operation	Continuous for 18-hour day.	Met
Mean Reaction Time	15 seconds.	Met
Launch Sequence	Less than 1 second.	Met
Energize System from Standby	Less than 40 seconds.	Met
Crew Size	Operate by one man; five man crew.	Met
Reload (rounds/minute)	Four missiles in five minutes	Met
Emplacement Time	45 seconds	Met
Launching Station Weight (empty)	10,000 pounds.	8,726 pounds
Minimum/Maximum Intercept Range		Met

Program Element: #2.37.30.A
DOD Mission Area: #213 - Ground Air Defense

Title: CHAPARRAL
Budget Activity: #4 - Tactical Programs

Operational/Technical Characteristics	Objectives	Demonstrated Performance 1/
Fuze: MIM-72A 2/	Function within effective kill radius of warhead, function on contact and provide self-destruct.	Met
MIM-72C 3/	Fuze/Warhead combination must be optimized for low altitude air threat.	Met
Warhead: MIM-72A	Compatible with overall mission criteria.	Met
MIM-72C	Fuze/Warhead combination must be optimized for low altitude threat.	Met
System Mean Effectiveness (Benign Environment)		

1/ MIM-72A performance was demonstrated during Engineering Test, Service Test, and Initial Production test. MIM-72C performance was demonstrated during Prototype and Engineering Tests, Development Test II/Operational Test II, and Initial Production Test.

2/

3/

FY 1981 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: #213 - Ground Air Defense

Budget Activity: #4 - Tactical Program

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	5142	10097	7412	3919	39046	235432
	QUANTITIES Missiles/Ground Support Equipment Sets						55/2
690	Surface-to-Air Missile HAWK/HAWK Improvement Program (SAM HAWK/HIP)	5142	10097	7412	3919	39046	235432

B. (U) 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 electronic countermeasures and antiradiation missile threat into the 1980's.

C. (U) BASIS FOR FY 1981 RDTE REQUEST: Funds in the amount of $7.412 million are required in FY81 to conduct system analysis in support of Army planning for the Improved HAWK Missile System including PATRIOT transition, Extended Life Studies and completion of the development effort on the Missile Electronic Countermeasures (ECM) Upgrade Product Improvement (PIP).

Program Element: #2.37.31.A Title: Surface-to-Air Missile HAWK/HAWK Improvement Program (SAM HAWK/HIP)

DOD Mission Area: #213 - Ground Air Defense Budget Activity: #4 - Tactical Program

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1980 Submission
Engineering Development Contract Awarded	November 1964	November 1964
Initial Operational Capability	November 1972	November 1972

D. (U) BASIS FOR CHANGE BETWEEN FY 1981 AND FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1979	FY 1980	FY 1981	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	5142	10097	7412	42965	235432
Funds (as shown in FY 1980 submission)	3143	10100	6420	0	187486

Change in Total Estimated Cost 48 million from FY80 to FY81 summary is as follows:

2.0 million increase in FY78 for Missile ECM Upgrade PIP.

2.0 million increase in FY79 for Missile ECM Upgrade PIP.

1.0 million increase in FY81 for HAWK Extended Life Study.

43.0 million increase (FY82 to FY85) is for the HAWK Project Office, System Analysis efforts, and extended life PIP's.

Program Element: #2.37.31.A

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

DOD Mission Area: #213 - Ground Air Defense

Budget Activity: #4 - Tactical Program

E. (U) OTHER APPROPRIATION FUNDS: ($ in thousands)

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional To Completion	Total Estimated Cost
Missile Procurement, Army:						
Funds (current requirements)	74698	36500	10000	4500	11700	1000100
Funds (as shown in FY 1980 submission)	72270	36500	9400	Not shown	11200	969670
Quantities						
Missiles/General Support Equipment Sets (current requirements)	608/0	197/0	0/0	0/0	0/0	5328/98
Missiles/General Support Equipment Sets (as shown in FY 1980 submission)	608/0	197/0	0/0	Not shown	0/0	5328/98
Military Construction, Army:						
Funds (current requirements)	0	0	0	0	0	1300
Funds (as shown in FY 1980 submission)	0	0	0	0	0	1300

(1) FY79 actual exceeded estimate due to the procurement of command support equipment.

(2) Change in FY81 and subsequent years due to inflation.

Program Element: #2.37.31.A

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

DOD Mission Area: #213 - Ground Air Defense

Budget Activity: #4 - Tactical Program

F. (U) 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 HIP provideq 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 FY73 to correct significant field problems and to enable the system to meet threat requirements into the 1980's.

G. (U) 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-16) 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 Agreement, contracted directly with US Industry to convert their HAWK assets to the Improved System. Under the US-Japan Coproduction Agreement, Japan is manufacturing Improved HAWK. Conversion of NATO Basic HAWK to Improved HAWK and production of Improved HAWK in Japan is proceeding on schedule.

H. (U) WORK PERFORMED BY: The Project is managed by the US Army Missile Command (MICOM), Huntsville, AL. It is conducted by contract and in-house efforts. The prime contractor is Raytheon Company, West Andover, MA. Other contractors are Westinghouse Electric Corporation, Baltimore, MD, and Applied Devices Corporation, Hauppage, NY.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1979 and Prior Accomplishments: The HAWK Improvement Program (HIP) was initiated in Nov 64 and engineering development was completed by the end of FY69. A series of flight test programs from Mar 70 to Sep 71 demonstrated the required performance and high reliability of the new missile and led to subsequent system type classification Standard A in Dec 71. The Secretary of Defense approved a Revised Program Memorandum on 10 Jan 72 and the procurement contract was signed on 14 Jan 72. A combined Development Test III/Operational Test III (DT III/OT III) was conducted from May through Jul 72 and led to a decision to field the system. The first battalion's formal Initial Operational Capability (IOC) was 10 Nov 72. Missile modifications were developed to increase missile capability against

Program Element: #2.37.31.A

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

DOD Mission Area: #213 - Ground Air Defense

Budget Activity: #4 - Tactical Program

Flight tests of these modifications were successfully completed in Jul 74 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 1980's was initiated in FY73. Development was completed on four improvements in FY77: (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 the Automatic Data Processor (ADP) in the Information Coordination Central which enhances the usefulness of the ADP in the area 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 Optical Tracking Adjunct 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. The Improved Continuous Wave Acquisition Radar (ICWAR) transmitter, Pulse Acquisition Radar Digital Moving Target Indicator (PAR DMTI), Army Tactical Data Link (ATDL), and In-board Commo product improvements were released for production in FY77, first production unit tests were completed in FY79 and fielding started in FY79. The Optical Tracking Adjunct System (TAS) was tested in Europe in FY78 and problems were identified requiring redesign of hardware and changes to factory and field procedures. Testing of the redesigned TAS and validation of the corrected procedures is planned for FY80. Development was terminated in FY77 on several improvements such as improved system mobility based on Army plans to field the PATRIOT system on an accelerated basis. The PAR Ultra Low Side Lobe Antenna (ULSA), designed to improve detection capability in an ECM environment, completed development and DT/OT II testing and a production decision is planned for FY80. Development continued on the Pulse Acquisition Radar Emission Control (PAR EMCON) modification to improve survivability of the IPAR in an ASM environment. Development was initiated on the Missile ECM Update Program. Development of the HPI RAM/EMCON PIP, to improve HPI availability, is continuing; technical problems encountered in the preproduction models have delayed starting DT/OT testing from FY79 to FY81. Block 10 Software was developed and tested successfully in a three-battery test.

2. (U) FY 1980 Program: Complete development of the IPAR EMCON PIP, continue development of the IHPI RAM/EMCON and Missile ECM PIP's, and initiate development of Block 11 Software. Perform coordinated testing of the PAR EMCON PIP and the Block 11 Software. Complete development testing of the redesigned TAS. In addition, HAWK will support other DOD programs with tests scheduled for both the Utah Test and Training Range and White Sands Missile Range. Both software blocks are scheduled for testing by the 32D AADCOM in Europe.

Program Element: #2.37.31.A

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

DOD Mission Area: #213 - Ground Air Defense

Budget Activity: #4 - Tactical Program

3. (U) FY 1981 Planned Program: Conduct Product Improvement Verification Testing (PIVT) for the HPI RAM/EMCON and TAS PIP's. Conduct the DT II for the Missile ECM PIP at WSMR.

4. (U) FY 1982 Planned Program: Initiate development of PIP's to extend the life of I-HAWK.

5. (U) Program to Completion: Complete development of the extended life PIP's.

Program Element: #2.37.31.A

Title: Surface-to-Air Missile HAWK/ HAWK Improvement Program

DOD Mission Area: #213 - Ground Air Defense

Budget Activity: #4 - Tactical Programs

J. (U) TEST AND EVALUATION DATA:

1. Development Test and Evaluation: The Improved HAWK Development Test II began with an Engineering Test/Service Test conducted January 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 (Raytheon Company, West Andover, MA) 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 1979 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	132 4/	[ ]	[ ]	[ ]
Annual Service Practice	Mar 74 Continuing	594 5/	[ ]	[ ]	[ ]

1/ Successful flights were those in which the test objectives were met.
2/ 756 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 modifications and were of several configurations to support differing test objectives and were therefore not scored as successful or failures.

4/ Five missiles in design limitation category (near miss) and one missile in ground support equipment (GSE) failure category.
5/ Seven missiles were in design limitation category and four missiles in GSE failure category.

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 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) optical tracking adjunct system (TAS). 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. 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. The optical tracking adjunct system was subjected to further testing in Europe from January thru May 1978. A review of the TAS program after the test indicated a concern over the tactical mean time between failure which led to a requirement for a detailed analysis of the failure causes. This analysis was followed by a redesign/retest effort, which will lead to a production decision in FY80. DT/OT testing of the IPAR Ultra Low Sidelobe Antenna product improvement was completed in FY79 and a production decision will be made in FY80. Development of emissions control of the IPAR continues, and coordinated DT/OT testing will begin in November 1979. Development of RAM and emissions control for the High Power Illuminator (HPI) is continuing with 960 hours of reliability testing completed. Technical problems encountered in the preproduction models have delayed DT/OT from FY79 to FY81. Block 10 software was tested in FY78 and FY79, and was approved for tactical use in August 1979. A three-battery test using block 10 software with fully operational Army Tactical Data links was completed in June 1979. The test demonstrated that the Army Tactical Data link can be successfully used to exercise fire control over PIP modified I-HAWK batteries.

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

Program Element: #2.37.31.A

Title: Surface-to-Air Missile HAWK/ HAWK Improvement Program

DOD Mission Area: #213 - Ground Air Defense

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test. These minor deficiencies have since been corrected. Reliability failure in out of eight missiles fired during the test indicated that normal handling by troops might adversely affect missile reliability. The Combat Development Command (CDC) recommended additional tests. Twenty-four FY 1970 missiles were subjected to extensive field handling. of these missiles successfully passed theater readiness monitoring facility (TRMF) tests. Five 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 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) optical tracking adjunct 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. 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. Follow-on testing of the optical tracking adjunct system was conducted in Europe, January thru May 1978. A review of this program after the test indicated concern over the tactical mean time between failure which led to an analysis of failure causes and subsequent redesign. A retest of the optical tracker including the design changes will be accomplished in FY80.

Program Element: #2.37.31.A

Title: Surface-to-Air Missile HAWK/ HAWK Improvement Program

DOD Mission Area: #213 - Ground Air Defense

Budget Activity: #4 - Tactical Programs

3. System Characteristics:

Operational/Technical Characteristics	Objectives	Demonstrated Performance 1/
Intercept Dead Zone (slant range-km)		
Max Intercept Range (slant range-km)		
Intercept Altitudes (km)		
Minimum		
Maximum		
Target Speed Handling Capability (M/Sec)		
Minimum		
Maximum		
Average Reaction Time (sec)		
Automatic Operation in Low Altitude, Non-Electroni Countermeasure (ECM) mode		
Missile Mission Reliability 4/		
Inherent System Availability (AL) 5/		
Systems Probability of Detection Evaluation and Transfer (PDET) (no ECM)		
Probability of Single Shot Kill (PSSK)(MIG-21), K-Kill		
Single Target (no ECM)		
Single Target in a Multiple Target Formation (no ECM) 6/		

Program Element: #2.37.31.A

Title: Surface-to-Air Missile HAWK/ HAWK Improvement Program

DOD Mission Area: #213 - Ground Air Defense

Budget Activity: #4 - Tactical Programs

Operational/Technical Characteristics	Objectives	Demonstrated Performance 1/
Single Target (ECM deception)	[ ]	[ ]
Single Maneuvering Target 2/		
Inherent System Effectiveness (ES)		
(Single Target, no ECM) 3/		

1/ *Improved HAWK test reports through 20 September 1979.*
2/

3/ Limited by target capability. Simulated tests show the development estimate can be accomplished.
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 Electronic Countermeasure (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.
7/ PSSK based on 13 live firings during lot acceptance tests.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #2.37.33.A
DOD Mission Area: #212 - Fire Support

Title: LANCE (Nonnuclear) Warhead
Budget Activity: #4 - Tactical Programs

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional To Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	4035	3343	1010	0	0	12175
	QUANTITIES (XM74)						To be determined
D231	LANCE Nonnuclear	4035	3343	1010	0	0	12175

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Develop improved munitions and incorporate them 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. (U) BASIS FOR FY 1981 RDTE REQUEST: To complete qualification and type classification (January 1981).

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1980 Submission
Begin Improved Bomblet Development	October 1976	October 1976
Improved Bomblet Final Design Selected	October 1978	October 1978
Begin Warhead Section Loading	December 1978	January 1979
Begin Development Testing	January 1979	August 1979
Complete Development Testing	January 1981	January 1981
Release for Production	January 1981	January 1981
Complete Production of Improved Nonnuclear LANCE Warhead Sections	July 1983	July 1983

Program Element: #2.37.33.A
DOD Mission Area: #212 - Fire Support

Title: LANCE (Nonnuclear) Warhead
Budget Activity: #4 - Tactical Programs

D. (U) BASIS FOR CHANGE BETWEEN FY 1981 and FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1979	FY 1980	FY 1981	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	4035	3343	1010	0	12175
Funds (as shown in FY 1980 submission)	5110	3346	1005	0	14362

FY79 decrease in funding is the result of reduced testing requirements precipitated by earlier test successes. FY80 decrease is the result of a general Congressional reduction. FY81 difference in funding level between the submissions is the result of refined cost estimates.

E. OTHER APPROPRIATION FUNDS:

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional To Completion	Total Estimated Cost
Missile Procurement, Army:						
Funds (current requirements)	01	0	1140	1360	0	2501
Funds (as shown in FY 1980 submission)	0	0	1760	236	0	17159
Quantities (current requirements)	0	0	0		0	
Quantities (as shown in FY 1980 submission)	0	0		0	0	

Funding for procurement of bomblets has been reapportioned over 2 years because of budget constraints. The increase in cost of the program is due most significantly to the increased cost of tungsten, the main ingredient of the bomblet.

Program Element: #2.37.33.A
DOD Mission Area: #212 - Fire Support

Title: LANCE (Nonnuclear) Warhead
Budget Activity: #4 - Tactical Programs

F. 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 NNL missiles, in FY 1977 and in FY 1978. The long-term objective of this improvement program is to double the effectiveness of the Nonnuclear LANCE Missile System with a unit price increase of $15 thousand (FY 1976 constant $) to be accomplished by development and incorporation of an improved munition.

G. (U) RELATED ACTIVITIES: The US Army Armament Research and Development Command, Dover, NJ, 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 has investigated and evaluated improvements to similar munitions. Similar efforts by other Services are coordinated with this program to preclude duplication of effort.

H. (U) 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 Metallurgical 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. (Anticipated Bidders Listed.) US Army Research and Development Command, Huntsville, AL, is responsible for the program.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 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. Development testing of the XM74 bomblet and system studies and analysis aimed at incorporation of the bomblet into the LANCE Nonnuclear Warhead Section were conducted. Contracts for missile and warhead components have been placed to support full-scale LANCE flight tests. Significant activities include selection of the Improved XM74 bomblet final design and system studies and analysis to support incorporation of the improved bomblet into the LANCE Nonnuclear Warhead Section. Full-scale LANCE flight tests will be conducted to qualify the improved bomblet in the LANCE system.

Program Element: #2.37.33.A
Title: LANCE (Nonnuclear) Warhead
DOD Mission Area: #212 - Fire Support
Budget Activity: #4 - Tactical Programs

2. (U) FY 1980 Program: A Development Test II/Development Test III flight test program will be conducted in FY 1980. This test program will lead to type classification of the Improved LANCE Nonnuclear Warhead. Tasks to be completed in FY 1980 are: development to qualify the improved bomblet for use in the LANCE system; system studies to assure all system performance operational requirements are met; and purchase of long-leadtime items to support flight test programs in subsequent years.

3. (U) FY 1981 Planned Program: Type classification is scheduled for January 1981. The improved munitions will be procured, and retrofit of the inventory of LANCE Nonnuclear Warhead Sections will begin.

4. FY 1982 Planned Program: Retrofit of warhead sections will continue and is scheduled for completion in July 1983 if modification procurements are approved in FY 81/82.

5. Program to Completion: Program to be completed with FY82 funding.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #2.37.35.A
Title: Combat Vehicle Improvement Program
DOD Mission Area: #211 - Close Combat
Budget Activity: #4 - Tactical Programs

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	7871	6000	14248	19399	Continuing	Not Applicable
	QUANTITIES						Not Applicable
DE01	M60A1 Tank Product Improvement Program (PIP)	7871	6000	4618	0	0	55831
D330	XM1 Tank Improvements	0	0	9630	19399	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program provides for early initiation of planned XM1 performance improvements, beyond the original XM1 tank performance requirements, responsive to future threat changes and technological opportunities. Also, provides for completion of development and testing of M60 tank training devices. These devices will significantly contribute to enhanced M60 crew proficiency between annual training periods.

C. (U) BASIS FOR FY 1981 RDTE REQUEST: Requested funds will provide for developing, engineering and testing of improvements and additions to the XM1 to include improved near term Nuclear, Biological, and Chemical (NBC) Protection, a Driver's Thermal Viewer, an Auxiliary Power Unit (APU), a Commander's Weapon Station and Thermal Viewer and Ballistic Armor Improvements. Also provides for completion of M60 training devices.

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1980 Submission
Training Devices		
M60A3 Unit Conduct of Fire Trainer (UCOFT)		
DT/OT II Completed	1QFY82	1QFY81
Production IPR	3QFY82	2QFY81

Program Element: #2.37.35.A
DOD Mission Area: #211 - Close Combat

Title: Combat Vehicle Improvement Program
Budget Activitiy: #4 - Tactical Programs

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1980 Submission
M60A3 One Station Unit Trainer (OSUT)		
DT II Completed	1QFY82	2QFY81
OT II Completed	1QFY82	3QFY81
Production IPR	3QFY82	4QFY81
M60A1 UCOFT		
Brassboard Test	1QFY82	Not Shown
DT II Completed	1QFY82	2QFY81
OT II Completed	1QFY82	3QFY81
Production IPR	3QFY82	4QFY81
Muzzle Position Sensor		
DT/OT I	Terminated	2QFY79
DT/OT II Completed		3QFY80
Production IPR		4QFY80
Adaption Hardware		
DT/OT II Completed	3QFY80	3QFY80
Production IPR	4QFY80	4QFY80
Auto Fire Extinguisher		
DT/OT II Completed	3QFY80	3QFY80
Production IPR	4QFY80	4QFY80

Reason for change: Contractual delays, as a result of integration of the XM1 and XM60 UCOFT contracts for greater cost effectiveness, resulted in program revisions and noted milestone changes.

Program Element: #2.37.35.A
DOD Mission Area: #211 - Close Combat

Title: Combat Vehicle Improvement Program
Budget Activity: #4 - Tactical Programs

D. (U) BASIS FOR CHANGE BETWEEN FY 1981 AND FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1979	FY 1980	FY 1981	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	1	6000	14248	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	9996	6600	4500	0	61739

FY79 change is due to termination of efforts to develop a Muzzle Position Sensor for the M60. Decrease in FY80 is due to a general Congressional reduction applied to the program. FY81 change is a result of the addition of the XM1 Improvement Program as a new start in FY81.

E. (U) OTHER APPROPRIATION FUNDS: ($ in thousands)

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional To Completion	Total Estimated Cost
Weapons and Tracked Combat Vehicles	Procurement, Army:					
Funds (current requirements)	132400	117400	99300	160900	89900	776700
Funds (as shown in FY 1980 submission)	132400	117400	129900	Not Shown	362800	914775
Quantities (current requirements): Modification kits -	Not Applicable					
Quantities as shown in FY80 submission)	Not Shown					

FY81, 82 changes are a result of changes in requirements among priority Army programs. Restructured program will achieve M60A3 operational objective one year later than originally planned (FY84).

Program Element: #2.37.35.A
DOD Mission Area: #211 - Close Combat

Title: Combat Vehicle Improvement Program
Budget Activitiy: #4 - Tactical Programs

F. (U) DETAILED BACKGROUND AND DESCRIPTION: The rapid modernization of Soviet tank forces, which shows no signs of slowing, has virtually eliminated the US quality edge. These gains have reduced US capability to counter, through qualitative superiority, the acknowledged Warsaw Pact numerical advantage in these systems. Essential to reversing this trend is correction of the operational deficiencies in our present M60 series tanks, fielding on schedule the superior XM1 tank, and introduction of subsequent XM1 performance improvements for the 1980's and beyond to maintain this superiority. The XM1, the US Army's first turbine-powered main battle tank, has twice the power, cross-country speed and mobility of current US combat tanks. Although it presently incorporates significant advances in crew protection, firepower, durability, reliability, agility, and maintainability, the XM1 is designed with growth potential in mind and can be adapted over time by evolutionary improvements to maintain its combative edge. The XM1 Product Improvement Program (PIP) will introduce time phased product improvements to the production line in groups called a "Package" so as to minimize cost while insuring effective configuration control. Three packages are currently planned for introduction into production in FY83, FY84, and FY86. The FY83 package introduces into the XM1 an Auxiliary Power Unit (APU) and improved Nuclear, Biological, and Chemical (NBC) protection. The FY84 package includes Armor Improvements, an improved Commander's and Driver's Thermal Viewer, a Heading Reference Unit (HRU), Signature Suppression and further NBC improvements. The FY86 package consists of further improved Signature Suppression (acoustic), a CO_2 Laser Rangefinder, an Automatic Muzzle Reference System, a Low Profile (LP) Antenna, an Evasive Target System, an NBC Overpressure System, an Advanced Techniques for Electrical Power Management Control and Distribution System (ATEP's) and Overhead Ballistic Protection. These packages will significantly enhance the XM1's survivability, fightability and overall effectiveness on the battlefield. Packages beyond FY86 will be responsive to threat developments. Retrofit of PIP's to vehicles in the field will also be controlled in Packages to once again control cost and minimize Integrated Logistics Support problems.

(U) The M60A1 tank, an improved version of the M60 tank, was type classified standard A in December 1961. The M60 series tank is currently in the last of its three-phase product improvement program and will be completed with all improvements with the exceptions of M60 trainer efforts during FY 1980. Included in this trainer effort are the Unit Conduct of Fire Trainers (UCOFT) for the M60A1 and M60A3, a movable classroom simulator used at battalion/squadron level to provide training in critical tasks performed by M60 series gunners and tank commander's and the One Station Unit Trainer (OSUT) for M60A3, a ten-station gunnery simulator for training large numbers of armor crewman in basic and advanced gunnery skills. These trainers are being developed jointly with the XM1 tank trainers.

G. (U) RELATED ACTIVITIES: Related, but nonduplicatory Army activities being conducted are as follows: Program Element (PE) 6.46.20.A-DG20, XM1 Tank System; PE 6.46.30A, Tank Gun Cooperative Development; PE 6.26.01.A, Tank and Automotive Technology; PE 6.36.02A, Advanced Land Mobility Systems Concepts; PE 6.36.31-D014, Combat Vehicle Turret and Chassis.

Program Element: #2.37.35.A
DOD Mission Area: #211 - Close Combat

Title: Combat Vehicle Improvement Program
Budget Activity: #4 - Tactical Programs

H. (U) WORK PERFORMED BY: In-house efforts on this program are accomplished by the Project Managers for XM1 and M60 tanks, Warren, MI; Project Manager for training devices, Orlando, FL; United States (US) Army Electronics Research and Development Command; Night Vision and Electro-Optics Laboratory, Fort Belvoir, VA; Tank Automotive Research and Development Command, Warren, MI; US Army Armament Research and Development Command, Dover, NJ. Major contractors are Chrysler Defense Engineering, Centerline, MI; Hughes Aircraft Company, Culver City, CA; Teledyne-Continental, Muskegan, MI; TX Instruments, Dallas, Texas; and Honeywell, Minneapolis, MN.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: In 1969, a Senior Officer Materiel Review Board recommended that the M60A1 tank be product improved. In 1971, the Top Loading Air Cleaner was introduced, followed by Add-On-Stabilization in 1972, T-142 Track in 1974, and the Improved Reliability Engine and Improved Electrical System in 1975. Passive Image Intensification Devices and a Deep Water Fording Kit were added in 1977. In 1978, the ANNVG-2 Laser Range Finder; the XM21 Solid-State Computer, the M239 Smoke Grenade Launcher, and the M240 Machinegun were incorporated. Additionally, development testing of the Muzzle Position Sensor continued; DT/OT II of the Engine Smoke Generator was completed. In FY 1979, the Tank Thermal Sight was incorporated; DT I for the Muzzle Position Sensor was completed, and full-scale engineering development on the sensor was terminated due to insufficient accuracy improvement. Development work on the Adaptation Hardware and Automatic Fire Extinguisher continued. Engine Smoke Generator was fielded and development of M60 training devices initiated.

2. (U) FY 1980 Program: All M60 product improvements with exception of M60 trainers will be completed. Testing of trainers will be initiated.

3. (U) FY 1981 Planned Program: Complete testing of trainers and make production decisions. Initiate XM1 system integration engineering efforts for the following improvement capabilities funded in FY81:

a. (U) Nuclear, Biological, and Chemical NBC Improvements (Near-Term): Provides for enhanced crew NBC protection by use of Vehicle Protective Paint, reduced crew compartment leakage, and installation of a Chemical Alarm, and Inertial Dust Separator for the crew compartment.

b. (U) Commander's and Driver's Thermal Viewer: Provides for greater visibility for both the Commander and driver during "dirty" battlefield conditions and/or night operations.

c. (U) Auxiliary Power Unit: Provides for an on-board electrical power source other than the main engine. This extends engine life, enhances the tank's silent watch capability, and reduces fuel consumption and operating costs.

Program Element: #2.37.35.A
DOD Mission Area: #211 - Close Combat

Title: Combat Vehicle Improvement Program
Budget Activitiy: #4 - Tactical Programs

d. (U) Commander's Weapon Station: Provides the Commander with improved weapon station capabilities both in terms of performance and human factors to more effectively fight the tank.

e. (U) Ballistic Armor Improvements: Provides for upgraded ballistic protection to meet advance weapon and munition threats.

4. (U) FY 1982 Planned Program: Continue FY81 improvement efforts. Start systems integration engineering efforts for a Heading Reference Unit (HRU) to assist crew to determine the tank's precise location on the battlefield. Also initiate efforts for integration of a CO_2 Laser Rangefinder, Low Profile (LP) Antenna, Signature Suppression, Advanced Techniques for Electrical Power Management Control and Distribution Systems (ATEP's) and Evasive Target Improvements to enhance the tank's survivability, first-round hit capability, and ability to more effectively operate on the battlefield.

5. (U) Program to Completion: Integration work will start in FY83 for an XM1 overpressure NBC system and Automatic Muzzle Reference System to further improve the tank's survivability and accurate fire capability. The first improvement production package will be introduced into production in FY83 followed by subsequent packages in FY84 and FY86. Improvements beyond FY86 will be identified in response to user needs to counter future threats.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D330 Title: XM1 Tank Improvements
Program Element: #2.37.35.A Title: Combat Vehicle Improvement Program
DOD Mission Area: #211 - Close Combat Budget Activity: #4 - Tactical Programs

A. (U) DETAILED BACKGROUND AND DESCRIPTION: The rapid modernization of Soviet tank forces, which shows no signs of slowing, has virtually eliminated the United States (US) quality edge. These gains have reduced the US capability to counter, through qualitative superiority, the acknowledged Warsaw Pact numerical advantage in these systems. Essential to reversing this trend is fielding, on schedule, the superior XM1 tank, and introduction of subsequent XM1 performance improvements for the 1980's and beyond to maintain this superiority. The XM1, the US Army's first turbine-powered main battle tank, has twice the power, cross-country speed, and mobility of current US combat tanks. Although it presently incorporates significant advances in crew protection, firepower, durability, reliability, agility, and maintainability, the XM1 is designed with growth potential in mind and can be adapted over time by evolutionary improvements to sustain its combative edge. The XM1 Product Improvement Program (PIP) provides for timely initiation of planned XM1 performance improvements beyond the original tank performance requirements to be responsive to threat changes which are certain to occur and to take advantage of technological opportunities. The PIP will introduce time-phased product improvements to the production line in groups called a "package" so as to minimize production costs while providing effective configuration control. Three packages are currently planned with introduction into production in FY83, FY84, and FY86. The FY83 package (package 1) consists of near-term Nuclear, Biological, and Chemical (NBC) Improvements and an Auxiliary Power Unit (APU). The FY84 package (package 2) includes Ballistic Armor Improvements, a Commander's Weapon Station, Commander's and Driver's Thermal Viewers, a Heading Reference Unit (HRU), improved NBC Seals/Gaskets and Signature Suppression. The FY86 package (package 3) contains a CO_2 Laser Rangefinder, Acoustic Signature Suppression Improvements, an Automatic Muzzle Reference System, a Low-Profile (LP) Antenna, Evasive Targets Improvements, a Hybrid (overpressure) NBC System, an Advanced Techniques for Electrical Power Management Control and Distribution System (ATEP's) and Overhead Ballistic Threat Improvements. Packages beyond FY86 will be responsive to threat developments. Retrofit of PIP's to vehicles in the field will also be controlled in "packages" to control cost and minimize Integrated Logistics Support Problems.

B. (U) RELATED ACTIVITIES: The Tank Automotive Research and Development Command (TARADCOM) Tank Base Science and Technology (TBS&T) Program encompasses all Research (6.1), Exploratory Development (6.2), and Nonsystem Advanced Development (6.3a) tank-related funded research and development efforts at DARCOM laboratories. These laboratories provide technologies for handoff to Program Managers. If suitable for the XM1, the XM1 Program Manager integrates them into the XM1 tank. An XM1 PIP Steering Committee, chaired by the XM1 Program Manager's Office, has been established with TARADCOM and users as members. This committee insures thorough coordination of user requirements, funding requirements, technology availability for handoff, nonduplicate efforts, and timely PIP implementation. Related and nonduplicatory Army activities being conducted are as follows: Program Element (PE) 6.46.20.A XM1 Tank System; PE 6.46.30.A, Tank Gun Cooperative Development; PE 6.26.01.A, Tank and Automotive Technology; PE 6.36.02.A, Advanced Land Mobility Systems Concepts; PE 6.36.31, Combat Vehicle Turret & Chassis.

Project: #D330 Title: XM1 Tank Improvements
Program Element: #2.37.35.A Title: Combat Vehicle Improvement Program
DOD Mission Area: #211 - Close Combat Budget Activity: #4 - Tactical Programs

C. (U) WORK PERFORMED BY: In-house efforts are accomplished by the Program Manager for XM1, Warren, Michigan. The major contractor is Chrysler Defense Engineering, Centerline, Michigan. Other contractors will be selected once the PIP begins in FY81.

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: Not Applicable.

2. (U) FY 1980 Program: Not Applicable.

3. (U) FY 1981 Planned Program: Initiate XM1 systems integration engineering efforts for the following improvement capabilities funded in FY81:

a. (U) Nuclear, Biological, and Chemical (NBC) Improvements (near-term): Provides for enhanced crew NBC protection by use of Vehicle Protective Paint, reduced crew compartment leakage, and installation of a Chemical Alarm and Inertial Dust Separator for the crew compartment.

b. (U) Commander's and Driver's Thermal Viewer: Provides for greater visibility for both the commander and driver during "dirty" battlefield conditions and/or night operations.

c. (U) Auxiliary Power Unit: Provides for an on-board electrical power source other than the main engine. This extends engine life, enhances the tank's silent watch capability, and reduces fuel consumption and operating cost.

d. (U) Commander's Weapon Station: Provides the commander with improved weapon station capabilities both in terms of performance and human factors to more effectively fight the tank.

e. (U) Ballistic Armor Improvements: Provides for upgraded ballistic protection to meet advanced weapon and munition threats.

4. (U) FY 1982 Planned Program: Continue FY81 improvement efforts. Start system integration engineering efforts for a Heading Reference Unit (HRU) to assist crews to determine the tank's precise location on the battlefield. Also initiate efforts for integration of a CO_2 Laser Rangefinder, Low-Profile (LP) Antenna, Signature Suppression, Advanced Techniques for

Project: #D330 Title: XM1 Tank Improvements
Program Element: #2.37.35.A Title: Combat Vehicle Improvement Program
DOD Mission Area: #211 - Close Combat Budget Activity: #4 - Tactical Programs

Electrical Power Management Control and Distribution System (ATEP's) and Evasive Target System to enhance the tank's survivability, first-round hit capability, and ability to more effectively operate on the battlefield.

5. (U) Program to Completion: Integration work will start in FY83 for an XM1 overpressure NBC system and an Automatic Muzzle Reference System to further improve the tank's survivability and accurate fire capability. The first improvement production package will be introduced into FY83 production followed by subsequent packages in FY84 and FY86. Improvements beyond FY86 will be identified in response to user needs to counter future threats.

6. (U) Major Milestones:

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1980 Submission
Introduce into Production -		
Package #1	4QFY83	Not Shown
Package #2	4QFY84	Not Shown
Package #3	2QFY86	Not Shown

7. (U) Resources ($ in thousands):

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	0	0	9630	19399	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	Not Applicable					

The XM1 Improvement Program is a new-start program in FY81.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #2.37.39.A
DOD Mission Area: #213 - Ground Air Defense

Title: AN/TSQ-73 Modifications
Budget Activity: #4 - Tactical Programs

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	-	-	1445	523	0	1968
	QUANTITIES						7
D233	AN/TSQ-73 Modifications	-	-	1445	523	0	1968

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: As initially contracted in 1970, the AN/TSQ-73 (Missile Minder) system had 40 thousand words of memory, 8 thousand of which were spare, and a required growth capability to 64 thousand words of memory. As the system has matured and subsequent requirements developed, all 64 thousand words of memory have been installed and used. The Group configured AN/TSQ-73 must be able to interface with a subordinate PATRIOT Missile battalion to properly control and distribute air defense fires. The Battalion configured AN/TSQ-73 must be able to interface with a lateral PATRIOT Missile battalion in order to provide continuity of operations in case of failure/destruction of either headquarters. All AN/TSQ-73 sets must be capable of interfacing with the Air Force's E-3A Radar in order to optimize the air defense of the battle area. Additional memory must be provided if these interfaces are to be supported. The proposed Complimentary Metal Oxide Silicon (C-MOS) Memory Expansion will increase the memory from 64 thousand to 256 thousand words. The new memory hardware will also avoid physical obsolescence of the memory and should increase reliability, availability, maintainability, and decrease long term logistical support by eliminating 16 power supplies and ten core stacks.

C. (U) BASIS FOR FY 1981 RDTE REQUEST: The FY 1981 budget request for the C-MOS Memory Expansion program will permit the design and fabrication of an engineering model. An FY 1981 start for the program is necessary in order to ensure that the necessary capability is available to support the PATRIOT Missile program.

D. (U) BASIS FOR CHANGE BETWEEN FY 1981 AND FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands). There was no FY 1980 submisson.

Program Element: #2.37.39.A
DOD Mission Area: #213 - Ground Air Defense

Title: AN/TSQ-73 Modifications
Budget Activity: #4 - Tactical Programs

E. (U) OTHER APPROPRIATION FUNDS: ($ in thousands)

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional To Completion	Total Estimated Cost
Missile Procurement						
Funds (current requirements)	-	-	-	3455	3061	6516
Funds (as shown in FY 1980 submission)	-	-	-	-	-	-
Quantities (current requirements)		-	-	-	25	25
Quantities (as shown in FY 1980 submission)	-	-	-	-	-	-

Program Element: #2.37.39.A
DOD Mission Area: #213 - Ground Air Defense

Title: AN/TSQ-73 Modifications
Budget Activity: #4 - Tactical Programs

F. (U) DETAILED BACKGROUND AND DESCRIPTION: As a result of new requirements, increased sophistication, and new interface demands, the AN/TSQ-73 software has grown to a point where there are no spare instructions remaining. Within this constraint, there are known modifications required to accomodate the PATRIOT Missile unit interface and to maintain interoperability with the Joint Services in the Tactical Air Control Systems/Tactical Air Defense Systems and Joint Interoperability of Tactical Command and Control Systems Program arenas. The Missile Minder (AN/TQS-73) is at the crossroads where memory must be made available to satisfy current demands by either reducing Material Need requirements, such as the number of tracks that the system now manages, or by implementing the Complimentary Metal Oxide Silicon (C-MOS) Memory Expansion Product Improvements Program. This product improvement proposal is the only solution that can provide the required memory capacity to meet all projected requirements and also provide a large growth capacity. In addition to the vastly increased memory capacity, the C-MOS Memory proposed in this product improvement will result in a reduction of overall system hardware. Replacement of the existing core memories with C-MOS Memories will result in a net reduction of 492 circuit board cards, and will eliminate 16 power supplies and ten core stacks.

G. (U) RELATED ACTIVITIES: Program Element 6.47.79.A, Joint Interoperability Tactical Command and Control Systems (JINTACCS) (Army). The JINTACCS program will provide data related to overall improvement in tactical effectiveness of US Armed forces in joint battlefield operations by insuring compatability an interoperability among the joint services/agencies, operating facilities, and their supporting command and control computer systems. Duplication of effort will be precluded by establishing and maintaining open lines of communication between responsible segments, assuring constant data exchange and coordination of ongoing team efforts.

H. (U) WORK PERFORMED BY: Program Management will be performed by Project Manager, Missle Minder, supported by US Army Communications Research and Development Command, Fort Monmouth, NJ, and US Army Missile Command, Redstone Arsenal, AL. Contracted efforts are to be performed by contractor(s) to be selected competitively.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: None

2. (U) FY 1980 Program: None

3. (U) FY 1981 Planned Program: Funding requested will initiate the Complimentary Metal Oxide Silicon (C-MOS) Memory Expansion program to increase the AN/TSQ-73 memory capability from 64 thousand to 256 thousand words. The design and fabrication of an engineering model will be started. Seven (7) prototype models will also be assembled and tested. Software

Program Element: #2.37.39.A
DOD Mission Area: #213 - Ground Air Defense

Title: AN/TSQ-73 Modifications
Budget Activity: #4 - Tactical Programs

modification, integration, and certification will be started. Maintenance and Diagnostic programs for the new hardware will be written. All necessary experimental work will be performed and the proposed system will be ready for full-scale development.

4. (U) FY 1982 Planned Program: Funds requested will be used to complete the assembly and testing of the prototypes. Maintenance and Diagnostic programs, and software modification, integration, and certification will also be completed.

5. (U) Program to Completion: There is no program beyond FY 1982.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #2.37.40.A
Title: Operations Control and Command Support System
DOD Mission Area: #254 - Tactical Command and Control
Budget Activity: #4 - Tactical Programs

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional To Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	0	0	16274	34708	Continuing	Not Applicable
	QUANTITIES						Not Applicable
D484	*Operations Control and* Command Support Systems	0	0	16274	34708	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The FY80 Authorization Bill deleted all RDTE funding for the Tactical Operations System (TOS). The Joint Committee supported the concept of the TOS but not the program as presented by the Army. Therefore the request for funds was deleted without prejudice. Accordingly, the Army is initiating a program new start to fulfill the Operations Control and Command Support System need. This program element includes the concept formulation, design/-development and production of an Operations Control System for Corps and subordinate echelons. Many battlefield automated systems are currently being developed as depicted in the Army Command and Control Master Plan (AC&CMP) and the Battlefield Automation Master Plan (BAMP). Each system is generally constrained to a single functional area. An urgent need exists for coordination and control of the functional systems by an overall executive system. Data from functional systems as well as from subordinate echelons must be processed by an executive system into a format usable by the commander and his staff while at the same time requirements, taskings, and directions to the appropriate functional systems and subordinate echelons must be processed and transmitted.

C. (U) BASIS FOR FY 1981 RDTE REQUEST: To take advantage of state-of-the-art technology, several contracts will be awarded early in FY 1981 for alternative system design concepts for an Operations Control and Command Support System. The objective of this competitive design effort is to generate several alternative concepts for the system with supporting studies and trade-offs analyses from which the best system concept can be selected.

Program Element: #2.37.40.A
Title: Operations Control and Command Support System
DOD Mission Area: #254 - Tactical Command and Control
Budget Activity: #4 - Tactical Programs

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1980 Submission
Mission Element Need Statement Approved	4th Qtr 80	Not Shown
Contract Award for Alternative System Design Concept	2nd Qtr 81	Not Shown

D. (U) BASIS FOR CHANGE BETWEEN FY 1981 and FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

Not Applicable. This is a new start program in FY81.

E. (U) OTHER APPROPRIATION FUNDS: Not Applicable

Program Element: #2.37.40.A
DOD Mission Area: #254 - Tactical Command and Control

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

F. (U) DETAILED BACKGROUND AND DESCRIPTION: The Operations Control System for Corps and Subordinate Echelons will provide combat commanders and their staffs in the late 1980's with the means to assist them in their command and control function. There are many battlefield automated systems currently being developed as identified in the Army Command & Control Master Plan (AC&CMP) and the Battlefield Automation Master Plan (BAMP). Each system is generally designed for a specific single functional area and provides data to the combat commander at a rate which by far exceeds the current capability of the manual system to accept and process the data and to respond to the ever changing needs and requirements of the battlefield environment. An urgent need, therefore, exists for an overall executive system to coordinate and control the functional systems and to process the data received from the functional systems and from subordinate echelons into a format usable by the commander and his staff. The Operations Control System is currently pre-milestone zero.

G. (U) RELATED ACTIVITIES: None

H. (U) WORK PERFORMED BY: Project Manager, Tactical Operations System/Operations and Intelligence Tactical Data Systems (TOS/OITDS), US Army Communications Research and Development Command (CORADCOM), Ft Monmouth, NJ. A contractor will be competitively selected.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS: The Operations Control System for Corps and Subordinate Elements is currently pre-milestone zero. A Mission Element Need Statement (MENS) is in preparation by Training and Doctrine Command (TRADOC) and will be submitted to Department of the Army (DA) for approval by 2Q80. Approval by the Secretary of Defense is expected in 4Q80.

1. (U) FY 1979 and Prior Accomplishments: N/A

2. (U) FY 1980 Program: Program activity will consist of in-house efforts to assist TRADOC in the preparation of the Mission Element Need Statement and the Functional System Description for the Operations Control System and in the preparation of a Request for Proposal to solicit industry for Alternative System Design Concepts.

3. (U) FY 1981 Planned Program: Several contracts will be awarded early in FY 1981 for alternative system design concepts. The objective of this competitive design effort is to generate several alternative concepts for an Operations Control System with supporting studies and trade-off analyses from which the best system design concept can be selected.

Program Element: 62.37.40.A
DOD Mission Area: 6254 - Tactical Command and Control

Title: Operations Control and Commahd Support System
Budget Activity: 64 - Tactical Programs

4. (U) FY 1982 Planned Program: Planned activity include the evaluation of the alternative design contracts awarded during FY81 and the selection of the contractor with the best design concept. Contract award for prototype system(s) is anticipated by 3Q82.

5. (U) Program to Completion: To be determined

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #2.80.10.A
Title: Joint Tactical Communications Program (TRI-TAC)
DOD Mission Area: #256 - Tactical Communications
Budget Activity: #4 - Tactical Programs

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	54185	54622	34976	42572	Continuing	Not Applicable *
	QUANTITIES						
D104	Joint Tactical Communications (TRI-TAC) Office	5996	5979	7034	7648	Continuing	Not Applicable
D110	Mobile Subscriber Equipment	2968	4539	2212	13120	128660	157200
D111	Digital Group Multiplexer	3686	2846	2541	1437	2064	41289
D113	Super High Frequency (SHF) Satellite Modulator - Demodulator (Modem)**	1528	0	0	0	0	Not Applicable
D114	Other Service Assigned TRI-TAC Tasks	1817	2071	2668	3854	Continuing	Not Applicable
D116	Facility Support Element	500	515	924	1045	Continuing	Not Applicable
D117	Short Range Wideband Radio (SRWBR) Assemblages***	2525	800	348	261	272	4229
D119	Modular Record Traffic Terminal (MRTT)	5400	9000	9465	6271	11563	42937
D172	Net Radio Interface (NRI)****	265	626	463	261	136	6085
D178	Joint Test Support*****	1200	1300	1586	1814	Continuing	Not Applicable
D222	Automatic Communications Central Office AN/TTC-39	28300	26946	7735	6861	6105	240865

* Quantities include 9-AN/TTC-39 Circuit switches, 7-AN/TYC-39 Message Switches, total of 549 items of DGM family (15 components), 6-AN/GRC-144 Radio Set SRWBR Modification Kits, and 3 each prototype assemblages of AN/TRC-173 Radio Terminal, AN/TRC-174 Radio Repeater, Standard SRWBR Assemblage, Radio Terminal Set, AN/TRC-175, and the Modified AN/TRCC-138 Radio Repeater. Other RDTE quantities represent a number of diverse items.

Program Element: #2.80.10.A
DOD Mission Area: #256 - Tactical Communications

Title: Joint Tactical Communications Program (TRI-TAC)
Budget Activity: #4 - Tactical Programs

** This project was transferred to Program Element 3.31.42.A, Satellite Communications Ground Environment, project D456 - Tactical Communications Systems (TACSATCOM) in FY 1980.
*** Program transferred from USAF to Army in May 1977.
**** NRI part of Project D110 prior to FY 1978.
***** Joint Test Support part of project D222 prior to FY 1978.

B. (U) 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 systems and equipment 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/equipment are needed to provide combat forces with tactical communications equipment 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 of Army tactical multichannel switched communications systems and equipment is characterized by obsolete, manpower-intensive, predominantly manual telephone and record traffic (messages) switchboards; obsolete, low-speed, electromechanical, unreliable teletypewriters, nonsecure analog telephones, a digital, solid-state multichannel transmission system capable only of 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 equipment. The Army's implementation of equipment developed under the TRI-TAC program will provide a significant increase in capability over current systems/equipment. The Army's Integrated Tactical Communications System employing TRI-TAC equipment will be capable of end-to-end voice, record and data security. TRI-TAC equipment bridges the span from the current analog equipment to digital systems. Digital systems/equipment 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.

Program Element: #2.80.10.A
Title: Joint Tactical Communications Program (TRI-TAC)
DOD Mission Area: #256 - Tactical Communications
Budget Activity: #4 - Tactical Programs

C. (U) BASIS FOR FY 1981 RDTE REQUEST: Continue contractor development of software interface of the AN/TTC-39 and AN/TYC-39 switches with other TRI-TAC developments. Monitor development of the Secure Digital Net Radio Interface KY-90 of the Net Radio Interface family which provides secure interface capability for combat net radios into the tactical switched multichannel network of TRI-TAC developed items. Continue development on the Modular Record Traffic family of Secure Record Traffic equipment to replace the obsolete, low-speed, electromechanical teletypewriters currently in the field. Continue preparation for award of development contract for Mobile Subscriber Equipment (MSE). MSE is the secure, mobile, radio-telephone to replace the limited mobility, nonsecure multichannel system currently used at brigade and in the division area. Continue support of Digital Group Multplexers, Short-Range Wideband Radio Assemblages, AN/TTC-39 circuit switches and AN/TYC-39 message switches remaining at the TRI-TAC Joint Test Facility for use in test of other TRI-TAC developments. 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[a]	Current Milestone Dates	Milestone Dates Shown in FY 1980 Submission
Engineering Development Contract Award	Apr 74	Apr 74
Preliminary Design Review	Sep 74	Sep 74
Integrated Test Plan	Feb 75	Feb 75
Final Design Review	Dec 75	Dec 75
Prototype Qualification Test (PQT)		
Start Message Switch/Circuit Switch	May 77/Mar 78	May 77/Mar 78
Complete Message Switch/Circuit Switch	Apr 78/Nov 78	Apr 78/Nov 78
Development Test and Evaluation/Initial Operational Test & Evaluation (DTE-IOTE)		
Start Message Switch/Circuit Switch	Jul 78/Feb 79	Jul 78 Feb 79
Complete Message Switch/Circuit Switch	May 79/Apr 80	May 79/Nov 79
Defense Systems Acquisition Review Council (DSARC III)		
AN/TYC-39 Message Switch Production Decision	Mar 80	Oct 79

Current Milestone Dates

Program Element: #2.80.10.A
DOD Mission Area: #256 - Tactical Communications

Title: Joint Tactical Communications Program (TRI-TAC)
Budget Activity: #4 - Tactical Programs

Major Milestones	Milestone Dates	Shown in FY 1980 Submission
AN/TYC-39 Production Award	Apr 80	Nov 79
DSARC IIIA - AN/TTC-39 Circuit Switch Production Continuation Decision	Sep 80	Sep 80
Initial Operational Capability (IOC)	Nov 82	Jun 82

The completion of AN/TTC-39 initial operational test has been adjusted from Nov 79 to Apr 80 due to delay in completion of AN/TTC-39 develop ment test and evaluation (DTE) and expanded scope of operational test. The DSARC III Milestone was rescheduled from Oct 79 to Mar 80 to accommodate the availability of AN/TTC-39 circuit switch operational test data. Production award is scheduled to follow DSARC III decision.

* Milestones shown for Project D222, Automatic Communications Central Office, AN/TTC-39 which is the lead major system TRI-TAC development item in the program element.

D. (U) BASIS FOR CHANGE BETWEEN FY 1981 AND FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1979	FY 1980	FY 1981	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	54185	54622	34976	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	55210	54812	35976	Continuing	Not Applicable

The majority of the difference in the RDTE funding levels for FY 1980, FY1981, and the Total Estimated Cost is due to the transfer by OSD of the Unit Level Message Switch (ULMS) program from the USMC to the Army. An increase in the inflation index has also contributed a proportionate increase in the total estimated cost.

E. (U) OTHER APPROPRIATION FUNDS: ($ in thousands)

Program Element: #2.80.10.A
DOD Mission Area: #256 - Tactical Communications

Title: Joint Tactical Communications Program (TRI-TAC)
Budget Activity: #4 - Tactical Programs

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional To Completion	Total Estimated Cost
Other Procurement, Army						
Funds (current requirements)	0	39900	87900	178600	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	0	39900	56100	-	Continuing	Not Applicable
Quantities (current requirements)	0	*	*		*	*
Quantities (as shown in FY 1980 submission)	0	*	*		*	*

* Large number of diversified items.

The increase in the FY 1981 estimate results from a reassessment of production leadtime for the AN/TTC-39 circuit and AN/TYC-39 message switches. This necessitated reprogramming the 2d year and 3d years of a planned multiyear procurement from FY 1982 and FY 1983 to FY 1981 and FY 1982 respectively.

Program Element: #2.80.10.A
Title: Joint Tactical Communications Program (TRI-TAC)
DOD Mission Area: #256 - Tactical Communications
Budget Activity: #4 - Tactical Programs

F. (U) 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 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 equipment 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 trucking 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, NJ, and the Army share of the Joint Test Element (JTE), Fort Huachuca, AZ, 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), Modulator Record Traffic Terminal (MRTT), and the Short-Range Wideband Radio (SRWBR) modifications to the inventory AN/GRC-144 Radio Set.

G. (U) 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 (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.

H. (U) 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); Raytheon Company, Sudbury, MA (Digital Group Multiplexer

Program Element: #2.80.10.A
DOD Mission Area: #256 - Tactical Communications

Title: Joint Tactical Communications Program (TRI-TAC)
Budget Activity: #4 - Tactical Programs

Family; AMTRON, Midlothian, IL (NRI): and ITT Nutley, NJ, (SRWBR). 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)).

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 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 Satelite 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 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) 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. The Army provided funding support for the TRI-TAC Office and the Joint Test Element (JTE). During FY 1978 Research and Development Acceptance Test (RDAT) on the AN/TYC-39 Message Switch was completed. Test models were delivered to the Joint Test Facility and Development Test and Evaluation/Initial Operational Test and Evaluation (DTE/IOTE) on the AN/TYC-39 Message Switch was started. Design and fabrication on the AN/TTC-39 Circuit Switch was completed and RDAT started. Prototype Qualification Test (PQT) was conducted, RDTE models delivered to the JTF, and DTE/IOTE begun on the Digital Group Multiplexer (DGM) Family. Fabrication continued on the AN/TRC-173 and 174 DGM Assemblages. A Mobile Subscriber Equipment (MSE) Special Task Force was established to

Program Element: #2.80.10.A
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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 was awarded, and planning for DTE/IOTE begun. The Army began separate funding of the assigned portion (35%) of the TRI-TAC Joint Test Element. The establishment of the Facility Support Element to provide the baseline of inventory equipment necessary to support the testing of all TRI-TAC equipment as required by DOD Instruction 5148.8, 9 April 1976, was completed. Support of the TRI-TAC Office was continued. Efforts to prepare for an FY 1979 Modular Record Traffic Terminal (MRTT) FSD contract award were continued. Engineering development contract for Short-Range Wideband Radio (SRWBR) modification to the AN/GRC-144 Radio Set was awarded. Monitoring of other Service-assigned TRI-TAC programs was continued. In FY 1979 DTE/IOTE of the AN/TTC-39 message switch was completed. DTE/IOTE began on the AN/TTC-39 circuit switch, DGM equipment and the AN/TRC-173 and 174 DGM assemblages. Modification of the AN/GRC-144 for Short-Range Wideband Radio (SRWBR) and SRWBR Assemblage fabrication continued. The analog Net Radio Interface (NRI) modification was completed. Requests for proposals (RFP) for initial production of SST equipment, for the MRTT program and the AN/TTC-39 and AN/TYC-39 switches were released. Preparation continued for the planned Mobile Subscriber Equipment (MSE) milestone and the AN/TTC-39 DSARC III milestone. Funding was provided for continuation of operation and maintenance of the Facility Support Element, the TRI-TAC Office, the Joint Test Element, and monitoring of other service-assigned TRI-TAC programs.

2. (U) FY 1980 Program: Continue to support and monitor contractor performance of ongoing development programs. Prepare for and award an initial production award of AN/TTC-39 and AN/TYC-39 switches after a favorable DSARC III decision. Prepare and evaluate RFP's for Single Subscriber Terminal (SST) and Modular Tactical Communications Center (MTCC) and award Full Scale Engineering Development (FSED) contracts. Prepare for MSE DSARC I milestone. Continue monitoring of other Service-managed TRI-TAC programs. Continue operation and maintenance of the Facility Support Element. Continue support to the TRI-TAC Office and Joint Test Element.

3. (U) FY 1981 Planned Program: Complete engineering and fabrication efforts of MRTT Single Subscriber Terminal (SST) and continue to monitor and evaluate the contractor performance. Continue planning and preparation for DTE/IOTE of SST. Continue development of the MRTT Modular Tactical Communications Center (MTCC). Conduct MSE DSARC and prepare for DTE/IOTE for the MTCC. Prepare for contract award for MSE. Continue development of AN/TTC-39 and AN/TYC-39 software interface with other TRI-TAC developments. Complete DTE/IOTE of the AN/GRC-144 SRWBR modification and associated assemblages. Award initial production contracts for DGM equipment and DGM assemblages. Continue monitoring of other service-managed TRI-TAC items. Continue operation and maintenance of Facility Support Element. Continue funding support to the TRI-TAC Office and Joint Test Element.

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4. (U) FY 1982 Planned Program: Award engineering development contract for Mobile Subscriber Equipment Modules (MSE). Continue development of Modules Tactical Communications Counter (MTCC). Complete DTE/IOTE of MRTT Single Subscriber Terminal and award initial production contract. Continue monitoring of other service-managed TRI-TAC items; continue operation and maintenance of the Facility Support Element. Continue funding support to the TRI-TAC Office and Joint Test Element.

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

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

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: #256 - Tactical Communications Budget Activity: #4 - Tactical Programs

A. (U) 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 equipment which will replace the current inventory of predominately manpower-intensive manual and nonsecure tactical multichannel switched communications equipment 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 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 equipment 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 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 equipment 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. (U) RELATED ACTIVITIES: This project is part of the Joint Tactical Communications (TRI-TAC) Program. Tasking for the development and initial procurement of TRI-TAC equipment has been assigned to the Services and National Security Agency (NSA). The Army-related projects in Program Element 2.80.10.A are: D110 - Mobile Subscriber Equipment, D111 - Digital Group Multiplexer Family, 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:

Project: #D104 Title: Joint Tactical Communications (TRI-TAC) Office
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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( )	Advanced Narrowband Digital Voice Terminal (ANDVT)	SEELEY Communications Security (COMSEC)
Digital Nonsecure Voice Terminals (DNVT), TA-954 & TA-984	Joint Test Element (JTE) Support	SELDON Communications Security (COMSEC)
Joint Test Element (JTE) Support	Marine Corps (PE 2.80.10.M)	ANDVT - Communications Security (COMSEC)
	Unit Level Switch (ULS) Family, AN/TTC-42V( ), SB-3865, GYC-7	Joint Test Element (JTE) Support
	Joint Test Element (JTE) Support	

C. (U) WORK PERFORMED BY: TRI-TAC Office, Fort Monmouth, NJ. Supporting contractor effort is performed by Booz Allen Public Administration Service, Inc., Tinton Falls, NJ.

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: The Joint Tactical Communications (TRI-TAC) Office was officially established by the Secretary of Defense and became effective 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). The Joint Tactical Communication 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 an 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

Project: #D104 Title: Joint Tactical Communications (TRI-TAC) Office
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areas of interoperabilty 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 and issuance of a Program/Budget Guide were accomplished. The Air Force awarded the Nonsecure Voice Terminal contract. 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 equipment. 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 equipment 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 prepared and coordinated with the Services and participating DOD agencies in August 1977. Bimonthly program status reviews were conducted along with a separate Logistics Status Review and Joint Review during FY 1977. Numerous performance and interface specifications and Interface Control Documents were prepared, revised, and issued in 1977. The TRI-TAC Office also 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. Primary efforts during 1978 evaluating contractor performance during full-scale engineering development (FSED) phase of the AN/TYC-39 Family of Switches were: TENLY/SEELEY COMSEC Equipment, 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. In addition, the validation phase efforts of the Communications Systems Control Element (CSCE) were monitored. The TRI-TAC Office participated in the selection process for the Digital Net Radio Interface (NRI), Digital Nonsecure Voice Terminal (DNVT), and the Short-Range Wideband Radio Modifications to the AN/GRC-144 Radio Set contract awards. They also participated in the Mobile Subscriber Equipment (MSE) Special Task Force Effort. The Program Management Plan (PMP) was revised and published on 31 July 1978. The TRI-TAC Office provided overall management and coordination for the completion of the Joint Test Facility and provided management and guidance for the Development Test and Evaluation/Initial Operational Test and Evaluation (DTE/IOTE) on the AN/TTC-39 Circuit Switch, AN/TYC-39 Message Switch, Communications Nodal Control Element (CNCE), Digital Group Multiplex (DGM) family, and TENLY/SEELEY Communications Security (COMSEC) programs. The TRI-TAC PMP was updated on 27 August 1979.

2. (U) FY 1980 Program: Continue overall management for the test, evaluation, and system architecutre 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

Project: #D104 Title: Joint Tactical Communications (TRI-TAC) Office
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interface and configuration control and providing overall program COMSEC, DGM family, Digital Tropo AN/TRC-170 and TDF Equipment. Pending a successful DSARC in FY 1980, a production contract for initial quantities of AN/TYC-39/TTC-39 switches will be awarded by the Army.

3. (U) FY 1981 Planned Program: Continue overall management for the test, evaluation, and system architectural 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. DTE/IOTE will be in progress on the Communications Nodal Control Element (CNCE), Digital Non-Secure Voice Terminal (DNVT), and associated Communications Security Equipment (COMSEC). Initial production contracts for DGM (Army) and AN/TRC-170 Tropo Radio (AF) will be awarded.

4. (U) FY 1982 Planned Program: Continue overall management for the test, evaluation, and system architectural aspects of the TRI-TAC Program. These resources include the support of the TRI-TAC Office to include civilian salaries, operating expenses, and support contract(s) in the accomplishment of the assigned mission. DTE/IOTE will be in progress on the Unit Level Circuit Switch (ULCS) and Modular Record Traffic Terminal (MRTT-SST). Initial production contracts will be awarded for CNCE, TDF and DNVT.

5. (U) Program to Completion: This is a continuing program.

6. (U) Major Milestones: Not Applicable.

7. (U) Resources ($ in thousands):

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	5996	5979	7034	7648	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	5996	6100	6205	-	Continuing	Not Applicable

Project: #D104 Title: Joint Tactical Communications (TRI-TAC) Office
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DOD Mission Area: #256 - Tactical Communications Budget Activity: #4 - Tactical Programs

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
Quantities (current requirements)						*
Quantities (as shown in FY 1980 submission)						*

Other Appropriations: Not Applicable.

The increase in the RDTE FY 1981 funding estimates is due to an inflation factor increase. FY80 decreased due to a general Congressional reduction applied to this program.

*No hardware or software quantities are included in this project.

FY 1981 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: #256 - Tactical Communications Budget Activity: #4 - Tactical Programs

A. (U) DETAILED BACKGROUND AND DESCRIPTION:
The Modular Record Traffic Terminal (MRTT) family is a set of secure, ruggedized, tailorable tactical record traffic terminal equipment and assemblages designed to provide facilities to compose, edit, process, transmit, receive, distribute, and switch record traffic required by combat operations and combat operations support. Two levels of employment are planned: Single Subscriber Terminals (SST) and Modular Tactical Communications Centers (MTCC). The SST consists of individual equipment items configured as terminals to meet the requirements of individual end-users. The MTCC will assemble SST's, optical character reader, auxiliary line printer, tactical digital facsimile, AN/TYC-11 Message Switch, and other peripheral equipment into a processor-controlled tactical message center environment. The MRTT family is needed to replace the obsolete, low-speed, unreliable, manpower-intensive, electromechanical teletypewriters, paper tape punches and tape readers employed as individual terminal equipment at battalion, brigade, and division level and in teletypewriter and message center assemblages (AN/MSC-29, AN/MGC-17, and AN/TSC-58, etc.) employed at brigade, division, and Corps levels. The MRTT family represents the user terminal equipment in the tactical record traffic system. SST's and MTCC's are interconnected in the communications network thru the AN/TYC-39 Automatic Message Switch or AN/TTC-39 Automatic Circuit Switch. 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 reformatting written messages and preparation of punched paper tapes for transmission. Low-volume subscribers will be served thru the common user Modular Tactical Communications Center MTCC located at major headquarters (i.e., Division, Brigade) or other concentrations of low-volume users. The MTCC will provide service via its own switch and the AN/TYC-39 switch direct to other MTCC's or Single Subscriber Terminal (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 major computer 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 Teletypewriter Terminal) and available state-of-the-art commercial equipment. 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 COED program in February 1976, directed an MRTT study by the TRI-TAC Office, and finally assigned the MRTT development program to the Army in May 1977. The Study Program Phase was initiated in May 1976 and was completed in December 1977. In March 1979, the task of developing the Unit Level Message Switch (ULMS-AN/TYC-11) was transferred from the Marine Corps to the Army. The ULMS will be housed in the MTCC.

B. (U) 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

Project: #D119 Title: Modular Record Traffic Terminal (MRTT)
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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, 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, and in Program Element 3.31.42.A, Satellite Communications Ground Environment, under D456 - Tactical Satellite Communications Systems (TACSATCOM). These related programs do not duplicate Modular Record Traffic Terminal (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.

C. (U) WORK PERFORMED BY: 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. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: Army and the other Services have participated in the TRI-TAC MRTT Study Program since April 1976. MRTT task was formally transferred to the Army on 10 May 1977 by the Office of the Secretary of Defense (OSD). In addition, the message switch utilized in the MTCC (AN/TYC-11) was transferred to the Army on 26 March 1979. The Joint Service Operational Requirement was approved in November 1978. The Baseline Cost Estimate, Procurement Plan and Determination and Findings (D&F) have been validated and approved less the AN/TYC-11. Updated documents incorporating the AN/TYC-11 module and its effects on cost and schedule are scheduled to be completed by January 1980. The Request for Proposal (RFP) for the SST Full Scale Engineering Development (FSED) program was released to industry in September 1979.

2. (U) FY 1980 Program: Prepare and evaluate the Request for Proposal for the MTCC. Award the FSED contracts for Single Subscriber Terminal (SST) and Modular Tactical Communications Centers (MTCC) for Development and Test and Initial Operational Test and Evaluation models.

3. (U) FY 1981 Planned Program: Complete engineering and fabrication efforts on the SST and continue to monitor and evaluate the contractor performance on the SST contract. Complete planning and preparation for the start of DTE/IOTE for SST. Continue engineering and fabrication efforts on the MTCC and continue to monitor and evaluate contractor performance on MTCC contract. Begin planning and preparation for the start of DTE/IOTE for the MTCC.

Project: #D119 Title: Modular Record Traffic Terminal (MRTT)
Program Element: #2.80.10.A Title: Joint Tactical Communications (TRI-TAC) Program
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4. (U) FY 1982 Planned Program: Conduct and complete DTE/IOTE on the SST. Conduct Development Acceptance In-Process (DEVA-IPR) type classify, prepare and award initial production contract for the SST. Prepare for DTE/IOTE of MTCC. Continue to monitor and evaluate contractor performance on MTCC.

5. (U) Program to Completion: Complete DTE/IOTE of MTCC, conduct DEVA-IPR, type classify and prepare for initial production contract. Award initial production contracts for MTCC.

6. (U) Major Milestones:

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1980 Submission*
FSED Contract Award	May 1980/Sep 1980	
Develpment Test and Initial Operational Test and Evaluation Start	Nov 1981/Jan 1984	
Development Test and Initial Operational Test and Evaluation Completion	Apr 1982/Oct 1984	
Decision to Proceed with Production	Jun 1982/Dec 1984	
Initial Production Contract Award	Aug 1982/Feb 1985	
Initial Production Deliveries Start	Jan 1984/Feb 1987	
Initial Operational Capability Date	Aug 1984/Sep 1987	

*No milestone dates were submitted for FY 1980.

Project: #D119 Title: Modular Record Traffic Terminal (MRTT)
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7. (U) Resources ($ in thousands):

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	5400	9000	9465	6271	11563	42937
Funds (as shown in FY 1980 submission)	6000	9000	3300	-	3800	22674
Quantities (current requirements)*						
Quantities (as shown in FY 1980 submission)						

* 40 SET's
8 MTCC's with AN/TYC-11's

Increase in RDTE funding level for FY 1981 submission over FY 1980 submission primarily due to transfer by OSD of AN/TYC-11 Unit Level Message Switch (ULMS) program from USMC to Army and the inclusion of the AN/TYC-11 switching module in the Modular Tactical Communications Center (MTCC). Decrease in the RDTE funding level for FY 1979 was also due to reassessment in the program caused by the OSD transfer of the ULMS program to the Army.

Other Appropriations: Not Applicable.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

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: #256 - Tactical Communications Budget Activity: #4 - Tactical Programs

A. (U) 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 300 line to 600 line by increments of 150 analog or digital terminations, and message switches (AN/TYC-39) equipped for 50 lines. Circuit switches can be grouped to provide up to 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. 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 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 curent 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 1979. The Advanced Development phase was completed in March 1974.

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B. (U) 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; D110 - Mobile Subscriber Equipment; D117 - Short Range Wideband Radio (SRWBR) Assemblages; and D119 - Modular Record Traffic Terminal (MRTT); and Program Element 3.31.42.A, Satellite Communications Ground Environment under project D456 - Tactical Satellite Communications Systems (TACSATCOM). 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 managements 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 the Office of the Secretary of Defense (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. (U) WORK PERFORMED BY: Project Manager, Multi-Service Communications Systems; US Army Communications Research and Development Command; and TRI-TAC Office; all of Fort Monmouth, NJ. Contractor is GTE-Sylvania, Needham Heights, MA.

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 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

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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 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 Defense Systems Acquisition Review Council (DSARC) was conducted on 2 November 1976 and approved program continuation on a revised cost and schedule baseline (16 month circuit switch extension). Department of Defense (DOD) directed updates of life cycle costs were completed in May 1977. Department of the Army (DA) approved cost goals and a revised TRI-TAC acquisition strategy were proposed in a DCP cover sheet revision to the Office of the Secretary of Defense (OSD) in April 1978 for final review and approval. OSD approved this revision on 21 August 1979. Major milestones attained during FY78 were the completion of Contractor Development test and the ahead of schedule start of Government development test of the AN/TYC-39 message switch. A training configuration of the AN/TYC-39 was delivered to the US Army Signal School where the first Government conducted training of military personnel began in August 1978. Contractor efforts continued in the development test of the AN/TTC-39 switch, interface development with other service managed TRI-TAC equipments now in development, and development of diagnostic software. During FY79 Government Development Test and Evaluation (DTE) and Operational Test and Evaluation (OTE) on the AN/TYC-39 message switch were completed and DTE of the AN/TTC-39 circuit switch began. Delays encountered during the circuit switch DTE necessitated rescheduling the start of Operational Test (OT). In order to assure availability of OT data, the DSARC III production decision milestone was rescheduled from October 1979 to March 1980. A request for proposal for initial production of circuit and message switches was released and a response was received in September 1979. The contractual development effort continued in the development of software for added interface requirements with other service managed TRI-TAC developments. Contractor support to DTE/OTE of the circuit and message switch continued.

Project: #D222 Title: Automatic Communications Central Office, AN/TTC-39
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2. (U) FY 1980 Planned Program: Complete the AN/TTC-39 circuit switch DTE/OTE; prepare for and conduct the Defense Systems Acquisition Review Council III (DSARC) production decision milestone; and complete negotiations for the initial production award which will follow a favorable DSARC III decision, complete type classification actions. Continue contractor development of software for interface with other TRI-TAC developments and support of AN/TTC-39 and AN/TYC-39 models remaining at the TRI-TAC Joint Test Facility to support joint test of other TRI-TAC developments.

3. (U) FY 1981 Planned Program: Continue contractor development of software for interface with other TRI-TAC developments and support of AN/TTC-39 and AN/TYC-39 models retained in the TRI-TAC Joint Test Facility used to support joint test of other TRI-TAC developments.

4. (U) FY 1982 Planned Program: Continue contractor development of software for interface with other TRI-TAC developments. Continuation of contractor support of AN/TTC-39 and AN/TYC-39 models retained at the TRI-TAC Joint Test Facility to support joint test of other TRI-TAC developments.

5. (U) Program to Completion: Support of AN/TTC-39 circuit and AN-TYC-39 message switches retained in TRI-TAC Joint Test Facility for use in joint test of other TRI-TAC equipment. Complete contractor development of software for interface with other TRI-TAC developments. Support will continue until capability for support becomes available from Army Logistical Support Systems per DODI 5148.8.

6. (U) Major Milestones:

Major Milestones	Current Milestone Dates*	Milestone Dates Shown in FY 1980 Submission
Engineering Development Contract Award	Apr 74	Apr 74
Prototype Qualification Test (PQT)		
Start Message Switch/Circuit Switch	May 77/Mar 78	May 77/Mar 78
Complete Message Switch/Circuit Switch	Apr 78/Nov 78	Apr 78/Nov 78
Development Test and Evaluation/Initial Operation Test and Evaluation (DTE/IOTE)		
Start Message Switch/Circuit Switch	Jul 78/Feb 79	Jul 78/Feb 79

Project: #D222 Title: Automatic Communications Central Office, AN/TTC-39
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Major Milestones	Current Milestone Dates*	Milestone Dates Shown in FY 1980 Submission
Complete Message Switch/Circuit Switch	May 79/Apr 80 3/	May 79/Nov 79
Defense Systems Acquisition Review Council (DSARC) III AN/TYC-39 Message Switch Production Decision	Mar 80 1/	Oct 79
AN/TYC-39 Production Award	Apr 80 2/	Nov 79
DSARC IIIA AN/TTC-39 Production Continuation Decision	Sep 80	Sep 80
Initial Operational Capability (IOC)	Nov 82	Jun 82

*Alternative C, Decision Coordinating Paper (DCP) #135, Cover Sheet Update, dated 14 Apr 78, approved 21 Aug 79.

1/ DSARC III milestone rescheduled from Oct 79 to Mar 80 due to unavailability of AN/TTC-39 operational test data.
2/ Production award will follow DSARC III decision.
3/ Completion of AN/TTC-39 operational test rescheduled from Nov 79 to Apr 80 due to delay in completion of AN/TTC-39 development test and evaluation and expanded scope of operational test.

Project: #D222 — Title: Automatic Communications Central Office, AN/TTC-39
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7. (U) Resources ($ in thousands):

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	28300	26946	7735	6861	6105	240865
Funds (as shown in FY 1980 submission)	28300	27000	9600	-	11800	227600
Quantities (current requirements)	6	6	0	0	0	16**
Quantities (as shown in FY 1980 submission)	9	0	0	0	0	16
Other Appropriations:						
Other Procurement, Army:						
Funds (current requirements)	0	39900	66900	67500	272000	446300
Funds (as shown in FY 1980 submission)	0	39900	0	-	222300	262200
Quantities (current requirements)	0	16	22	21	79	138
Quantities (as shown in FY 1980 submission)	0	16	-	-	116	132

* Engineering Development models include 7 AN/TYC-39 and 9 AN/TTC-39 swithces
**Total Army quantity of 138 represents 105 AN/TTC-39 (300 line), 10 AN/TTC-39 (600 line) and 23 AN/TYC-39 message switches

The decrease in FY 1981 RDTE funding was due to a reassessment of the software interface requirements. The decrease in FY80 is due to a general Congressional reduction applied to this program. The total estimated cost increased due to an increase in the inflation index.

Project: #D222 Title: Automatic Communications Central Office, AN/TTC-39
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The increase in FY 1981 Other Procurement Army appropriations results from a reassessment of production lead time which required a follow-on award in FY 1981. The quantity increase results from a reassessment of user requirements. The OPA funding-level increase results in total estimated costs resulting from a reduction of other service requirements from higher unit costs and higher inflation rates. The current total estimated costs has been increased to reflect the funding levels in the current baseline cost estimate (BCE), which will be provided at the Defense Systems Acquisition Review Council meeting for the production decision.

Project: #D222 Title: Automatic Communications Central Office AN/TTC-39
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E. (U) TEST AND EVALUATION DATA:

1. (U) Development Test and Evaluation:

a. (U) A joint Developmental Test and Evaluation (DTE) for the AN/TYC-39 Message Switch (MS) began in June 1978 and was successfully completed in February 1979 at the Joint Test Facility, Fort Huachuca, AZ. The AN/TTC-39 Circuit Switch (CS) began a combined DTE as scheduled in February 1979. The AN/TTC-39 CS DT will be completed in November 1979. The specific objectives for both the AN/TTC-39 and the AN/TYC-39 are as follows: (1) Determine the degree to which the development contract specifications were met; (2) Determine whether the test item was practicable, safe, maintainable, and reliable; (3) Evaluate, to the extent possible, the interoperability and compatibility with current inventory items as well as other TRI-TAC-developed items; (4) Verify the traffic handling capability of the switches through the use of real and simulated traffic loading; (5) Evaluate the Adequacy of Logistic Support.

b. (U) During the 7 1/2 months of DT for the AN/TYC-39 MS no major deficiencies were reported; however, 9 nonmajor deficiencies were identified in the AN/TYC-39 Message Switch Independent Evaluation Report, September 1979. Software anomalies accounted for four of the deficiencies. Hardware and safety inconsistencies accounted for four and one deficiency, respectively. Subsequent to the completion of Message Switch DTE, three (3) of the software deficiencies have had "software patches" developed and will be retested as part of the Autodin Upgrade rescheduled for government testing in November 1979. The remaining software deficiency was procedural and will be rectified by including this correction in the post-deployment software instructions. The four hardware deficiencies currently under analysis deal with electromagnetic interference (EMI) humidity, fungal growth, and environment and control unit (ECU) cooling capacity. Any approved changes as a result of this analysis will be incorporated in the Full-Scale Engineering Development (FSED) models and retested at the Joint Test Facility, Ft. Huachuca, AZ, prior to a production award decision in March 1980. The AN/TTC-39 Circuit Switch will complete DTE in November 1979, and an Independent Evaluation Report with the test results will be available in January 1980. To date the AN/TTC-39 has completed all of the subtests which comprise the Development Test Phase.

c. (U) The AN/TTC-39 program 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). The circuit switch can be grouped to provide up to 3000 terminations (2400 lines) while the message switch can be employed either with or independent of the circuit switch. The Engineering Development equipment being tested will be essentially the same as the production models although the circuit switch and message switch modularity and software package may vary according to specific employment of production equipment.

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d. (U) All subsystems and support equipment were or will be available for testing during the specific timeframe.

e. (U) The development contractor is GTE Sylvania, Needham, MA. The Army program manager is Project Manager, Multi-Service Communications Systems, Fort Monmouth, NJ. DTE is being accomplished by the Digital Communications Test Company, United States Army Electronic Proving Ground, Fort Huachuca, AZ, while IOT&E will be accomplished by the United States Army Operational Test and Evaluation Agency. The United States Air Force, United States Navy, United States Marine Corps, and the National Security Agency will have responsibilitives in the conduct and evaluation of the testing process.

f. (U) The Joint Test Facility, Fort Huachuca, AZ, as well as the remote operating areas around Fort Huachuca, AZ, provide the primary facilities for conduct of DTE of the AN/TTC-39-AN/TYC-39 program. However, interoperability tests and scenario play are also conducted with the Naval Telecommunications System Test Node (NTSTN) located at San Diego, CA. The DTE for the AN/TYC-39-AN/TTC-39 has been and will be conducted by the US Army Test and Evaluation Command (TECOM) with support of the Joint Test Organization at Fort Huachuca, AZ. Testing will be conducted by 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.

g. (U) The major test and review milestones listed below are those goals and thresholds which have been established by OSD-approved Decision Coordinating Paper (DCP) - 135, January 1977, and Cover Sheet Update to this DCP approved in August 1979 by OSD.

	Approved Program	Completed/Current Estimate
Full Scale Engineering Development		
Contract Award	Apr 74	Apr 74
Preliminary Design Review	Sep 74	Sep 74
Integrated Test Plan	Feb 75	Feb 75
Final Design Review	Oct 75	Dec 75
Research Development and Acceptance Test		
a. Begin Message/Circuit Switch	May 77/Mar 78	May 77/Mar 78
b. Complete Message/Circuit Switch	Apr 78/Nov 78	Jun 78/Mar 79
Development Test/Operational Test (DTE/IOTE)		

Project: #D222 Title: Automatic Communications Central Office AN/TTC-39
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	Approved Program	Completed/Current Estimate
a. Start Message/Circuit Switch	Jul 78/Feb 79	Jun 78/Feb 79
b. Complete Message/Circuit Switch	May 79/Nov 79	Jun 79/Apr 80
AN/TYC-39 - AN/TTC-39 DSARC III	Oct 79	Mar 80
Initial Production Award	Nov 79	Apr 80

h. (U) During DTE three (3) AN/TYC-39 message switches were under Test. All three were configured for 50-line operation. There are a total of four AN/TTC-39 circuit switches undergoing DTE. There will be two (2) 300-line configurations and two (2) 600-line configurations.

i. (U) Formal retest has not developed as a major issue.

j. (U) Reliability - The primary measure of the specified Message Switch reliability is expressed in terms of inherent availability which is a function of operating hours and system downtime. The demonstrated inherent availability for the Message Switch was 0.99927 for DT which was somewhat less than the specification of 0.9999. This indicates that the redundancy designed into the message switch is capable of providing a high degree of availability.

(U) Availability - In addition to inherent availability, a mean time between unscheduled maintenance actions (MTBUMA) parameter was computed to evaluate the logistic burden associated with maintenance actions required to achieve the high inherent availability. The Message Switch has a demonstrated MTBUMA of 30.2 hours.

(U) Maintainability - Both from an organizational level as well as an Intermediate level maintenance index there has been no adverse impact on availability of the Message Switch. Design for maintainability is considered more than adequate with a few exceptions. Specific maintainability figures are shown in paragraph E-3. Maintenance personnel performing test hold appropriate Military Occupational Specialities (MOS) and have been trained at the contractor's plant or at the United States Army Signal Center and School at Fort Gordon, GA.

k. (U) The results of the Environmental qualification testing of the AN/TYC-39 indicated 3 deficiencies--humidity, fungus, and environmental control unit (ECU) cooling capacity (described above in subparagraph b). These are currently under evaluation for corrective action.

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: #256 - Tactical Communications Budget Activity: #4 Tactical Programs

2. (U) Operational Test and Evaluation:

a. (U) A joint Initial Operational Test and Evaluation of the AN/TYC-39 commenced on 15 February 1979 and was completed on 6 June 1979. The IOTE of the AN/TTC-39 Circuit Switch is scheduled to begin mid-November 1979 with a completion date of April 1980. The IOTE objectives of the AN/TTC-39 program are as follows: (1) To provide information to assess the operational effectiveness of the AN/TTC-39 and AN/TYC-39, (2) To provide information to assess the suitability/adequacy of personnel selection and training criteria for operational requirements, (3) To provide information to assess the operational reliability, availability, and maintainability (RAM) and its impact on operational performance, (4) To provide information on the operational effectiveness of logistical concepts, and (5) To provide information to assess the operation effectiveness, suitability, and interoperability with the present inventory systems as well as the other TRI-TAC developments.

b. (U) The Independent Evaluation Report (IER) October 1979 indicated that for the characteristics that were tested in IOTE, the AN/TYC-39 as tested was effective for employment within the DA-approved Integrated Tactical Communications System (INTACS) architecture. The results demonstrated the fact that, when operators strictly adhere to automatic message switching procedures, messages can be securely received, stored, and transmitted by the message switch with accountability. The transit time of a message in the AN/TYC-39 for all precedences is within the speed of service required by the US Army. The Message Switch as tested has achieved sufficient reliability over 1400 operational hours of testing to support the conclusion that it should be operationally suitable when fielded. There were several areas which have been indicated as needing improvement. These areas were: training, organization and doctrine, and human factors. All of these areas are currently under analysis. Any approved modification which is a result of this analysis will be incorporated in the FSED equipment.

c. (U) The Engineering Development equipment that was and is to be tested will be essentially the same as the production models although the circuit switch and message switch modularity and software program may vary according to specific employment of production equipment.

d. (U) All subsystems and support equipment were or will be available for testing during the specific timeframes.

e. (U) The Joint Test Facility, Fort Huachuca, AZ, as well as remote operating areas around Fort Huachuca provide the primary facilities and resources to support the conduct of IOTE of the AN/TTC-39 program. However, IOTE interoperability tests and scenario play are also conducted with the Naval Telecommunications System Test Node at San Diego, CA, and displacements to CONUS-based United States Air Force bases to simulate tactical Airbase operations. IOTE for the AN/TTC-39 family of switches

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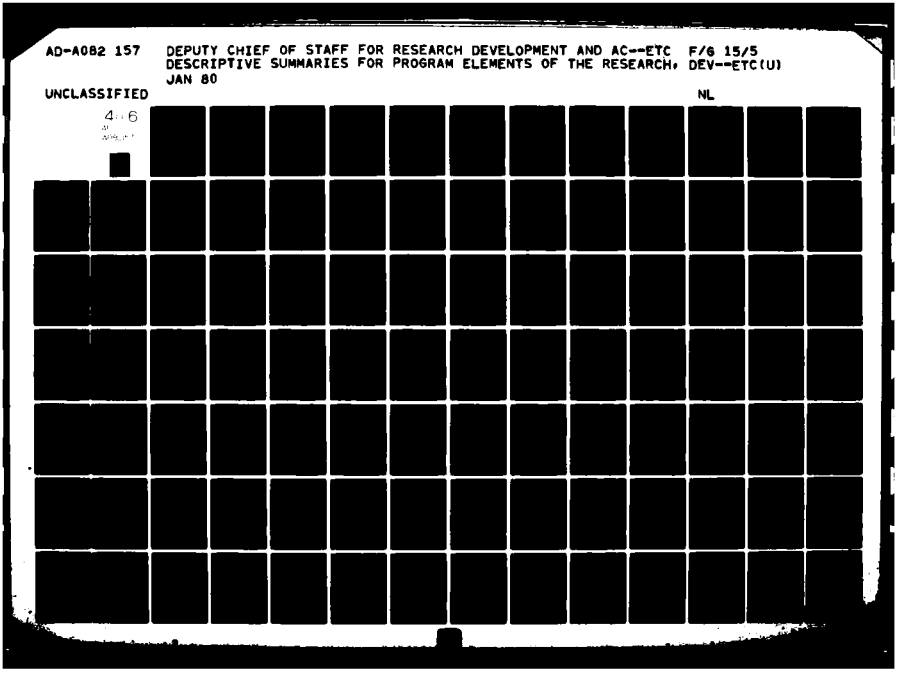

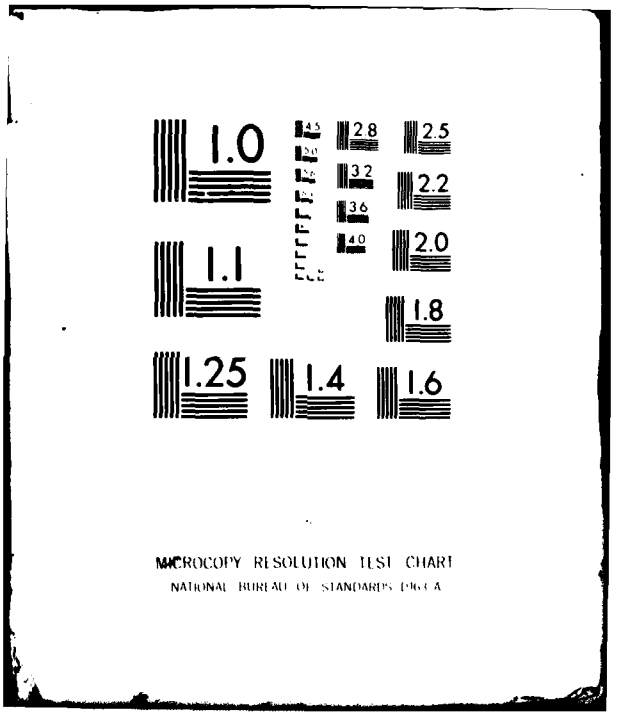
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NATIONAL BUREAU OF STANDARDS 1963-A

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: #256 - Tactical Communications Budget Activity: #4 Tactical Programs

has been and 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. Testing will be performed by 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.

f. (U) During IOTE, three AN/TYC-39 message switches (50-line) were utilized for the majority of the scenario play. One scenario ("Jump" Operation) required the use of four message switches. In addition a 25-line AN/TYC-39 message switch was utilized for this scenario. The current approved AN/TTC-39 circuit switch IOTE test plan details the requirements for four circuit switches. Two AN/TTC-39 300-line and two 600-line switches will be used for IOTE.

g. (U) To date formal retest has not developed as a major issue.

h. (U) Availability - The operational availability user criterion is 99.9 percent with the message switch demonstration 96.3 percent.

(U) Maintainability - The Message Switch met the user criterion for Mean Time To Repair (MTTR) for general support (GS) level maintenance, but did not achieve the criterion for organizational level nor direct support (DS) level maintenance. The overall maintenance ratio is .131 man-hours of operation (less than eight minutes) for the message switch.

(U) Reliability - The best estimate of Mean Time Between Mission Failure (MTBMF) during the last 1400 operational hours of IOTE is about 220 hours for failures of 100 percent degradation lasting more than 15 minutes. There were only 3 of 370 IOTE RAM incidents or 0.8 percent that could not be performed by trained personnel. The AN/TTC-39 Circuit Switch will begin IOTE in November 1979. Evaluation and analysis in these areas is presently underway. Any approved modification which is a result of this analysis will be incorporated in the FSED equipments.

i. (U) The IOTE for the AN/TYC-39 will be completed prior to the DSARC III in March 1980. The AN/TTC-39 circuit switch will complete its IOTE by April 1980. Since OTE will not be entirely completed prior to the DSARC, emerging test progress and test results will be provided for this decision forum.

j. (U) There has been no additional experience or testing other than that accomplished at the Joint Test Facility at Ft. Huachuca, AZ, during OTE/ IOTE.

Project: 0D222
Program Element: 62.80.10.A
DOD Mission Area: 0256 - Tactical Communications

Title: Automatic Communications Central Office AN/TTC-39
Title: Joint Tactical Communications (TRI-TAC) Program
Budget Activity: 04 Tactical Programs

k. (U) There are no other operational test results other than those identified in subparagraphs b and i above, and paragraph 3 below.

3. (U) System Characteristics: The Operating and Technical characteristics listed below are those which have been approved by OSD in Decision Coordinating Paper (DCP) 135, January 1977, and Cover Sheet Update in August 1979. The demonstrated performance characteristics listed below have been derived from government-witnessed Contractor Development Testing (CDT) and/or Development Test and Evaluation/Initial Operational Test and Evaluation (DTE/IOTE).

Operational/Technical Characteristics	Objectives	Demonstrated Performance
AN/TTC-39 Circuit Switch (600-Line/300-Line)		
Inherent Availability (Hrs) 1/	.999/.999	.9958/.9948 (DTE)
Mean Time Between Failure (Hrs)	2500/250 hours 3/	2500/250 hours 3/
Mean Time to Repair (Min) 2/	15 minutes	15/15 minutes (CDT)
Simultaneous Conferences 1/	6/4	6/4 (CDT)
Maximum Conferees per Conference 1/	20	20/20 (CDT)
Alternate Routing 1/	Up to 5	Up to 5/5 (CDT)
Standby Battery Power (Min)	15 minutes	15/15 minutes (CDT)
Terminations per Module	150	192/192 (CDT)
Maximum Weight per Shelter (lbs)	7000 lbs	6709/8288 (CDT)
AN/TTC-39 Message Switch (50-Line)		
Inherent Availability 1/	.9999	.99927/.963 (DTE/IOTE)
Mean Time Between Failure (Hrs)	2500 hours 3/	220 hrs (IOTE)
Mean Time to Repair (Min) 2/	15 minutes	2.03 hrs/1 hr (DTE/IOTE)
Reference Storage (Days) 1/	10 days	10 days
Journal Storage (Days)	30 days	30 days
Standby Battery Power (Min)	15 minutes	16.26 minutes (DTE)
Message Processing Time (Sec) 4/	2 seconds	1.732 seconds (DTE)
Throughput Character per Second	9000	9534 (DTE)
Bit Error Rate per Consecutive Bits		1 per 1010 1 per 1010 (CDT)
Maximum Weight per Shelter (lbs)	7000 lbs	6840 lbs (DTE)

Project: #D222 Title: Automatic Communications Central Office AN/TTC-39
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NOTES:
1/ DCP performance features for which minimum thresholds for the Army have been established.
2/ Represents organizational level mean time to repair.
3/ Mean time between failure is not an explicit specification requirement. It is derived from the availability and mean-time-to-repair requirements.
4/ Two seconds represent a mean message processing time.
5/ Demonstrated performance will be based on the results of Government testing to be conducted during DT/OT II and CDT.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #3.31.42.A
DOD Mission Area: #256 - Tactical Communications

Title: Satellite Communications Ground Environment
Budget Activity: #4 - Tactical Programs

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	9520	20690	26681	40765	Continuing	Not Applicable
	QUANTITIES						Diverse Items
D253	Defense Satellite Communications System-Defense Communications System (DSCS-DCS) (Phase II)	4237	8990	15188	22813	Continuing	Not Applicable
D450	Satellite Communications	0	500	800	1137	Continuing	Not Applicable
D456	Tactical Satellite Communications (TACSATCOM)	5283	11100	10693	16815	Continuing	Not Applicable

B. (U) 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. 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 provide rapid reliable communications, command, and control resources during all types of situations, and especially in a hostile environment, does not presently exist. Efforts under this program will provide developments that will allow tactical commands to establish and maintain effective communications to support a variety of command and control requirements. These communications will be protected against enemy jamming and will not be limited to line of sight operations, thereby enhancing command and control in support of the highly fluid tactical operations expected on the modern battlefield.

Program Element: #3.31.42.A
DOD Mission Area: #256 - Tactical Communications

Title: Satellite Communications Ground Environment
Budget Activity: #4 - Tactical Programs

C. (U) BASIS FOR FY 1981 RDTE REQUEST:

1. (U) Project D253-Defense Satellite Communications System (DSCS): Funding is required to continue the system design of the Real Time Adaptive Control System (RTACS). RTACS provides realtime control of the DSCS to increase the satellite communications capacity and availability, and provides the necessary degree of responsiveness, survivability, and flexibility required to monitor and control the expanded capabilities of the DSCS Phase III satellites, which are scheduled for May 1983 launch. RTACS interfaces with the Air Force-developed Satellite Configuration Control Element (SCCE), which provides command and control of the DSCS III satellites. Award contracts for the development of a 30/20 GHz modulation subsystem and terminals for use with the Extra High Frequency (EHF) satellite scheduled for launch in 1986.

2. (U) Project D456-Tactical Satellite Communications (TACSATCOM): Funding is required to continue Engineering Development of the antijam capability which is critical for continuous operation of the multichannel initial system during jamming conditions. Funding will provide for initiation of an advanced development effort which will provide a highly jam-resistant single channel satellite radio capability for nuclear and critical command and control communications. Funding also supports continuation of the development of the multichannel objective system. This multichannel effort will, among other things, increase the efficient use of expensive satellite resources by a factor of four.

3. (U) Project 450-Satellite Communications: Continue development of a 30 GHz transmitter feasibility model that is needed to relieve the Super High Frequency (SHF) spectrum congestion. Continue electromagnetic compatibility analysis of ground mobile forces satellite communication terminals to preclude mutual interference. Initiate development of solid state low-noise amplifier and high power amplifier to provide cost-effective low-noise amplification and to improve the effectiveness of future K-Band earth stations.

D. (U) BASIS FOR CHANGE BETWEEN FY 1981 AND FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1979	FY 1980	FY 1981	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	9520	20590	26681	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	7697	20600	22079	Continuing	Not Applicable

Program Element: #3.31.42.A Title: Satellite Communications Ground Environment
DOD Mission Area: #256 - Tactical Communications Budget Activity: #4 - Tactical Programs

Funding for FY 1981 reflects the increases required to support the development of satellite ground equipment necessary to the DSCS and TACSATCOM systems as authorized in the OSD-approved program plans in addition to the use of new inflation indexes. Funding level changes addressed in Project D253 and D456.

E. (U) OTHER APPROPRIATION FUNDS: ($ in thousands)

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional To Completion	Total Estimated Cost
Other Procurement, Army:						
Funds (current requirements)	107000	137800	163800	169100	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	108000	139600	201100	--	Continuing	Not Applicable
Quantities[a]						

[a]Large number of diverse items.

The Defense Satellite Communication System (DSCS) procurement funds reduction resulted from: (1) deferring the FY 1979 requirement for Light Transportable Terminals to FY 1984, (2) finalization of the Real Time Adaptive Control System (RTACS) acquisition strategy which eliminated the need for FY 1980 funds, and (3) restructuring the Jam-Resistance Secure Conferencing (JRSC) program from a three-year effort to four years. The Tactical Satellite Communications (TACSATCOM) FY 1981 procurement funds have been decreased form the FY 1980 submission due to rescheduling of AN/MSC-65 production contract award from FY 1980 to FY 1981, thereby providing less than one full year's production effort, and by the reduction of the Multichannel Initial System (MCIS) Terminal production rate.

Program Element: 63.31.42.A Title: Satellite Communications Ground Environment
DOD Mission Area: 6256 - Tactical Communications Budget Activity: 64 - Tactical Programs

F. (U) 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 (PE) are: the Defense Satellite Communications System (DSCS) Phase II and the Tactical Satellite Communication System (TACSATCOM). Ground terminal requirements for all Services are developed within these projects. Efforts to advance the state-of-the-art in those technological areas necessary to improve ground environment of the DSCS program, and to develop satellite communications equipments suitable for TACSATCOM and other satellite applications, are conducted within the Satellite Communications Project D450.

G. (U) 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 Defense Satellite Communication System (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.

H. (U) WORK PERFORMED BY: The US Army Satellite Communications Agency, Fort Monmouth, NJ. Contractors include: Comtech Laboratories, Inc., Smithtown, NY; Ford Aerospace and Communications Corporation, Palo Alto, CA; Raytheon Company, Sudbury, MA; Magnavox, Torrance, CA; Radio Corporation of America, Camden, NJ; Linkabit Corporation, San Diego, CA; Harris Corporation, Melbourne, FL; Martin-Marietta Corporation, Orlando, FL; Electronic Communications, Incorporated, St Petersburg, FL; and Cincinnati Electronics, Cincinnati, OH.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments:

a. (U) The Phase I DSCS became operational in July 1967 and was originally composed of 26 satellites and 29 terminals. In FY 1969, this capability was expanded to include wideband 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 a Time Division Multiple Access (TDMA) capability. In FY 1973, engineering development of the AN/USC-28 Spread Spectrum equipment and the Light Terminal was initiated. In FY 1974, an engineering development contract was awarded for Quadra-Phase Shift Keying (QPSK) equipment. The Heavy Terminal, Light Terminal, TDMA, and QPSK developments were completed by 1975. The Signal Processing equipment (QPSK, AN/USC-28) is included in the Digital Communications Subsystems which are under fabrication by Tobyhanna Army Depot and will be used with the Heavy Terminal (AN/FSC-78) and Medium Terminal (AN/GSC-39). Developments were initiated in FY 1975 for G/T 34 and G/T 26 antennas which are required for use with the Medium and Light Terminals. These antennas were completed in FY 1976 and 1977, respectively. Development of the AN/USC-28 was completed in FY

Program Element: #3.31.42.A Title: Satellite Communications Ground Environment
DOD Mission Area: #256 - Tactical Communications Budget Activity: #4 - Tactical Programs

1977. Design approaches for Burst Error Correction equipment and Low Rate Multiplexer were also completed in FY 1977. This equipment is required to increase accuracy and efficiency during anti-jam operations. In FY 1978, advanced development of the Pilot Control System (PCS) was completed. Contracts were also awarded for extension of the PCS, continuation of the Low Rate Multiplexer development, development of a Conferencing and Beacon Entry capability for the AN/USC-28, advanced development of a Burst Error Correction Coder, and interface of the Satellite Configuration Control Element (SCCE) and the AN/FSC-78 Terminals. In FY 1979, the development of the PCS was continued to enable interim use of the system for the Atlantic satellite.

b. (U) 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, and a system development plan was prepared. In December 1972, an engineering development contract was awarded to Radio Corporation of America (RCA), Camden, NJ, for SHF multichannel ground terminals to be mounted in 1/4-ton trailers and 1 1/4-ton trucks. In FY 1974, the SHF small terminal contract was expanded to include an engineering development model of an SHF Communications Control Facility. Engineering development contracts were awarded for a UHF Antenna to Harris Corporation, Melbourne, FL, a TACSAT Signal Processor (TSSP) to Martin-Marietta Corporation, Orlando, FL, and an Ultra High Frequency (UHF) Manpack Transceiver to Cincinnati Electronics, Cincinnati, OH. An advanced development contract was also awarded for a Control/Network Terminal Modem with Harris Corporation, Melbourne, FL. In FY 1976, the SHF multichannel satellite communication terminals were type classified STANDARD and a contract was awarded for a Low-Rate Initial Production (LRIP) quantity of terminals. In FY 1977, the Communication Control Facility (AN/TSQ-118) was type classified STANDARD. In FY 1978, an engineering development contract for the Antijam/Control Modem was awarded. This modem is required to provide protection against jamming for the multichannel SHF initial system. Development Test/Operational Test (DT/OT) II testing of single-channel UHF Manpack system was initiated and was completed in FY 1979. An advanced development model of an SHF hardened antenna was also developed and tested. In FY 1979, studies and exploratory development for the terminal to be used in the multichannel objective system of the 1990's were initiated. This objective system will provide greater protection against jamming and will increase efficient use of satellite resources by a factor of four. Engineering development efforts for the antijam/control modem to be used with the multichannel SHF initial system continued. A full scale production contract for the AN/TSC-85 and AN/TSC-93 Multichannel Initial System Terminals was initiated.

c. (U) Satellite Communications: In FY 1974, a contract was awarded for investigation into the potential application of a Millimeter Wave Antenna. Investigations were also initiated for a Peak Power Amplifier and potential use in the Ground Mobile Forces Satellite System. Investigation into these areas continued through FY 1977. In FY 1977, study efforts were initiated for a low cost antenna tracking system, a surface acoustic wave bandpass filter, a 40-megabit/second (MBS) coder, and an alternate frequency investigation. In FY 1978, the 40-Megabit Coder investigation and a feasibility model

Program Element: #3.31.42.A
DOD Mission Area: #256 - Tactical Communications

Title: Satellite Communications Ground Environment
Budget Activity: #4 - Tactical Programs

Low-Power/Peak-Power Amplifier tube was completed. Development of a low cost antenna tracking system also continued. This system eliminates the need for a programmer or servo-system for application in the low-cost SHF terminal development effort. Efforts on the 20 GHz receiver feasibility model were also continued. Electromagnetic Compatibility Analysis of Satellite terminals was initiated.

2. (U) FY 1980 Program:

a. (U) Defense Satellite Communications System (DSCS): Award the system design contract for the Real Time Adaptive Control System (RTACS) which is essential for operation with the DSCS III satellites scheduled for early CY 1983 launch. Task the development contractor for design of the retrofit for the Satellite Configuration Control Element (SCCE) for operation with BATSON II communications security equipment. Engineering development efforts for the Burst Error Correction Coder and the Adaptive Power Control equipment will be initiated.

b. (U) Tactical Satellite Communications (TACSATCOM): Continue engineering development efforts of the Antijam/Control Modem for the multichannel initial system (MCIS) terminals. Advanced development efforts for the Super High Frequency (SHF) Demand Assigned Multiple Access (DAMA) Modem for the Multichannel Objective System will be continued. This objective system, which is being developed for fielding in the 1990's, will increase protection against jamming threats, and will improve the efficient use of satellite resources. Initiate system engineering for the Advanced Design Models (ADM) of the Multichannel Objective System (MCOS) terminal and Single-Channel Objective Tactical Terminal (SCOTT) efforts.

c. (U) Satellite Communications: Continue electromagnetic compatibility analysis of the Ground Mobile Forces Satellite Communications Terminals. Initiate 30 GHz transmitter feasibility model development to increase antijam protection in the up-link.

3. (U) FY 1981 Planned Program:

a. (U) DSCS: Continue the system design effort for RTACS. The SCCE retrofit development efforts for operation with BATSON II communications security equipment will be completed. The Burst Error Coder and the Adaptive Power Control engineering developments will be completed. Award contracts for the development of a 30/20 GHz modulation subsystem and 30/20 GHz terminals for use with the Extra High Frequency (EHF) satellite scheduled for launch in 1986.

b. (U) TACSATCOM: Development Test/Operational Test (DT/OT) II testing of the Antijam/Control Modem for the multichannel SHF initial system terminals will be completed. Advanced development efforts for the SHF Demand Assigned Multiple

Program Element: #3.31.42.A Title: Satellite Communications Ground Environment
DOD Mission Area: #256 - Tactical Communications Budget Activity: #4 - Tactical Programs

Access (DAMA) Modem for the multichannel objective system will continue. Continue system engineering for the MCOS and SCOTT Advanced Development Models (ADM) terminal efforts. Award ADM contract for DAMA Terminal for the MCOS.

c. (U) Satellite Communications: Development of a solid-state low-noise amplifier and a high-power amplifier will be initiated. This equipment is required to allow operations in the higher frequency bands and relieve congestion in the lower frequency ranges. Continue 30 GHz transmitter feasibility model development and electromagnetic compatibility analysis of satellite terminals. All necessary experimental work will be performed, and proposed systems will be ready for full-scale development.

4. (U) FY 1982 Planned Program:

a. (U) DSCS: Complete system design of the RTACS. Award a contract for support of the Engineering Design Models (EDM) SCCE equipment. Award contracts for development of a Downlink Jamming Cancellor and an Adaptive Channelized Bandpass Attenuator to enhance the DSCS antijam capabilities. Continue contracts for development of a 30/20 GHz modulation subsystem and 30/20 GHz terminals. Initiate system design of a Limited Network Control Element for use with Worldwide Military Command and Control System (WWMCCS) Transportable Terminals.

b. (U) TACSATCOM: Complete the multichannel SHF DAMA Modem advanced development effort which will provide the cornerstone of the TACSATCOM multichannel objective system (MCOS). Initiate the Single Channel Objective Tactical Terminal (SCOTT) ADM effort which will provide Electronic Counter-Countermeasure (ECCM) and Demand Assigned Multiple Access (DAMA) capability for critical single channel Army command and control communications. Continue system engineering for advanced development of the MCOS terminal and SCOTT efforts.

c. (U) Satellite Communications: Complete the feasibility model development efforts for the 30 GHz transmitter, low-noise amplifier and high-power amplifier. Complete electromagnetic compatibility analysis of terminals.

5. (U) Program to Completion: This is a continuing program.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D253 Title: Defense Satellite Communications System
Defense Communications System (Phase II)

Program Element: #3.31.42.A Title: Satellite Communications Ground Environment
DOD Mission Area: #256 - Tactical Communications Budget Activity: #4 - Tactical Programs

A. (U) DETAILED BACKGROUND AND DESCRIPTION: The Initial Defense Communications Satellite Project (IDCSP) was initiated in 1962 to establish research and development in military satellite communications and to provide a limited operational capability. Investigation of satellite communications was necessary to: improve service, quality, capacity, and reliability of segments of the Defense Communications System (DCS); provide contingency communications required during crisis or limited war; and provide communication for high priority users. The IDCSP evolved into the Phase I, Defense Satellite Communications System (DSCS) which became operational in 1967. To improve the capacity, reliability, and quality of the DSCS, a Phase II Program was approved in June 1968 and initiated in FY 1969. Phase II DSCS employs new satellites, terminals, and modulation equipment. In the DSCS program, the Army develops the satellite communications ground terminals and associated equipment in response to requirements developed by the Defense terminals - the Heavy and Medium Terminals. In Phase II, DSCS, the Army has developed Heavy, Medium, and Light Terminals, and associated modulation equipment to convert the DSCS to a digital system with a higher capacity and reliability. These improved terminals are required to satisfy known and contingency operational needs of the World Wide Military Command and Control System (WWMCCS), the National Communications System (NCS), and other elements of the DCS. In order to optimize the capacity and efficiency of the DSCS, the Army is charged with the development of a control system that will provide an effective control capability for the expanded DSCS of the 1980's. Past efforts resulted in the development of a manual control system for the IDCSP and for Phase II, DSCS, the first automated Pilot Control System. Present and future efforts are directed toward expanding the Pilot Control System for interim use and developing a Real Time Control System (RTACS) to automate, expand, and increase the speed and accuracy of the control functions for the DSCS. Following the US Air Force development of the DSCS III satellite and the Satellite Communications Control Element (SCCE), the Army will procure the SCCE. The SCCE will provide the DSCS Control System with an improved and automated capability for allocating satellite resources. The SCCE will provide operational command and control of the DSCS III satellites to optimize utilization of premium satellite resources in support of realtime user requirements. Present and future efforts are also directed toward providing other increased capabilities. Spread Spectrum Conferencing and Beacon Entry equipment will provide a communications conferencing capability and an alternative means of establishing communication links with the Spread Spectrum Multi-Access (SSMA), AN/USC-28, antijam equipment. This conferencing capability is needed for the WWMCCS and to expand the utility of secure communications. The Low-Rate Multiplexer is a less expensive, programable multiplexer that will be used for low-data-rate users. It provides an alternative to existing new equipment and is adaptable to SSMA use to provide jam-resistant communications. The Burst Error Correction Coder provides both forward error correction coding and protection against burst jamming. It is needed for use with the AN/USC-28. The downlink jamming canceller and the adaptive channelized bandpass attenuator will increase protection against jamming. The 30/20 GHz terminal and modulation developments will make it

Project: #D253 Title: Defense Satellite Communications System
Defense Communications System (Phase II)

Program Element: #3.31.42.A Title: Satellite Communications Ground Environment
DOD Mission Area: #256 - Tactical Communications Budget Activity: #4 - Tactical Programs

possible for certain of the DSCS users to operate in the less crowded K-band. The Limited Network Control Element will integrate control of Jam-Resistant Secure Conferencing (JRSC) into RTACS.

B. (U) RELATED ACTIVITIES: The Defense Communications Agency (DCA) is the Defense Satellite Communications System (DSCS) Program Manager. In support of the DSCS, the Army is responsible for development of the ground environment; the Air Force is responsible for development and launching of the satellite; and the Navy is responsible for development of the shipboard terminals. The ground environment consists of the earth terminals, modulation equipment, Antijam (A/J) equipment, and the Jam-Resistant Secure Conferencing (JRSC) equipment being developed for the World Wide Military Command and Control System (WWMCCS).

C. (U) WORK PERFORMED BY: The US Army Satellite Communications Agency, Fort Monmouth, NJ, has been designated the project office for the development of the ground complex of the Defense Satellite Communications System. The Commander of the Agency is the Project Manager. Primary contractors for the Phase II system are: Ford Aerospace Corporation, Western Development Laboratories Division, Palo Alto, CA, for the Pilot Control System extension (PCS-X), and Raytheon Company, Sudbury, MA, for the Pseudo Noise/Time Division Multiple Access (PN/TDMA) equipment; and Linkabit, La Jolla, CA, and CNR, Needham, MA, for the Burst Error Correction Coder. Magnavox Research Laboratories, Torrance, CA, for the spread spectrum conferencing and beacon entry equipment; General Atronics, Philadelphia, PA, for the Low-Rate Multiplexer.

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: The Phase I DSCS became operational in July 1967 and was expanded to include wideband 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 a Time Division Multiple Access (TDMA) capability. In FY 1973 engineering development of the AN/USC-28 Spread Spectrum equipment and the Light Terminal was initiated. In FY 1974 an engineering development contract was awarded for Quadra-Phase Shift Keying (QPSK) equipment. The Heavy Terminal, Light Terminal, TDMA, and QPSK developments were completed by 1975. The Signal Processing equipment (QPSK, AN/USC-28) is included in the Digital Communications Subsystems which are under fabrication by Tobyhanna Army Depot and will be used with the Heavy Terminal (AN/FSC-78) and Medium Terminal (AN/GSC-39). Developments were initiated in FY 1975 for G/T 34 and G/T 26 antennas which are required for use with the Medium and Light Terminals. These antennas were completed in FY 1976 and 1977 respectively. Development of of the AN/USC-28 was completed in FY 1977. Design approaches for Burst Error correction equipment and Low-Rate Multiplexer were also completed in FY 1977. This equipment is required to increase accuracy and efficiency

Project: #D253 Title: Defense Satellite Communications System
Defense Communications System (Phase II)

Program Element: #3.31.42.A Title: Satellite Communications Ground Environment
DOD Mission Area: #256 - Tactical Communications Budget Activity: #4 - Tactical Programs

during antijam operations. In FY 1978 advanced development of the Pilot Control System (PCS) was completed. Contracts were also awarded for extension of the PCS, continuation of the low-rate multiplexer development for a conferencing and beacon entry capability for the AN/USC-28, advanced development of a Burst Error Correction Coder, and interface of the Satellite Configuration Control Element (SCCE) and the AN/FSC-78 terminals. In FY79 the development of the PCS was continued to enable interim use of the system for the Atlantic satellite.

2. (U) FY 1980 Program: The Real Time Adaptive Control system design contract will be awarded this fiscal year. In addition, task the development contractor for design of the retrofit for operation with BATSON II communications security equipment required for satellite control. Contracts will be awarded for engineering development of the Burst Error Correction Coder to expand the protection of spread spectrum equipment under burst jamming conditions and engineering development of the Adaptive Power Control equipment to provide the capability for automatic power adjustment in the RTAC's. For the Real Time Adaptive Control development, a separate contract will be awarded for validation and verification of software. All necessary experimental work will be performed, and the burst error correction coder and Adaptive Link Power Control will be ready for full-scale development.

3. (U) FY 1981 Planned Program: The Real Time Adaptive Control System design effort will continue through this fiscal year. The first contracts for support of the DSCS III System and 1986 Extra High Frequency (EHF) satellite launch will be awarded for development of a 30/20 GHz Modulation subsystem and 30/20 GHz terminals. The Burst Error Correction Coder and Adaptive Power Control engineering developments will be completed.

4. (U) FY 1982 Planned Program: The system design of the Real Time Adaptive Control System will be completed. Support will be provided for the Engineering Design Models (EDM) SCCE equipment. The contracts for development of a 30/20 GHz modulation subsystem and 30/20 GHz terminals will be continued. To provide for increased ECCM capabilities, contracts will be awarded for development of a Downlink Jamming Canceller and for development of an Adaptive Channelized Bandpass Attenuator. System design will be started for a Limited Network Control Element for use with WWMCCS Transportable Terminals.

5. (U) Program to Completion: This is a continuing program.

6. (U) Major Milestones: Not Applicable.

Project: #D253

Title: Defense Satellite Communications System
Defense Communications System (Phase II)

Program Element: #3.31.42.A

Title: Satellite Communications Ground Environment

DOD Mission Area: #256 - Tactical Communications

Budget Activity: #4 - Tactical Programs

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	4237	8990	15188	22813	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	3663	9000	11300	-	Continuing	Not Applicable
Other Procurement, Army						
Funds (current requirements)	40400	107000	104800	73900	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	42800	112400	91100	-	Continuing	Not Applicable
Quantities*						

The increase in RDTE funds for FY 1979 is due to efforts to accelerate fielding of the Pilot Control System (PCS-X). The decrease in FY80 is due to a general Congressional reduction applied to this project. The increase in RDTE funds for FY 1981 submission results from initiation of development of the next generation of DSCS terminals and for system design of a Limited Network Control Element for use with World Wide Military Command and Control System (WWMCCS) Transportable Terminals, as directed by OSD. In addition, new inflation indexes were used in FY81. The reduction in FY79 procurement funding is due to deferral of FY 1979 light terminal requirement to FY 1984. The decrease in FY 1980 is due to finalization of the Real Time Adaptive Control System (RTACS) aquisition strategy which eliminated the need for 1980 funds. Also, the JRSC program was restructured from a three-year to a four-year effort. In FY 1981 the control orderwire subsystem interface hardware and Satellite Communications Control Element (SCCE) procurement funding increased due to better program definition.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D456 Title: Tactical Satellite Communication Systems
Program Element: #3.31.42.A Title: Satellite Communications Ground Environment
DOD Mission Area: #256 - Tactical Communications Budget Activity: #4 - Tactical Programs

A. (U) DETAILED BACKGROUND AND DESCRIPTION: The Army, along with the Air Force and Marine Corps, requires a family of man-pack and mobile Tactical Satellite Communications (TACSATCOM) terminals to improve the effectiveness and reliability of the communications equipment needed to meet critical tactical command and control and intelligence requirements. TACSATCOM will provide communications links over difficult terrain profiles with quick set-up/tear-down times and will offer the highest possible assurance of positive and continuous communications between widely dispersed and fast-moving tactical forces. TACSATCOM will further reduce the threat of physical damage by allowing personnel to deploy terminal equipment at sites less exposed to detection and direct fires. The objectives of this program are: (a) to develop and procure single channel and multichannel tactical satellite communication capabilities for use by Ground Mobile Forces; (b) to develop operational concepts; and, (c) to support special military operational needs. This equipment will replace existing line-of-sight equipment where it is more cost effective or where it meets essential military requirements that are not being actively accomplished by other means.

B. (U) RELATED ACTIVITIES: Management of the Army TACSATCOM Program is vested in the Project Manager, Satellite Communications, Fort Monmouth, NJ. The Army is responsible for development of ground terminals for all Services. Similarly, the Air Force and Navy are developing airborne and shipborne terminals respectively. The Air Force is also responsible for the development and launching of the satellites required to support all Services.

C. (U) WORK PERFORMED BY: The US Army Satellite Communications Agency, Fort Monmouth, NJ, is the project office for the development and procurement of all ground terminals for the Services. Contractors include: RCA, Camden, NJ; Magnavox Government and Industrial Electronics Company, Fort Wayne, IN; Harris Corporation, Melbourne, FL; Martin-Marietta Corporation, Orlando, FL; and Cincinnati-Electronics, Cincinnati, OH. Also, work is performed by Tobyhanna Army Depot, Tobyhanna, PA, and Naval Ocean Systems Center, San Diego, CA.

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: 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. Subsequent tests results proved the feasibility of using satellite communications to meet tactical requirements. A System Development Plan was prepared and in December 1972, an advanced development contract was awarded to RCA Corporation, Camden, NJ for SHF ground terminals to be mounted in 1/4 ton trailers and 1 1/4 ton trucks. In FY 1974, the RCA SHF small terminal contract was expanded to include an engineering development for a SHF Communications Control Facility

Project: 0D456 Title: Tactical Satellite Communication Systems
Program Element: 03.31.42.A Title: Satellite Communications Ground Environment
DOD Mission Area: 0256 - Tactical Communications Budget Activity: 04 - Tactical Programs

required to better utilize the full capability of existing and planned satellites. Engineering development contracts were also awarded for: Ultra High Frequency (UHF) Antennas to Harris Corporation, Melbourne, FL; Tactical Satellite (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 an Anti-Jam/Control Modem with Harris Corporation, Melbourne, FL. In FY 1976, the SHF Satellite Communication Terminals were type classified and a contract was awarded for a Low-Rate Initial-Production (LRIP) quantity of SHF terminals. In FY 1977, developmental contractual efforts were completed on the Manpack Transceiver and the AJ/Control Modem and, the Communication Control Facility (AN/TSQ-118) was type classified. In FY 1978, an engineering development contract was awarded for an Anti-Jam/Control Modem for the multichannel SHF initial terminals. Development Test/Operational Test II (DT/OT II) testing of the UHF Manpack System was initiated in FY 1978 and will continue into FY 1979. Continued engineering development was conducted on the Anti-Jam (AJ)/Control Modem for the Multichannel initial system terminals.

2. (U) FY 1980 Program: Continue engineering development and initiate Development Test/Operational Test (DT/OT) II testing of the Anti-Jam/Control Modem capability which is critical to the Multichannel Initial System fielding. Continue advanced development of a Demand Assigned Multiple Access (DAMA) Modem that will be fielded as a component of Multichannel Objective System Terminals in the 1990's to replace existing first generation multichannel systems. This multichannel objective system will increase the efficient use of premium satellite capacity by a factor of four, as well as increase anti-jam protection. Initiate system engineering contract for the Advanced Development Models (ADM) Multichannel Objective System (MCOS) terminal and Single Channel Objective Tactical Terminal (SCOTT) efforts.

3. (U) FY 1981 Planned Program: Complete Development Test/Operational Test (DT/OT) II testing of the Anti-Jam/Control Modem for the multichannel SHF initial systems terminals. Continue Advanced Development (AD) of the multichannel Demand Assigned Multiple Access (DAMA) Modem for the Multichannel Objective System (MCOS). Continue system engineering for the MCOS and SCOTT ADM terminal efforts. Award ADM contract for DAMA terminal for the MCOS.

4. (U) FY 1982 Planned Program: Complete the multichannel SHF DAMA Modem advanced development effort which will provide the cornerstone of the TACSATCOM multichannel objective system (MCOS). Initiate the single channel objective tactical terminal (SCOTT) ADM effort which will provide ECCM and DAMA capability for critical single channel Army command and control communications. Continue system engineering for advanced development of the MCOS terminal and SCOTT efforts.

5. (U) Program to Completion: This is a continuing program. Completion of all engineering development contracts, DT/OT's, and introduction of the family of terminals in the Army inventory remain to be accomplished. Related research and development efforts in the area of modems, exciter drivers, etc., will continue toward more efficient use of satellite power.

Project: #D456 — Title: Tactical Satellite Communication Systems
Program Element: #3.31.42.A — Title: Satellite Communications Ground Environment
DOD Mission Area: #256 - Tactical Communications — Budget Activity: #4 - Tactical Programs

6. (U) Major Milestones: Not Applicable.

7. (U) Resources ($ in thousands):

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	5283	11100	10693	16815	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	4034	11100	9300	-	Continuing	Not Applicable
Quantities (current requirements)*						
Quantities (as shown in FY 1980 submission)*						
Other Procurement, Army:						
Funds (current requirements)	66600	30800	59000	95200	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	65200	27200	110000	-	Continuing	Not Applicable
Quantities (current requirements)*						
Quantities (as shown in FY 1980 submission)*						

*Large number of diverse items.

Increase in FY79 procurement funding reflects nonrecurring cost of hardware/software integration for the AN/GSC-40 program. Increase in FY80 procurement funding provides for one additional AN/GSC-40 command post, by direction of OSD.

Increase in FY 1979 RDTE funding due to additional anti-jam control modem requirements to provide new acquisition capability and data rates suitable for other services. Increase in RDTE funding in FY81 reflects a change in inflation indices.

Project: 0D456 Title: Tactical Satellite Communication Systems
Program Element: 63.31.42.A Title: Satellite Communications Ground Environment
DOD Mission Area: 0256 - Tactical Communications Budget Activity: 04 - Tactical Programs

Reduction in FY 1981 procurement funding is due to rescheduling of AN/MSC-65 production contract award from FY80 to FY81 thereby providing less than one full year's production effort; and by reduction of multichannel Initial System Terminal production rate.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #3.31.45.A Title: EUCOM Command, Control, and Communications Systems (EUCOM C^3 Systems)

DOD Mission Area: #251 - Theater Command and Control Budget Activity: #4 - Tactical Programs

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT QUANTITIES	778	1000	2309	2612	1360	14086
DH58	EUCOM C^3 Systems	778	1000	2309	2612	1360	14086

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program supports a continuous effort in response to the Deputy Secretary of Defense tasking for Army to examine the entire Command, Control, and Communications structure in Europe and propose options for improvements. A Joint Chief of Staff (JCS) study was initiated in 1974 on the C^3 picture in Europe. The study identified deficiencies requiring research development and acquisition initiatives toward the most cost-effective means of improving the European C^3 picture. The 2 May 1979, OSD C^3I Memorandum tasked the Army to begin immediate near-term improvements of Communication facilities that support Nuclear Weapons storage sites. This project was identified as top priority and program implementation has begun. Presently three communications networks support the European nuclear weapons storage sites, an HF radio net, a voice console system with circuits primarily traversing the Defense Communication System (DCS) network and an ultra High Frequency (UHF) satellite net which augments the Cemetary Net and the European Command and Control Console System (ECCS) south of the Alps. The Commander needs a Communications network capable of meeting the demand for instantaneous and faultless transmission. Present communications support systems have been operating for many years, but for the past three years have come under severe criticism.

Efforts under this program are essential in analyzing and implementing the C^3 requirements necessary to establish an efficient, responsive and survivable communications system to support the nuclear weapons storage sites.

C. (U) BASIS FOR FY 1981 RDTE REQUEST: Funding in FY 1981 will initiate the upgrade of the High Frequency (HF) Single Sideband (SSB) unsecure voice radio of the United States European Command (USEUCOM). HF radio equipment, consisting of radios,

consoles and ancillary equipment, will undergo reconfiguration and reliability testing to increase net responsiveness. Two new sites south of the Alps will be activated and evaluations of additional sites will be undertaken. Complete system test and prepare test report for the ECCCS upgrade.

D. (U) BASIS FOR CHANGE BETWEEN FY 1981 AND FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1979	FY 1980	FY 1981	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	778	1000	2309	3972	14086
Funds (as shown in FY 1980 submission)	864	1000	0	0	0

The difference in funding for FY 1981 is to support the initial phase of a three-phase improvement program of the Nuclear Weapon Storage (NWS) site communication network by upgrading the HF radio capability as directed by OSD.

E. (U) OTHER APPROPRIATION FUNDS: ($ in thousands): Not Applicable

Program Element: #3.31.45.A Title: EUCOM Command, Control, and Communications Systems (EUCOM C^3 Systems)

DOD Mission Area: #251 - Theater Command and Control Budget Activity: #4 - Tactical Programs

F. DETAILED BACKGROUND AND DESCRIPTION: Deputy Secretary of Defense Memorandum, 14 March 1974, directed the Joint Chiefs of Staff (JCS), with the Army as Executive Agent, to examine the entire Command, Control, and Communications (C^3) picture in Europe and to propose options for improvement. The study was initiated in April 1974 and a final report, identifying deficiencies requiring research, development, and acquisition initiatives, was submitted to JCS in August 1975. The JCS completed their review in February 1976 and submitted their comments to the Secretary of Defense (SECDEF). Since then, the report and its recommendations have served as a baseline for actions undertaken to improve the many aspects of European C^3. As a related action, Deputy Secretary of Defense Memorandum, 24 June 1976, directed the Secretary of the Army to plan for the expansion of Headquarters Allied Powers, Europe (SHAPE) Static War Headquarters (Project 85) which included a European Command (EUCOM) Cell accommodating a hardened command center. Integration of USEUCOM's hardened command center required detailed technical analyses and evaluation of initiatives that optimize shared physical facilities as well as communications and Automatic Data Processing (ADP) equipment procedures. These facilities had to meet common survivability and interoperability criteria. Tasks accomplished under the program are essential in defining and analyzing C^3 requirements necessary to establish an efficient and survivable C^3 system in the European environment. By OSD tasking memo of 2 May 1979, the Department of the Army (DA) was appointed Executive Agent for the European NMS communications improvements. DA identified the Army Communication Command (ACC) as the responsible command and set about to give the program definition. Having been designated by DOD as a top priority project, ACC responded that improvements to the NMS communications support would be accomplished in three phases, near-term (FY79-80), mid-term (FY81-86) long-term (FY87 and out).

G. (U) RELATED ACTIVITIES: Initial efforts accomplished under this program were used as part of the input data to a related study and configuration prototype evaluation developed under Program Element (PE) 6.37.35 and Worldwide Military Command and Control System (WWMCCS) Architecture. Each of these studies addressed a different portion of the Command, Control, and Communications environment. PE 6.37.35 is no longer funded.

H. (U) WORK PERFORMED BY CONTRACTORS: BDM Corporation, McLean, VA; International Telephone Telegraph Co. Nutley, N.J. Developing Organization, US Army Communications Command, Fort Huachuca, AZ.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: The FY78 program analyzed the results for the collation and European C^3 enhancement. Specific areas were: Communication Security (COMSEC) design of methods equipment and precedures for necessary

Program Element: #3.31.45.A Title: EUCOM Command, Control, and Communications Systems (EUCOM C^3 Systems)

DOD Mission Area: #251 - Theater Command and Control Budget Activity: #4 - Tactical Programs

COMSEC interface between European Command (EUCOM) and the Supreme Headquarters Allied Powers, Europe (SHAPE); Communications interoperability of the US and North Atlantic Treaty Organization (NATO) voice communications, SHAPE switchboard, interface analysis of EUCOM and SHAPE conferencing design. The FY 1979 program continued those efforts started in FY 1978, specifically external communication survivability of EUCOM and Project 85; collocation reporting requirement and European analyses of Army C^3 requirements. Reprogramming of FY 1979 funds to initiate improvements in the Cemetary Net was approved by Congress.

2. (U) FY 1980 Program: The FY 1980 program will finalize survivability, vulnerability are interoperability analyses and provide a comprehensive transition plan for proceeding to an orderly procurement program. Any unresolved and unforecasted requirements arising from this effort during FY 1980 will be completed.

3. (U) FY 1981 Planned Program: Efforts FY 1981 will be to improve the reliability of the High Frequency (HF) equipment at selected nuclear capable units; reduce Radio Frequency (RF) signature while communications vans are in transit and provide secure anti-jam links between field storage sites, delivery units, mobile and fixed command headquarters.

4. (U) FY 1982 Planned Program: Continue to improve and expand direct command and control communications by augmenting the Cemetery Net with UHF SATCOM terminals. Initiate examination of potential difficulties in transitioning from mid-term AFSATCOM systems to proposed Strategic Satellite System (SSS).

5. (U) Program to Completion: Focus on strategy to provide a new NWS communications system which can be optimally designed for the tactical nuclear force mission and invulnerable to the threat. Emphasis is to be placed on new technologies to develop a flexible system with an optimum configuration to meet the changing threat.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.37.12.A Title: Mapping and Geodesy
DOD Mission Area: #321 - Navigation and Positioning Fixing Budget Activity: #5 - Intelligence and Communications

A. (U) RESOURCES (PROJECT LISTING): ($ in Thousands)

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	265	930	0	718	Continuing	Not Applicable
	QUANTITIES	Prototype Analytical Photogrammetric Positioning System (APPS)					1
		Prototype Quick Reaction Multicolor Printer (QRMP)					1
		Prototype Forward Area Positioning System (FAPS)					1
D862	Terrain Data Development	210	0	0	0		
D580	Field Army Mapping	0	900	*0*	*718*	*Continuing*	*Not Applicable*
D673	Field Army Surveying	55	30	0	0	Not Applicable	Not Applicable

B. (U) BRIEF DESCRIPTION OF PROJECT: This program was established to support the advanced development and testing of equipment and techniques in support of the field Army in the areas of position location and mapping. The program element consists of two projects: D580, Field Army Mapping, and D673, Field Army Surveying. The objectives of this advanced development program were to develop techniques, software, and equipment for Army mapping, surveying, and Military Geographic Intelligence activities in direct support of Field Army tactical deployment of forces and weapon system operation. This program included work on the development of new high-accuracy and rapid-response surveying and mapping system. Major elements of the program were the development of an Analytical Photogrammetric Positioning System, a Low Cost Northseeker, a Forward Area Positioning System, and a Quick Response Multicolor Printer and other advanced components to upgrade the Topographic Support system. This program addressed the development of continually increasing Army capabilities to generate and disseminate up to date general and special purpose map data which would have enabled Commanders to use the terrain to their advantage against numerically superior forces and to provide coordinates, elevations, and azimuths quickly and accurately enough to allow artillery fires to be delivered for maximum effort.

C. (U) EXPLANATION OF CANCELLATION OR DEFERRAL: The Field Army Surveying Project (D673) was cancelled because anticipated requirements for development of new capabilities for a Forward Area Positioning System and a Low Cost Northseeker have not yet been generated. FY 1981 funds for the Field Army Mapping Project (D580) were deleted because the requirement for development of a Quick Response Multicolor Printer (QRMP) had not been approved in time for the FY 1981 budget submission. However, the requirements document has since been approved and the QRMP will be pursued in FY 1982.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.42.01.A
Title: Aircraft Avionics
DOD Mission Area: #321 - Navigation & Position Fixing
Budget Activity: #5 - Intelligence and Communications

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	4584	3651	8531	15020	Continuing	Not Applicable
	QUANTITIES						
DC95	Airborne Data Links	3110	595	4335	5995	0	13995
DC96	Aircraft Navigation & Control Systems	309	0	3014	5813	Continuing	Not Applicable
DC97	Avionics Systems	1165	3056	1182	3252	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program element provides for engineering development leading to production of data link, avionics, and air traffic control equipment. There is a need to provide aircraft subsystems and ground equipment which enable Army tactical helicopters and special mission aircraft to provide continuous support during adverse weather, day and night, in an enemy air defense and electronic warfare environment. Aircraft do not currently possess this capability.

Program Element: #6.42.01.A
DOD Mission Area: #321 - Navigation & Position Fixing

Title: Aircraft Avionics
Budget Activity: #5 - Intelligence and Communications

C. (U) BASIS FOR FY 1981 RDTE REQUEST: The FY 1981 request supports continuation of OV-1D MOHAWK data link improvement; and engineering development of Integrated Avionics Control Systems (IACS), an Advanced Map Display, a Digital Data Bus Tester, and an Integrated Inertial Navigation System.

D. (U) BASIS FOR CHANGE BETWEEN FY 1981 AND FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1979	FY 1980	FY 1981	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	4584	3651	8531	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	6539	756	4201	Continuing	Not Applicable

Decreased funding in FY79 was made to finance higher priority programs. DC95 decreased by $1.0 million, DC96 decreased by $1.075 million, and DC97 was increased by $.3 million thru reduction of funds. Increase of 2.895 million in FY80 is a result of Congressional action which moved the money from the Airborne Avionics modification (procurement of AN/ARC 114 radio couplers) to Research and Development funding under this Project Element. FY81 increases include additional funds for components for Airborne Data Links (DC95) and to complete development of ten ASN/132 inertial navigation systems under DC96.

E. (U) OTHER APPROPRIATION FUNDS: Not Applicable.

Program Element: #6.42.01.A
DOD Mission Area: #321 - Navigation & Position Fixing

Title: Aircraft Avionics
Budget Activity: #5 - Intelligence and Communications

F. DETAILED BACKGROUND AND DESCRIPTION: Project DC95 (Airborne Data Links) is responsive to the OV-1D MOHAWK side looking airborne radar (SLAR), AN/APS-94F)

Efforts under project DC97 include the Integrated Avionics Control System (IACS) which will use integrated control panel, microprocessor and data bus multiplexing techniques to achieve significant saving of cockpit space. Other efforts include system installation and engineering support, and developments in communications accessories and antennas, including radio processing and ECCM improvements. Under project DC96, an integrated navigation system (AN/ASN-132) is being developed. For autonomous operation system must be self-contained and resistant to exploitation. To accomplish this, an inertial system is used as the primary aircraft position sensor. The time varying error from the inertial unit is updated by precision, multi-station TACAN data in an on-board digital computer. Present Special Electronic Mission Aircraft (SEMA) have a 1969 vintage inertial system, the AN/ASN-86, which is antiquated and unreliable. The SEMA fleet will double in size in the next five years.

G. RELATED ACTIVITIES: In order to avoid unnecessary duplication of effort, direct coordination, monitoring and participation of other service, Federal Aviation Administration (FAA), National Aeronautic and Space Administration (NASA), organizations's efforts are accomplished.

The Inertial Navigation System (AN/ASN-132) being developed under project DC96 takes advantage of Air Force developments under the Precision Location/Strike System (PLSS) (PE 6.47.42.F). The Air Force has developed, and is nearing production, of a form-fit-function (F^3) standard inertial navigation unit (INU) for its A-10 aircraft. The Army has participated in preparation of the specification and source selection for the F^3 INU. The inertial sensor for the AN/ASN-132 will be the Standard INU. Accordingly, schedules and funds are being coordinated with the Air Force, and the Army quantity will be procured via a Military Interdepartmental Procurement Request (MIPR).

H. (U) WORK PERFORMED BY: Combat Surveillance and Target Acquisition Laboratory (Project DC95), Project Manager, Navigation and Control Systems (Project DC96), and US Army Avionics Research and Development Activity (Project DC97), Fort Monmouth, NJ. Contractors include: Grumman Aerospace Corporation, Bethpage, NY; Rockwell International Corporation, Cedar Rapids, IA; American Electronic Laboratories, Inc., Colman, PA; Litton Industries, Woodland Hills, CA; Collins Radio, Cedar Rapids, IA; AEL Service Corporation, Landsdale, PA; and Raycom, Freehold, NJ.

Program Element: #6.42.01.A
DOD Mission Area: #321 - Navigation & Position Fixing

Title: Aircraft Avionics
Budget Activity: #5 - Intelligence and Communications

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: Completed Engineering Development (ED) models of AN/ARC-98 high frequency radio. ED models (from two contractors) of the Integrated Avionics Control System (IACS) were delivered. AN/ARC-114 and AN/ARC-115 radios have been modified for digital remote control operation in support of the IACS program. Plans were delivered for an integrated IACS/Doppler/Projected Map Display system. Contracted for an advanced development (AD) model of AN/ASN-132 to develop mathematical software algorithm for TACAN update of inertially derived position data. Completed hardware fabrication, software coding and system integration phases of AD contract.

2. (U) FY 1980 Program: Engineering Development models of the Integrated Avionics Control System (IACS) from Collins Radio and Grumman Aerospace will be tested. *If tests are successful, a request for proposal* for production models will be issued. Complete the present AD requirements document and contract with software verification flight testing. Initiate an engineering development (ED) phase by contracting for prototype components of the Modular Integrated Communications and Navigation System (MICNS) data link. Conduct in-house effort to define system integration and modification to adapt the current data link hardware to the OV-1 MOHAWK application.

3. (U) FY 1981 Planned Program: Contract for an Advanced Map Display System which will provide Army aircraft with a day/night nap-of-the-earth navigation capability through the use of a doppler-driven advanced map display. All necessary experimental work has been performed and the proposed system is ready for full scale development. The nap-of-the-earth communication, control, and display functions will be incorporated into the Integrated Avionics Control System (IACS). Initiate a program for a data bus tester. Software will be developed to form the test data into a usable form for data validation and analysis. All necessary experimental work will be performed and the proposed system will be ready for full scale development. Complete development of ten AN/ASN-132 Inertial Navigation Systems. Install and flight test three systems in the Improved Guardrail program. Conduct environmental qualification tests on non-Air Force furnished items. Develop interim ILS documentation. Install one system in Quickfix II prototype aircraft. Test and deliver six additional systems to improved Guardrail. The initiation of hardware fabrication of the side-looking radar will result in three prototype systems built and contract tested over a 12 month period.

4. (U) FY 1982 Planned Program: Continue advanced map display system development. Engineering development contract for a Single Channel Ground and Airborne Radio System (SINCGARS) V antenna will be initiated. All necessary experimental work will be performed and the proposed system will be ready for full scale development. Effort on the data bus tester will continue. Complete Engineering Development on the AN/ASN-132 Inertial Navigation Program. Continue in-house efforts as well as government tests on side looking radar prototypes, and adapt and integrate the system with the data link.

Program Element: #6.42.01.A
DOD Mission Area: #321 - Navigation & Position Fixing

Title: Aircraft Avionics
Budget Activity: #5 - Intelligence and Communications

5. (U) Program to Completion: This is a continuing program. Complete engineering development of advanced map display and data bus controller and transition to production. In response to user requirements, develop air traffic control hardware to the point of production transition. Complete airborne data links project in FY83.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.16.A
Title: Mapping Geodesy
DOD Mission Area: #321 - Navigation and Positioning Fixing
Budget Activity: #5 - Intelligence and Communication

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	950	1528	232	1437	Continuing	Not Applicable
	QUANTITIES	Position and Azimuth Determining System (PADS)					5 PADS ED MODELS (only)
		Analytical Photogrammetric Positioning System					1 AAPP system
		Topographic Support System:					
		Interactive Graphics Equipment (IGE)					1 IGE
		Orthophoto Production Capability (OPC)					1 OPC
D578	Field Army Surveying Equipment	350	169	0	0	Continuing	Not Applicable
D579	Field Army Mapping	600	1359	232	1437	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program element includes RDTE funds necessary to support the engineering development and testing of equipment and techniques in support of the field Army in the areas of position and mapping. The 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 includes work on the development of new high-accuracy and rapid-response surveying and mapping systems such as the Position and Azimuth Determining System (PADS) and the Topographic Support System (TSS). The PADS is urgently needed by the field artillery to provide accurate and timely three-dimensional position information and azimuth for use in the control of field artillery fires. The US Army also requires a highly mobile, modern Topographic Support System (TSS) that is capable of providing topographic products and services to the Army combat, combat support, and combat service support forces to replace topographic equipment presently in the field that is of 1940 and 1950 vintage. Repair parts are scarce or nonexistent, therefore, maintenance in operational situations is a monumental, if not impossible, task. The proposed TSS can provide urgently required, nonstandard, one-time topographic capabilities such as special-purpose color products which are needed in limited quantities for rapid portrayal of battlefield intelligence, command and control systems, escape and evasion, cockpit displays, red-light and black-light viewing and weapon guidance systems.

Program Element: #6.47.16.A Title: Mapping Geodesy
DOD Mission Area: #321 - Navigation and Positioning Fixing Budget Activity: #5 - Intelligence and Communication

C. (U) BASIS FOR FY 1981 RDTE REQUEST: Begin development of Interactive Graphics Equipment and an Orthophoto Production Capability to provide the Topographic Support System (TSS) with a more rapid data processing capability than that provided by currently available commercial equipment.

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1980 Submission
Standardize Quick Response Multicolor Printer	4Q FY 1985	Not Shown
Standardize Interactive Graphics Equipment	1Q FY 1988	4Q FY 1984
Standardize Orthophoto Production Capability	(Formerly Standardize Analytical Plotter) 1Q FY 1988	4Q FY 1984
Standardize AAPPS	1Q FY 1987	4Q FY 1984

Delay in standardizing the two TSS components will be caused by lower funding in FY 1981 to 1984 due to lack of relative Army products.

D. (U) BASIS FOR CHANGE BETWEEN FY 1981 AND FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

RDTE	FY 1979	FY 1980	FY 1981	Additional To Completion	Total Estimated Cost
Funds (current requirements)	950	1528	232	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	840	1539	1875	Continuing	Not Applicable

FY 1979 funding was increased by reprogramming funds from Program Element 6.37.12.A to provide for necessary expenses in completing the Position and Azimuth Determining System (PADS) and the basic TSS. FY80 decreased due to a general Congressional reduction applied to this program. FY 1981 RDTE funds were transferred to higher priority Army programs.

Program Element: #6.47.16.A Title: Mapping Geodesy
DOD Mission Area: #321 - Navigation and Positioning Fixing Budget Activity: #5 - Intelligence and Communication

E. (U) OTHER APPROPRIATION FUNDS: ($ in thousands)

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional To Completion	Total Estimated Cost
Position and Azimuth Determining System						
Funds (current requirements)	13000	14600	19500*	19200	294427**	360727**
Funds (as shown in FY 1980 submission)	12300	14600	14400	-	76100	117400
Quantities (current requirements)	9	30	60*	60	976**	1135*
Quantities (as shown in FY 1980 submission)	9	60	60	-	284	1135
Topographic Support System						
Funds (current requirements)	23000	0	20800	23800	56900	124500
Funds (as shown in FY 1980 submission)	18200	0	25800	0	81700	125700
Quantities (current requirements)						9 Equivalent Systems
Quantities (shown in FY80 submission)						

*Revised FY81 procurement profile is based on current assessment of production capability and current cost estimates
**Significant increase in requirements since last update due to revised assessment of Post D-Day consumption of PADS systems. Current revised FY79 programs for PADS and Topographic Support Systems based on actual contract award costs.

Program Element: #6.47.16.A Title: Mapping Geodesy
DOD Mission Area: #321 - Navigation and Positioning Fixing Budget Activity: #5 - Intelligence and Communication

F. (U) DETAILED BACKGROUND AND DESCRIPTION: The objectives of this program are the engineering development and testing of materiel for field Army survey and point positioning 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. This program element provides the necessary engineering development of the systems and equipment originating in Program Element 6.37.12.A, Mapping and Geodesy. As a result of the formation of the Defense Mapping Agency (DMA) on 1 July 1972, this program element now addresses only the general areas of field Army surveying and mapping. The base plant-related development efforts were transferred to the DMA on 1 July 1972, and the data on these efforts is now included in the Defense Mapping Agency (DMA) program submission. The systems retained in this program element include: (1) the Position and Azimuth Determining System (PADS), a palletized inertial survey platform for jeep or helicopter operation with mobile artillery and missile systems to give realtime control accurate to 20 meters Circular Error Probability (CEP) horizontally, 10 meters PE vertically, and .01 mil in azimuth; (2) the Topographic Support System (TSS), including interactive Graphics Equipment and an Orthophoto Production Capability, which will modernize the field Army topographic battalions (which presently use World War II vintage equipment) so that they will be rapidly responsive in a highly mobile tactical environment; (3) the Advanced Analytical Photogrammetric Positioning System (AAPPS) which will provide the field Army with the capability of determining coordinates of enemy target positions accurate to 25 meters horizontally and 15 meters vertically and of friendly positions to 10 meters CEP and 8 meters vertically using photogrammetric techniques and advanced sensor imagery; and (4) a Quick Response Multicolor Printer (QRMP) for rapid reproduction of limited quantities of topographic products in response to specific requests.

G. (U) RELATED ACTIVITIES: The Army works directly with Air Force, Navy, and Marine Corps and under the coordination of the DMA and the Director, 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 the Army Program Element 6.37.12.A, Mapping and Geodesy. This program element supports the engineering development and testing of equipment and techniques in support of the field Army in the area of position and mapping only.

H. (U) WORK PERFORMED BY: This work is accomplished in-house at the US Army Engineer Topographic Laboratories (USAETL), Fort Belvoir, VA, with assistance from other Army elements, and by contractors under USAETL direction. 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, Inc., Melville, NY. All contracts exceed $25,000.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS: In FY 1972, the Lightweight Gyro Azimuth Surveying Instrument was tested

Program Element: #6.47.16.A Title: Mapping Geodesy
DOD Mission Area: #321 - Navigation and Positioning Fixing Budget Activity: #5 - Intelligence and Communication

and type classified for troop use. This instrument automatically determines true north by sensing the earth's rotation. It replaces an instrument of 1955 vintage and is more accurate, less costly, lighter, more reliable, and easier to maintain than its predecessor. Development of an Analytical Photogrammetric Positioning System to determine position coordinates of weapons systems and potential targets for missile and tube artillery was also initiated. In FY 1973, development and testing of the Analytical Photogrammetric Positioning System were completed and the system was type classified. In FY 1974, development of the Topographic Support System (TSS) was initiated. In FY 1975, the Long Range Position Determining System was tested. 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. In FY 1977, fabrication of the Position and Azimuth Determining System was completed and system DT II/OT II started. Some reliability deficiencies were discovered, and corrective action was taken by the contractor. The system was retested in FY 1978 and was found satisfactory. Selection of off-the-shelf components for the Topographic Support System was also completed. In FY 1979, the PADS was type classified. The Topographic Support System design was reviewed, and a decision was made to type classify sixteen modules on completion of first article tests. Responsibility for procurement of both systems was transferred to the Mobility Equipment Research and Development Center.

2. (U) FY 1980 Program: Begin development of Interactive Graphics Equipment and an Orthophoto Production Capability for addition to the Topographic Support System. Review specifications for each item at a special IPR. Close out development effort on the Position and Azimuth Determining System.

3. (U) FY 1981 Planned Program: Continue development of the two Topographic Support Systems (TSS) developmental items as rapidly as possible.

4. (U) FY 1982 Planned Program: Continue development of Interactive Graphics Equipment and an Orthophoto Production Capability for TSS. Award a contract for design and fabrication of a prototype of the latter.

5. (U) Program to Completion: This is a continuing program. Development and testing of the Topographic Support System Orthophoto Production Capability and Interactive Graphics Equipment will be completed in FY 1986, and they will be standardized. Development effort will begin in FY 1983 on a Quick Response Multicolor Printer and an Advanced Analytical Photogrammetric Positioning System. These items will be fabricated, tested, and standardized by FY 1985 and FY 1987, respectively. Other systems will be developed in later years.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.78.A
Title: NAVSTAR Global Positioning Systems (GPS) User Equipment
DOD Mission Area: #321 - Navigation and Position Fixing
Budget Activity: #5 - Intelligence and Communications

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	9708	15488	19294	25340	Continuing	Not Applicable
	QUANTITIES						32
D168	NAVSTAR GPS EQUIPMENT	9708	15488	19294	25340	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: In general, the conduct of military operations requires that forces involved know their position and velocity. The missions assigned to the Army generate a broad spectrum of both unique and common navigation requirements. The degree to which these requirements are met directly affects the outcome of military operation. Traditionally, precise positioning and navigation (POS/NAV) needs of the Army have been satisfied by a multitude of specialized equipment responsive to particular mission requirements. The result has been a proliferation of POS/NAV systems producing an aggregate of systems with varying degrees of accuracy and capabilities. The operations and maintenance costs for these facilities and user terminals represent a large expenditure of funds each year. If the Army is to increase its effectiveness in a highly mobile battlefield environment as portrayed in emerging tactical doctrine, it must be able to navigate and determine the position of its weapons sytems under conditions of adverse weather, day or night, in all environmental conditions, worldwide. The NAVSTAR Global Positioning System (GPS) will provide the Army an increased capability at an expected significant reduction in life cycle cost with respect to the present systems. GPS will consist of at least 18 satellites, a Master Ground Station, and user equipment in vehicles, ships, airplanes, and manportables. The system will provide global, highly accurate information which will satisfy a significant portion of the Army 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 Joint Program Office (JPO) for the Phase II efforts; i.e., full-scale development of manpack, vehicular, and aircraft equipment.

C. (U) BASIS FOR FY 1981 RDTE REQUEST: Funds are required to continue the full-scale development contracts for a family of manpack, vehicular, and aircraft sets. In addition, funds are required for internal Army Support, Test Planning, Operational Test Vehicle Modification, and Logistics Planning. A production decision for user equipment is scheduled for 1983.

Program Element: #6.47.78.A Title: NAVSTAR Global Positioning Systems (GPS) User Equipment
DOD Mission Area: #321 - Navigation and Position Fixing Budget Activity: #5 - Intelligence and Communications

D. (U) BASIS FOR CHANGE BETWEEN FY 1981 AND FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1979	FY 1980	FY 1981	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	9708	15488	19294	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	9509	15503	25100	Continuing	Not Applicable

Increase in FY79 and decrease in FY81 reflect better defined actual needs during those fiscal years. Decrease in FY80 is due to a general Congressional reduction applied to this program.

E. (U) OTHER APPROPRIATION FUNDS: Not Applicable.

Program Element: #6.47.78.A Title: NAVSTAR Global Positioning Systems (GPS) User Equipment
DOD Mission Area: #321 - Navigation and Position Fixing Budget Activity: #5 - Intelligence and Communications

F. (U) 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. This has resulted in a proliferation of POS/NAV systems with varying degrees of accuracy and capabilities. The operations and maintenance costs for these systems represent a large expenditure of funds each year. 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 which will reduce the total annual expenditure for these 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 satellites will be in 17,600-kilometer orbits. GPS will greatly enhance military capabilities for navigation and position fixing. The NAVSTAR program was approved for concept validation at DSARC I in December 1973 and for full-scale development in August 1979(PHASE II).

G. (U) RELATED ACTIVITIES: This is a joint program with all Services participating. The Air Force is the executive Service. Funding for Phase I, Concept Validation, was derived from program elements 6.34.03.A, 6.34.21.F, and 6.34.01.N NAVSTAR Global Positioning System (GPS). Phase II efforts for user equipment are in program elements 6.47.78.A, 6.47.78.N, 6.47.78.F, and 6.47.19.M. The Phase II NAVSTAR space and control segments are funded by program element 6.44.78.F. The Program Manager for the Joint-Service Program coordinates the supporting activities of the Army, Navy, Air Force, Marine Corps, Defense Mapping Agency, and NATO through his Service and NATO deputies to provide cohesive and complementary development, test, and evaluation of the NAVSTAR Global Positioning System.

H. (U) WORK PERFORMED BY: Contracts for this program were awarded to Magnavox, Torrance, CA, and Rockwell Collins, Cedar Rapids, IA. Internal Army effort is provided by the US Army Communications Research and Development Command (CORADCOM) at Ft Monmouth, NJ.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1979 and Prior Accomplishments: Studies were conducted to determine operational characteristics, performance parameters, and equipment characteristics to meet Army requirements and applications. A Materiel Need with supporting technical plan and cost analysis was prepared and approved for a family of user equipment to satisfy a broad spectrum of Army requirements. The Joint Program Office awarded a contract on 23 October 1974 to General Dynamics Corporation for study and fabrication of ground control systems and joint Service airborne, vehicle, and manportable user system equipment. The Army

Program Element: 6.47.78.A Title: NAVSTAR Global Positioning Systems (GPS) User Equipment
DOD Mission Area: 321 - Navigation and Position Fixing Budget Activity: 5 - Intelligence and Communications

received ten advanced development models of three different types of user equipment. Advanced development contracts were initiated for competitive development of manpack equipment in June 1975 for two sets from Texas Instruments, and in March 1976 for four models from Magnavox. Flight tests, vehicular tests, and manpack tests were conducted at the Army's Yuma Proving Ground, using both a ground-based simulation facility and four operational satellites. Results of these tests were excellent. Both the Magnavox and Texas Instruments Manpacks successfully determined position to an accuracy of better than 10 meters. All of these efforts were funded by the Phase I program elements. A Required Operational Capability (ROC) was prepared and approved in February 1979, and DSARC II was conducted in June 1979. Following the DSARC, full-scale development contracts were awarded for a full family of manpack, vehicular, and aircraft equipment.

2. FY 1980 Program: Contractor development of user equipment continued hardware design neared completion, and software development was initiated. Design of retrofit kits for vehicles and aircraft was initiated. The Logistics concept, including maintenance, training, and supportability, was completed. Development of test equipment for user sets maintenance was initiated.

3. FY 1981 Planned Program: Development of user equipment and test equipment will continue. Design verification tests will be completed, and hardware fabrication will begin. Software development will continue. Detailed development of training materials will be initiated. Design of retrofit kits for operational aircraft and vehicle maintenance will continue.

4. FY 1982 Planned Program: Development of GPS user sets, associated software test equipment, and retrofit kits will be completed. Development test will be initiated. Design of retrofit kits for operational aircraft and vehicles will be completed. Integration of equipment with test vehicles will be initiated. Acceptance tests for user equipment will be initiated.

5. Program to Completion: Plans call for continued support of the NAVSTAR Program. Development and Operational testing of user sets, test equipment, logistics concepts, and training materials will be completed. Production of the NAVSTAR family of user equipment will be initiated. Global Positioning System equipment will also be made available to NATO and selected allied nations so that they may achieve similar objectives and benefits.

Program Element: #6.47.78.A
DOD Mission Area: #321 - Navigation and Position Fixing

Title: NAVSTAR Global Positioning Systems (GPS) User Equipment
Budget Activity: #5 - Intelligence and Communications

J. (U) TEST AND EVALUATION DATA:

1. (U) Development Test and Evaluation:

a. (U) During Phase I, the GPS concept was validated using eleven different host vehicles. Parameters verified include system accuracy, effects of dynamics, precision weapon delivery, landing approach, rendezvous, photomapping, nap-of-earth operations, static positioning, combined operations, cross-country, shipboard operations, jamming resistance, selective availability, propeller rotor blade modulation, foliage attenuation, multipath rejection, ionospheric/tropospheric correction, satellite clock and ephemeris accuracy, acquisition and reacquisition time, time transfer, signal levels and signal structure. No major deficiencies were noted.

b. During Phase II, Full-Scale Development, the following User Segment Joint Service DT&E will be conducted:

(1) (U) In-plant test will verify design of User Equipment (UE) (April 82).

(2) (U) Vehicle mod center test will verify host vehicle/US compatibility (May 82).

(3) (U) Field DT&E will verify systems performance. Appropriate missions will be combined (DT/OT-II 3 QCY 82-4 QCY 82).

(4) (U) Army Independent DT II will verify suitability of design for Army deployment. Testing will be integrated with Joint Service DT&E. (2 QCY 82 - 2 QCY 83).

c. (U) GPS manpack, vehicular and aircraft user equipment tested during Phase II DT/OT II will be prototypes of production equipment.

d. (U) All test items and support equipment are expected to be available during the test period.

e. (U) User segment development contractors - Rockwell - Collins Division, Cedar Rapids, IA, Magnavox Advanced Products Divison, Torrance, CA. Test Support Contractor - Aerospace Corporation, El Segundo, CA. Joint Service Program Manager - Col D. Henderson (USAF). Test Agencies - include USATECOM, US Air Force Test and Evaluation Command (USAFTEC), USAOTEA, US Navy Operational Test and Evaluation Force (OPTEVFOR), and USMCOTEA.

Program Element: #6.47.78.A
DOD Mission Area: #321 - Navigation and Position Fixing
Title: NAVSTAR Global Positioning Systems (GPS) User Equipment
Budget Activity: #5 - Intelligence and Communications

f. (U) Test sites include Yuma Proving Ground, AZ; El Centro NAS, CA; Carswell AFB, TX; Ocean Test Ranges; Nellis AFB, NV; White Sand Armys Missile Range, NM, and US Army Electronics Proving Ground, AZ.

g. (U) User Segment Schedule
Contract Award - Jul 79
Start Vehicle Integration - Jan 82
First Set Delivery - Mar 82
Start DT&E - Mar 82
Start Mod Center Test - Apr 82
Start Army DT II - Oct 82
Start IOT&E - Dec 82
DSARC III - Sep 83

h. (U) A total of 47 User Equipment sets with associated Support Equipment from each contractor will be tested in Phase II.

i. (U) Logistics supportability will be tested during Phase II DT&E and IOT&E. The Reliability, Availability, and Maintainability (RAM) requirements vary depending on the type of User Equipment (UE) set. Mature Mean time Between Maintenance (MTBM) is expected to be 1000 hours minimum for all sets. Goal is to demonstrate 500 hours MTBM during Phase II. Contractors will maintain equipment during DT&E and provide depot level support during IOT&E and Army DT II.

j. (U) User equipment tested during Phase II DT/OT will be prototypes of Phase III production equipment.

k. (U) Environmental qualification test of user equipment will begin in March 1982. Environmental tests identified in MIL STD 810C will be conducted because of the broad range of user applications.

2. (U) Operational Test and Evaluation:

a. (U) The Army is the only service that conducted operational during Phase I. The weight goal of 25 lbs of the manpack was not achieved in order to keep phase I cost down. The ultimate design goal of the manpack is expected to be achieved. NAVSTAR Satellites 1 and 2 clocks had manufacturing defects but satellites 3 and 4 carry improved versions of clocks and have been trouble free. The NAVSTAR VE can be expected to mature into a system which will meet requirements. US Army Operational Test and Evaluation Agency (USAOTEA) judged the GPS UE is suitable for continuation into the full-scale development phase. During Phase II, improvements will be accomplished.

Program Element: #6.47.78.A Title: NAVSTAR Global Positioning Systems (GPS) User Equipment
DOD Mission Area: #321 - Navigation and Position Fixing Budget Activity: #5 - Intelligence and Communications

b. (U) During Phase II, Full-Scale Development, NAVSTAR GPS Joint Service IOT&E will be conducted.

(1) (U) User equipment Joint Service IOT&E will be combined with DT&E where practical. Each Service's operational test organization will participate in the Joint Service IOT&E By conducting operational test on vehicles from its services. IOT&E objectives are related to:

(a) (U) Operational effectiveness

(b) (U) Operational suitability

(c) (U) Military utility

(d) (U) Mission performance

(e) (U) Supportability

(f) (U) Assessing doctrine, training, and organization

(g) (U) Vulnerability

(h) (U) Human factors

(2) (U) Milestones OT II Feb-May CY83

a. (U) User equipment tested during Phase II IOT&E will be prototypes of production equipment. OT II during Phase II will include testing UE from two competing contractors on UH60 helicopter, M60 tank, and the foot soldier.

b. (U) All test items and support equipment are expected to be available during the test period.

c. (U) Sets allocated for OT II from each contractor are as follows:

(1) (U) UH60 2 sets
(2) (U) M-60 2 sets

(1) (U) Manpack 4 sets

d. Operational tests as described above of user equipment will be conducted prior to major production contract.

e. (U) OT I conducted January-February 1979. No major deficiencies noted and judged to be suitable for operational use with planned man/machine improvements.

f. (U) RAM requirements will be verified by OT II test personnel in accordance with OT II test design plan.

3. (U) System Characteristics:

Operational/Technical Characteristics	*Objectives	**Demonstrated Performance
Manpack weight	10-14 lbs	***28.5 lb (DT-I)
System Accuracy	10 M CEP	11.5M CEP (DT-I)
Mission Accuracy	10-100M CEP	91.7M (OT-I)
System Availability (Manpack)	2000 hrs MTBF	****

* Phase III (Operational) Objective.

** Demonstrated during Phase I with advanced development user equipment and 4 satellite constellation.

*** Manpack not designed to fulfill weight requirement in order to save cost.

**** Size of OT RAM data sample did not permit an in-depth analysis. However, with limited sample manpack achieved availability was 97.9%. Phase II OT will produce a full-scale RAM assessment.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #3.10.22.A Title: Scientific and Technical Intelligence
DOD Mission Area: #312 - General Defense Intelligence Programs Budget Activity: #5 - Intelligence and Communications

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	1800	0			Continuing	Not Applicable
D381	Scientific/Technical Intelligence	1800	0			Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This is a continuing program covering acquisition and evaluation of foreign systems in support of intelligence and threat assessment requirements. The program is aimed at obtaining technology employed in foreign systems which could constitute a military threat, determination of the extent of threat posed by those systems, and making the foreign technology available for use in development of countermeasures or adversary systems.

C. BASIS FOR FY 1981 RDTE REQUEST: Funding will support evaluation of certain foreign systems The foreign systems will be analyzed and evaluated to determine component and subsystem characteristics, and to the extent possible, tested operationally to determine performance and effectiveness.

D. (U) BASIS FOR CHANGE BETWEEN FY 1981 AND FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

Not applicable. No FY 1980 Congressional Descriptive Summary was submitted.

E. (U) OTHER APPROPRIATION FUNDS: ($ in thousands): Not Applicable.

Program Element: #3.10.22.A Title: Scientific and Technical Intelligence
DOD Mission Area: #312 - General Defense Intelligence Programs Budget Activity: #5 - Intelligence and Communications

F. (U) DETAILED BACKGROUND AND DESCRIPTION: Evaluation and exploitation of foreign material is conducted to assess the state of the art of threat technology and assimilate knowledge of capabilities and vulnerabilities in support of intelligence requirements and long-range threat analyses. The Army must be prepared to exploit and defeat foreign threat systems through a thorough knowledge of their capabilities, characteristics, and vulnerabilities. Further, detailed knowledge of the capabilities and performance characteristics of threat systems is essential for development of defensive measures. All evaluation efforts are based on stated requirements of intelligence forecast, threat assessment, force development, Research, Development, Test, and Evaluation (RDTE), or other requirements as appropriate. Results of evaluation are published in reports and disseminated to all interested parties throughout the Department of Defense.

G. (U) 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. Exploitation evaluation is coordinated with the Defense Intelligence Agency, all Services, and other interested agencies. Program Element 6.57.09.A, Exploitation of Foreign Items, ensures that the foreign technology is made available to US RDTE elements in support of engineering development, as well as exploratory research and technology enhancement.

H. (U) WORK PERFORMED BY: The actual evaluation of materiel is normally assigned to the commodity command or separate counterpart 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 Agent, the Army is responsible for implementing the evaluation to insure that the objectives and requirements of all Services and agencies are satisfied and duplication of effort is minimized. The US Army Foreign Science and Technology Center, Charlottesville, VA, has overall management responsibility for project D381.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1979 and Prior Accomplishments: Prior to FY 1980, the scope of this project also included research by the US Army Missile Intelligence Agency in analog-digital interface relating to analysis of foreign missile modeling and simulation applications. This work was concluded in FY 1979. In FY 1978 and FY 1979, two foreign threat systems were evaluated in detail and tested operationally in support of threat assessment and technological support to US development programs.

Program Element: #3.10.22.A Title: Scientific and Technical Intelligence
DOD Mission Area: #312 - General Defense Intelligence Programs Budget Activity: #5 - Intelligence and Communications

2. (U) FY 1980 Program: Not funded.

3. FY 1981 Planned Program: Evaluation and exploitation of foreign threat systems will continue. The thrust of this program is to contribute to technologically sound assessment of the threat posed by certain foreign systems, thereby assuring that US development programs are directed at the most economic and effective objective. The request will support evaluation of foreign threat systems for exploitation. Targets of opportunity will be considered as the occasion arises.

4. (U) FY 1982 Planned Program: None

5. (U) Program to Completion: This is a continuing program. Testing and evaluation for foreign systems will continue as funds are available. The program will be flexible so that as foreign systems become available they will be exploited and tested in a timely manner. The program offers a high payoff for the resources invested.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: 63.31.11.A Title: Strategic Communications (STARCOM)
DOD Mission Area: 6322 - Support and Base Communication Budget Activity: 05 - Intelligence and Communications

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	415	500	693	784	Continuing	Not Applicable
	QUANTITIES						
D481	Strategic Communications (STARCOM)	415	500	693	784	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: There is a need to modernize our base communications systems, both in the continental US and overseas, by installing modern electronic switching equipment which is faster, less power-consuming, and more capable than older technologies. These systems must interoperate with civilian agencies, have an extreme degree of reliability, and provide the commander with a credible responsiveness to contingency requirements. This program provides for developmental efforts for nontactical telecommunications networks, services, and facility controls. The equipment and systems developed are for worldwide deployment in fixed Army base environments and support command and control communications and post/camp level entry into the Defense Communications System (DCS). Maximum use is made of commercially developed equipment and technology to satisfy this need. System interoperability provides worldwide connectivity for military forces in direct execution of our national objectives.

C. (U) BASIS FOR FY 1981 RDTE REQUEST: Principal efforts will be directed toward monitoring the development contract for Electromagnetic Radiation Hazards (EMRH) Monitoring System Engineering Development Models (EDM), Integrated Logistics Support (ILS), and Producibility Engineering Package (PEP). Continue to survey commercial availability of unattended power sources to include solar, turbine, and alternate fuel candidates. Procure and evaluate viable candidates. Establish a baseline for potential application of distributed microprocessors to meet future Army switching requirements.

D. (U) BASIS FOR CHANGE BETWEEN FY 1981 AND FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

Program Element: #3.31.11.A Title: Strategic Communications (STARCOM)
DOD Mission Area: #322 - Support and Base Communication Budget Activity: #5 - Intelligence and Communications

	FY 1979	FY 1980	FY 1981	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	415	500	693	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	1000	500	550	Continuing	Not Applicable

Increase in FY 1981 is required to support the investigation of microprocessors in future Army switching requirements. The decrease in *FY 1979 was due to redirection of funds to higher priority programs.*

E. (U) OTHER APPROPRIATION FUNDS: ($ in thousands): Not applicable.

Program Element: #3.31.11.A Title: Strategic Communications (STARCOM)
DOD Mission Area: #322 - Support and Base Communication Budget Activity: #5 - Intelligence and Communications

F. (U) DETAILED BACKGROUND AND DESCRIPTION: The objective of this project is to develop nontactical communications concepts, equipment, and systems in response to requirements identified by the US Army Communications Command. The equipment and systems are for worldwide deployment in fixed Army Base environments. Maximum use is made of commercially developed equipment and technology from US and foreign communications industry to determine its capability to satisfy Army needs and for the development of Army-unique requirements which cannot be satisfied by commercially available equipment. Specific tasks include the Electromagnetic Radiation Hazards Monitoring System and equipment standards. Future tasks in this program element will support STARCOM requirements developed in Echelons Above Corps (EAC).

G. (U) RELATED ACTIVITIES: None.

H. (U) WORK PERFORMED BY: Project Manager *DCS (Army) Communications Systems Agency, Fort Monmouth, NJ; US Army* Communications Electronics-Engineering Installation Agency, Fort Huachuca, AZ. Contractors include Institute of Telecommunications Sciencies, Boulder, CO; National Bureau of Standards, Boulder, CO.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: Obtained Letter Requirement (LR) approval and initiated full-scale engineering development of the Electromagnetic Radiation (EMR) Hazards Monitoring System. Developed, fabricated, and installed brassboard system at Sierra Army Depot, CA.

2. (U) FY 1980 Program: Complete evaluation of brassboard EMR Hazards Monitoring System. Prepare specification for engineering development models (EDM's),; Integrated Logistic Support (ILS) and Producibility Engineering Package (PEP), award development contract.

3. (U) FY 1981 Planned Program: Monitor development contract for EMR Hazards Monitoring System EDM's, ILS, and PEP. Survey commercial availability of unattended power sources and procure candidates for evaluation; obtain commercial 16/32 Kilobits per second (kbps) multiplexers for evaluation; study and survey industry to establish a baseline for potential application of distributed microprocessors to Army requirements; initiate investigation of a low-cost, high-speed, microprogrammable processing capability to enhance the low- and high-speed data-handling and transmission facilities. Establish baseline for potential of distributed microprocessors to meet future Army requirements.

4. (U) FY 1982 Planned Program: Complete development contract on Electromagnetic Radiation (E.R) Hazards Monitoring System, and start Developmental Testing (DT) II and Operational Testing (OT) II. Continue evaluation of commercial technology

Program Element: #3.31.11.A Title: Strategic Communications (STARCOM)
DOD Mission Area: #322 - Support and Base Communication Budget Activity: #5 - Intelligence and Communications

in unattended power sources, and 16/32 kbps multiplexers for potential application to meet Army requirements; perform trade-off analyses and develop alternative approaches to satisfying requirements for low-cost, high-speed microprogrammable communication processors.

5. (U) Program to Completion: This is a continuing program.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #3.31.26.A
Title: Long Haul Communications (DCS)
DOD Mission Area: #323 - Common User Communications
Budget Activity: #5 - Intelligence and Communications

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	3372	2580	8769	9999	Continuing	Not Applicable
	QUANTITIES						
D149	Army Support for DCS (Defense Communication Systems)	3372	2580	8769	9999	Continuing	Not Applicable
D245	Strategic Communication Development	11600	0	0	0	Not Applicable	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The Defense Communications System (DCS) is the communications path which assures a worldwide communications link for commanders at various levels and in turn to the National Command Activities and the Joint Chiefs of Staff. Key inputs into this system are warning information, friendly and enemy force status and revelant information pertaining to crisis or contingency operations. A modern accessible and and survivable communications system allows key decisionmakers to receive or transmit information from normal day to day operations to a massive strategic exchange. This program provides for development of communications systems and equipment for the DCS, as assigned to Army by the Defense Communications Agency. Major emphasis is currently directed toward converting the DCS to an all-digital network to support the need for rapid and reliable transmission of information. To achieve this improvement, new programs for interoperability, quality, accuracy, and speed of transmission have been implemented. Maximum use is being made of commercially developed technologies, both US and foreign, to satisfy this need. The goal of the DCS program is to provide a more reliable, flexible, and less exploitable telecommunications system.

C. (U) BASIS FOR FY 1981 RDTE REQUEST: Complete engineering development of the Megabit Digital Troposcatter Modem MD-918 to include developmental Test II, complete the Development In-Process Review (DEVA-IPR), and award the initial production contract. Complete the concept formulation and initiate validation of alternative systems concepts for the Access Area Digital Switching System (AADSS). Award contract for advanced development models of Defense Communication System (DCS) Multiplexer Family. Continue development and evaluation of DCS Line of Sight (LOS) Radio design alternatives and award a development

Program Element: #3.31.26.A Title: Long Haul Communications (DCS)
DOD Mission Area: #323 - Common User Communications Budget Activity: #5 - Intelligence and Communications

contract for system components for the DCS Facilities Improvement Design. Initiate efforts to improve the telecommunications in Korea. Investigate improvements for conventional survivability of the DCS. Begin developmental efforts for the Secure Voice Improvement Program.

D. (U) BASIS FOR CHANGE BETWEEN FY 1981 AND FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1979	FY 1980	FY 1981	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	3372	2580	8769	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	5850	2600	7240	Continuing	Not Applicable

For the FY80 budget submission Project D245 (Strategic Communications Development) Program Element 6.37.07.A was transferred to Program Element 3.31.26.A (Long Haul Communications (DCS)) and combined with project D149. This restructure was accomplished to correct a minor inconsistency wherein Project D245, as a Strategic Communications program, was being carried in Budget Activity 4 (Tactical Program) versus Budget Activity 5 (Communications and Intelligence). The increase in FY81 funding will provide for continued improvement of the telecommunications system in Korea and begin developmental efforts for the Secure Voice Program. The decrease in FY79 was due to reprogramming to higher priority programs. The FY80 decrease was due to a general reduction by Congress.

E. (U) OTHER APPROPRIATION FUNDS: Not applicable

Program Element: #3.31.26.A Title: Long Haul Communications (DCS)
DOD Mission Area: #323 - Common User Communications Budget Activity: #5 - Intelligence and Communications

F. (U) DETAILED BACKGROUND AND DESCRIPTION: The objective of this project is to develop nontactical communications concepts, hardware, software, and systems to be used by the Army, Navy, and Air Force in the Defense Communications System in response to requirements identified by and tasking to Army from the Defense Communications Agency. The equipment and systems are to be deployed worldwide in fixed nontactical Defense Communications Systems (DCS) facilities. Maximum use is made of commercially developed technology required to test and evaluate nontactical communications equipment. Specific tasks include Access Area Digital Switching (AADSS), Line of Sight (LOS) Radio, DCS Multiplexer Family, and DCS Facilities Design.

G. (U) RELATED ACTIVITIES: Program Element 647.01.A Project D245 Strategic Communications Development and Program Element 3.34.01 Communication Security Equipment Technology provide input to this program from advanced development during FY79 and earlier. This program includes both advanced development and engineering development starting in FY80 when D245 was merged with project D149. This effort is closely coordinated by the Army with the Defense Communications Agency (DCA) and National Security Agency (NSA) to insure all programs are complimentary and avoid any duplication of effort.

H. (U) WORK PERFORMED BY: Project Manager DCS (Army) Communications System, US Army Electronics Research and Development Command, US Army Communications Research and Development Command, Fort Monmouth, NJ; US Army Communications Electronics-Engineering Installation Agency, Fort Huachuca, AZ; and the Institute for Telecommunications Sciences, Boulder, CO; Varien Associates, Palo Alto, CA; GTE Sylvania, Needham Heights, MA.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: Designed, fabricated, and tested engineering development models of the Megabit Digital Troposcatter Modem MD-918; designed and fabricated advanced development of models of a high-power S-band klystron having improved bandwidth, efficiency, gain, and Mean Time Before Failure (MTBF). Awarded contract for advanced development of an adaptive antenna control for troposcatter systems. Acquired an advanced state of the art commercial switchboard for evaluation to establish a development baseline for Access Area Digital Switching System (AADSS) and support concept formulation. Prepare a Statement of Work for Competitive AADSS concept development and validation. Successfully completed preparation of the procurement package and awarded contract for completion of Engineering Development, the Megabit Digital Troposcatter Modem MD 918 and its Integrated Logistic Support. Delivered three improved S-band klystron tubes and completed development testing. Completed testing the adaptive antenna control advanced development model. Assessed capabilities of state-of-the-art communications processors and recommended various control signaling alternatives of AADSS.

2. (U) FY 1980 Program: Continue engineering development of the Megabit Digital Modem to include Integrated Logistics Support. Award a contract for Access Area Digital Switching System (AADSS) concept formulation. Initiate concept development

Program Element: #3.31.26.A Title: Long Haul Communications (DCS)
DOD Mission Area: #323 - Common User Communications Budget Activity: #5 - Intelligence and Communications

for Defense Communication System (DCS) Line of Sight (LOS) Radio. Analyze and evaluate advanced multiplexing techniques for the DCS Multiplexer Family Development and develop concepts and criteria for DCS Facilities Design. Continue support of the Tri-service Digital European Backbone (DEB) system. Start initial effort to convert Korea to an all-digital transmission system. Investigate methods to increase conventional survivability of the DCS. Begin design development for network improvements to the Secure Voice Program.

3. (U) FY 1981 Planned Program: Complete engineering development of the Megabit Digital Troposcatter Modem MD-918 including Development Test/Operational Test (DT II/OT II), complete the Development In-Process Review (DEVA IPR) and award the initial production contract, complete AADSS concept formulation and initiate validation of alternative system concepts, award contract for advanced development models of DCS Multiplexer Family, continue development and evaluation of DCS Line of Sight (LOS) Radio design alternatives, and award development contract for system components for the DCS Facilities Design task.

4. (U) FY 1982 Planned Program: Design, fabricate, and test three AADSS advanced development models for demonstration and validation of alternative system concepts; fabricate and test advanced development models of DCS Multiplexer; award contract for DCS LOS Radio modules for antijam and data rate enhancements; fabricate and test system components for the DCS Facilities Design.

5. (U) Program to Completion: This is a continuing program.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #3.34.01.A
DOD Mission Area: #324-Communications Security

Title: Communications Security (COMSEC) Equipment
Budget Activity: #5 - Intelligence and Communications

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT					Continuing	Not Applicable
	QUANTITIES						
D491	Communications Security					Continuing	Not Applicable
D901	Signal Security Activities						

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED:

C. BASIS FOR FY 1981 RDTE REQUEST:

Program Element: #3.34.01.A
DOD Mission Area: #324-Communications Security

Title: Communications Security (COMSEC) Equipment
Budget Activity: #5 - Intelligence and Communications

D. BASIS FOR CHANGE BETWEEN FY 1981 AND FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1979	FY 1980	FY 1981	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)				Continuing	Not Applicable
Funds (as shown in FY 1980 submission)				Continuing	Not Applicable

The increase in FY 1981 from the previous request will support Army initiatives in developing

The decrease in FY79 was due to reprogramming to high priority programs. D901 was terminated in an attempt to reduce low-dollar level projects in FY81 and beyond. FY 1980 decrease is a result of a general Congressional reduction.

E. (U) OTHER APPROPRIATION FUNDS: ($ in thousands): Not applicable

Program Element: #3.34.01.A
DOD Mission Area: #324-Communications Security

Title: Communications Security (COMSEC) Equipment
Budget Activity: #5 - Intelligence and Communications

F. DETAILED BACKGROUND AND DESCRIPTION:

G. (U) RELATED ACTIVITIES: All COMSEC RDTE with DOD is a responsibility of the NSA under DOD Directive C-5200.5. This effort represents those COMSEC development delegated to the Army by NSA. Program Elements 3.31.26.A (formerly 6.47.01.A), Communications Engineering Development, is related to this effort. All D491 programs are coordinated at regular intervals with the Services and civilian agencies.

H. (U) WORK PERFORMED BY: Developing Agencies - US Army Communications R&D Command, Ft Monmouth, NJ; Project Manager, SINCGARS, Ft Monmouth, NJ; Tobyhanna Army Depot, Tobyhanna, PA. Contractors include: Magnavox Corporation, Fort Wayne, IN; General Altronics 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; Honeywell Corporation, Shrewsbury, NJ.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1979 and Prior Accomplishments:

Program Element: #3.34.01.A
DOD Mission Area: #324-Communications Security

Title: Communications Security (COMSEC) Equipment
Budget Activity: #5 - Intelligence and Communications

2. FY 1980 Program:

3. FY 1981 Planned Program:

4. FY 1982 Planned Program:

5. (U) Program to Completion: This is a continuing program to assure optimum utilization of available COMSEC equipment, early identification of new Army COMSEC needs, and cost-effective solutions.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: 6.33.15.A
Title: Target Missile
DOD Mission Area: 622 - Aerial Targets
Budget Activity: 6 - Defensewide Mission Support

A. (U) RESOURCES (PROJECT LISTING): ($ in Thousands)

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT						
D238	Target Missiles	0	0	0	0	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF PROJECT: The objective of this element is to develop and evaluate aerial targets and ancillary equipment required for realistic and cost-effective target systems to evaluate air defense weapons and to train air defense units. Close coordination is maintained with other Services through the Joint Logistic Commanders Conference and the Armaments/Munitions Requirements and Development (AMRAD) Committee to insure maximum standardization of target systems.

C. (U) EXPLANATION OF CANCELLATION OR DEFERRAL: Program was cancelled by the Congress in FY 1980. The Army is currently revalidating its requirements.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.37.18.A
Title: Electronic Warfare Vulnerability/Susceptibility
DOD Mission Area: #454 - Other Test and Evaluation Support
Budget Activity: #6 - Defensewide Mission Support

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional To Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	15397	19407			Continuing	Not Applicable
D190	Tri-Service Electro-Optic Weapons Vulnerability/ Susceptibility	0	0			Continuing	Not Applicable
D267	Missile Vulnerability/ Susceptibility	12120	14884			Continuing	Not Applicable
D626	Nonmissile Vulnerability/ Susceptibility	3277	4523			Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: All electromagnetic dependent systems are susceptible/vulnerable to some degree to electronic countermeasures (ECM). Therefore, Army electromagnetic dependent systems must be analyzed and/or field tested to determine the extent of their vulnerabilities and insure that counter-countermeasures (CCM) are developed to assure system effectiveness in a hostile ECM environment. Foreign missile systems must also be analyzed to determine their electronic warfare susceptibilities which could be exploited by the United States. 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 non-missile electromagnetic systems that will reduce the vulnerability of US systems to enemy electronic warfare operations.

C. (U) BASIS FOR FY 1981 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 STINGER-POST, PATRIOT enhancement programs and other air defense missile systems. Jammers must be fabricated to support product improvement testing of enhanced air defense systems. Special Electromagnetic Interference (SEMI) work will continue to include missile measurements and jammer

development. Electronic Warfare test bed instrumentation for field evaluation of the Stand-Off Target Acquisition System (SOTAS), Single Channel Ground Airborne Radio System (SINCGARS), Position Location Reporting System (PLRS), and other communications electronics systems will continue. A program will be developed to analyze and minimize the susceptibility of US systems to enemy signal intelligence. Tri-Service exploitation of foreign missile systems will continue.

D. BASIS FOR CHANGE BETWEEN FY 1981 and FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1979	FY 1980	FY 1981	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	15397	19407		Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	17774	19445		Continuing	Not Applicable

Decrease of $2377 in Project D267 in FY 1979 is due to reprogramming to meet higher priority requirements. Decrease in FY80 is due to a general Congressional reduction. Decrease of $2460 in D267 in FY 1981 is due to budgetary constraints not anticipated in the FY 1980 submission.

E. (U) OTHER APPROPRIATION FUNDS: Not Applicable.

Program Element: #6.37.18.A Title: Electronic Warfare Vulnerability/Susceptibility
DOD Mission Area: #454 - Other Test and Evaluation Support Budget Activity: #6 - Defensewide Mission Support

F. (U) DETAILED BACKGROUND AND DESCRIPTION: All electronic/electro-optical dependent systems are susceptible to electronic warfare (EW) to some degree. All such US Army systems must be analyzed so that their susceptibilities are determined and counter-countermeasures are developed to assure their effectiveness in a hostile ECM environment. Hostile threat systems must also be analyzed in order that their electronic warfare (EW) susceptibilities may be exploited by the United States. This program provides for EW susceptibility investigations of the missile systems, electro-optical systems, other electronic dependent systems, and electronic counter-countermeasure technology of the US Army as well as foreign hostile missile systems which represent a threat to the tactical field commander. Recommendations designed to eliminate or reduce the susceptibility of Army systems, including proposed hardware, software, and operating procedure changes, are provided to system developers. The susceptibilities detected in foreign threat systems are provided to appropriate intelligence and ECM system development activities for exploitation. This program consists of eighteen task areas; twelve for missile systems, and six for other electronic dependent systems.

G. (U) RELATED ACTIVITIES: The work performed under this Program Element (PE) is directly applicable to the work being performed by other US Army Electronics Research and Development Command (ERADCOM) laboratories, particularly: Electronic Warfare Laboratory, Fort Monmouth, NJ; Signals Warfare Laboratory, Vint Hill Farms, VA; Night Vision and Electro-Optical Laboratory, Fort Belvoir, VA. Results of the susceptibility investigations are provided, as well as appropriate electronic counter-countermeasures (ECCM) recommendations, to the other Army development commands, e.g., Missile Command (MICOM) and Communications-Electronics Readiness Command (CERCOM). 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 program for electro-optically guided weapons countermeasure tests is being conducted under a program funded by the Director Defense Test and Evaluation (PE65804D). The Army is Executive Agent for this program.

H. (U) WORK 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), NM. 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, NJ. Analysis of US systems' susceptibility to signal intelligence (SIGINT) and development of techniques/methods to reduce such susceptibility is performed by the Signals Warfare Laboratory, Vint Hill Farms, VA.

Program Element: 06.37.18.A Title: Electronic Warfare Vulnerability/Susceptibility
DOD Mission Area: 0454 - Other Test and Evaluation Support Budget Activity: 06 - Defensewide Mission Support

Operational tests of laser designated weapons are conducted by the Office of the Test Director, Joint Electro-Optics Guided Weapons Countermeasures Test Program, WSMR, NM. Major contractor support is provided by GTE Sylvania, Mountain View, CA; New Mexico State University, Las Cruses, NM; General Dynamics Corp., Fort Worth, TX; Sanders Associates, Nashua, NH; Stanford Research Institute, Menlo Park, CA; American Electronics Lab., Lansdale, PA; Hughes Aircraft Co., Culver City, CA; Kentron International, Inc., Fort Worth, TX, and Hycor, Woburn, MA.

1. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1979 and Prior Accomplishments: Electronic countermeasure (ECM) vulnerability studies have been conducted on SAFEGUARD, PERSHING, LANCE, NIKE-HERCULES, SHILLELAGH, DRAGON, TOW, HELLFIRE, COPPERHEAD, Improved HAWK, REDEYE, STINGER, CHAPARRAL, US ROLAND, PATRIOT, and other Army missile systems and missile radar fuzes. Highly versatile capabilities to conduct infrared and unintentional radiation measurements have been established and measurements on aircraft, weapon systems, and countermeasure devices were conducted. Incorporation of ultraviolet and millimeter signature measurement capabilities into these facilities has been completed. PATRIOT missile system testing for contractor Product Qualification Tests have been completed, and in-depth studies of system effectiveness against ECM threat specifications were completed and the results published. Investigations have been initiated on the Division Air Defense (DIVAD) Gun System and the STINGER/Passive Optical Seeker Technique (POST) system. Vulnerability investigations of Improved HAWK product improvements were conducted. US ROLAND system Development Test/Operational Test (DT/OT) II tests were completed and the results of studies of the system effectiveness in an ECM threat environment were published. ECM tests of the solid-state track link for the TOW missile system were completed and smoke/aerosol tests of electro-optically guided weapons (including beamrider concepts) were conducted. Assistance was provided the Product Manager (PM) in the ECM analysis of the TOW Product Improvement Program (PIP) proposals. ECM investigations of the advanced development (AD) PERSHING II system have been completed, and engineering development (ED) PERSHING II ECM investigations were begun. Susceptibility tests and vulnerability analyses were complete on the COPPERHEAD ED laser seeker. Susceptibility tests and analyses were used in comparing ECM capability of competing HELLFIRE ED laser seekers. Several ECCM recommendations have already been implemented on both COPPERHEAD and HELLFIRE with others pending. A susceptibility assessment of the Target Acquisition and Designation System/Pilot Night Vision System (TADS/PNVS) for the Advanced Attack Helicopter (AAH) was completed. Special Electromagnetic Interference (SEMI) investigations were completed on the STINGER-POST and AN/TAS-4 night sight and were begun on the COPPERHEAD and GRAYROCK.

In the area of electronic counter-countermeasures technology for communications systems, fast frequency hopping (FFH) and steerable null antenna processing (SNAP) techniques, originally developed and demonstrated under this program, are now being incorporated into the Army's Single Channel Ground Air Radio System (SINCGARS) development program. A development program for a communications electronic warfare (EW) simulator (COMEWS) was continued to provide a necessary jamming test bed for SINCGARS field tests. A series of field

tests were completed to determine feasibility of using SNAP ECCM technology on vehicular and airborne platforms and development of an airborne SNAP unit was completed. EW vulnerability analyses of PERSHING and PATRIOT missile systems communications were completed. EW vulnerability analysis of PATRIOT missile systems communications was completed. In the radar area, EW vulnerability field tests were completed on the FIREFINDER countermortar/counterbattery radar, AN/GVS-5 Laser Rangefinder, Stand-Off Target Acquisition System (SOTAS), and the AN/APS-94 Sidelooking Airborne Radar (SLAR). EW vulnerability assessment of the AN/UPD-7 data link was conducted. EW vulnerability/electronic counter-countermeasure (ECCM) support was continued on the Position Location Reporting System (PLRS) program. Fabrication of the PLRS heliborne jammer instrumentation was completed. Fabrication of an instrumented EW support system to evaluate susceptibility of PLRS to emitter location techniques was initiated.

2. FY 1980 Program: The ECM design analysis of PATRIOT will continue with advanced threats integrated and Development Tests/Operational Tests II EW field tests will be completed. STINGER/POST ECM simulations will be initiated and EW assessments of DIVADS competitive candidates will be conducted in support of the selection process. Special ECM tests to verify ECCM fixes will be conducted on the US Roland system. Laboratory susceptibility tests will be performed on first production COPPERHEAD laser seekers. Vulnerability analysis of the HELLFIRE ED laser seeker will be completed. Work will continue on a vulnerability assessment of the TADS/PNVS for the AAH. A dynamic IR background generator will be developed for the Dynamic Analysis Laboratory. Field tests will be performed to verify the ECM hardness of TOW-PIP and the ECCM model SADARM sensor. ECM analysis of Assualt Breaker will be initiated. SEMI investigations will be completed on COPPERHEAD, GRAY ROCK, and the AN/TAS-5 Night Sight; continued on STINGER/POST; and initiated on HELLFIRE and the XM1 tank. Infrared, ultraviolet, and millimeter measurements will be conducted in support of ongoing vulnerability analyses of the STINGER-POST and other missile systems. ECM evaluations of the PERSHING II engineering development (ED) will continue with emphasis on the digital correlator. ECM investigations of the General Support Rocket System (GSRS) will be initiated. ECM analyses will be conducted on the modified PATRIOT, ROLAND, and CHAPARRAL fuzes.

Vulnerability investigations of SINCGARS, tactical information distribution systems (TIDS), and PLRS, Stand-Off Target Acquisition System (SOTAS) and communications systems for PATRIOT, PERSHING, and EW systems will be continued. SOTAS ECCM verification tests and EW field tests of the AN/TPQ-37 counter mortar/counter battery radar systems production units will be conducted. Development of the first station of the Mobile Electronic Warfare Environment Simulator (MEWES) for radar testing and threat instrumentation test beds for SINCGARS and PLRS will be completed. Development of Improved Very High Frequency (VHF) emitter location instrumentation to evaluate SINCGARS susceptibility under field conditions will be initiated.

3. FY 1981 Planned Program: Assessment of the vulnerability of PATRIOT to the 1987 advanced threat will continue with field testing of hardware and software product improvements. Continued Electronic Countermeasures (ECM) support will be provided to STINGER/POST firing tests, US ROLAND tests, and Division Air Defense (DIVAD) Gun System product verification

testing. Vulnerability investigations of the CHAPARRAL will be initiated. Static and dynamic ECM lab/field tests and flight simulations will be performed on both COPPERHEAD and HELLFIRE production laser seekers. Susceptibility analysis of the HELLFIRE Infra-Red (IR) imaging seeker will be initiated. Lab/field investigations and susceptibility/vulnerability assessment Target Acquisition and Designation System/Pilot Night Vision System (TADS/PNVS) will be completed. Major hardware components will be developed for the Dynamic Analysis Laboratory (DAL). A prototype TOW Product Improvement Program threat device will be developed. ECM investigations of Sense and Destroy Armor (SADARM) and Assault Breaker will continue. Laboratory investigations of PERSHING II hardware will be completed and captive flight tests started. Simulation models for Fuze evaluations will be updated to incorporate responses to chaff and artillery Fuze studies started. Special Electromagnetic interference (SEMI) investigations on STINGER/POST, HELLFIRE, and the XM1 tank will be completed and efforts on other electronic devices/systems will be initiated. Signature measurements will be continued in support of EW vulnerability analyses. Analytical and test support will be provided for SINCGARS EW field tests. Development of Mobile Electronic Warfare Environment Simulator (MEWES) will be completed and threat instrumentation developments for very high frequency (VHF) and ultra high frequency (UHF) communications systems will be continued. The Stand-Off Target Acquisition System (SOTAS) programs will be supported with ECM field testing and analysis. Position Location and Reporting System (PLRS) Electronic Warfare (EW) field tests and the EW vulnerability ECCM analysis of the PLRS JTIDS (Joint Tactical Information Distribution System) Hybrid will be completed.

4. FY 1982 Planned Program: Conduct advanced ECM/ECCM testing of the DIVAD Gun System during Initial Production Tests using threat level responsive coherent deception techniques and formulate EW vulnerability conclusions for DIVAD Gun System. Conduct advanced ECM and IRCM testing on US Roland during confirmatory tests. Develop ECM test systems for use in DIVAD and ROLAND vulnerability assessments. Vulnerability studies of PATRIOT missile system will be continued, structured around the enhancement program. Special emphasis will be given to the effects of low cross section targets, improved guidance, arm countermeasures, multifunction capabilities, radar control and fuze. EW analysis of the PATRIOT extended range program will also be pursued. The STINGER-POST EW vulnerability program will address advanced jamming and decoying techniques supported by the development of demonstration/experimental hardware. The simulation capabilities will be upgraded to permit closed loop semiphysical simulations of CHAPARRAL Rosette. The IR portion of the Dynamic Analysis Laboratory will be completed and dynamic lab investigations will be performed on the IRIS. Special electromagnetic interference (SEMI) tests will also be performed on IRIS. The EW portion of the Development Tests and the SEMI tests will both be performed on the TOW-PIP. ECM and ECCM investigations will continue on SADARM and Assault Breaker. ECM portion of PERSHING II captive flight program will be completed and missile flight program will be started. GSRS studies will provide inputs to support DSARC I decision.

Program Element: #6.37.18.A Title: Electronic Warfare Vulnerability/Susceptibility
DOD Mission Area: #454 - Other Test and Evaluation Support Budget Activity: #6 - Defensewide Mission Support

PATRIOT Fuzed EW evaluation will be completed. EW studies of Artillery fuzes will be completed and lab analysis started. SEMI efforts will be incorporated as an integral part of the communications-electronics EW vulnerability investigations and will continue as a part of the missile EW vulnerability investigations. Signature measurements will continue to be provided in support of EW vulnerability analyses.

Generic electronic counter-countermeasures (ECCM) techniques for laser guided weapon systems will be evaluated. Perform comparative analysis of quiet radar techniques.

Provide continuous development of EW equipment, techniques, and tactics in support of an Armywide EW program. Develop generic classes of Army missile systems that have common threat environments. Conduct validation tests and assessment of ECCM techniques in support of the various Army missile system project managers. Begin EW vulnerability analysis of SINCGARS Fast Frequency Hopping (FFH) and Slow Frequency Hopping (SFH) system versus future ECM/ESM threat. Complete PLRS EW vulnerability/ECCM analysis/field test report and provide EW vulnerability/ECCM assessment for PLRS development in process review. Initiate ECCM evaluation of PLRS/JTIDS hybrid network design approaches using computer simulation techniques. Identify PLSRS/JTIDS EW field test needs and initiate modification to PLRS EW test instrumentation to accommodate JTIDS and PLRS modification. Assess impact of RF/EO countermeasures on target acquisition capability of thermal imaging and image intensifier system. Complete development of the MEWES remote stations to make the system fully operational.

5. (U) Program to Completion: This is a continuing program.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D267 Title: Missile Vulnerability/Susceptability
Program Element: #6.37.18.A Title: Electronic Warfare Vulnerability/Susceptability
DOD Mission Area: #454 - Other Test and Evaluation Support Budget Activity: #6 - Defensewide Mission Support

A. (U) DETAILED BACKGROUND AND DESCRIPTION: All electronic/electro-optic dependent missile systems are vulnerable/susceptible to electronic countermeasures (ECM) to some degree. All such US Army missile systems must be analyzed so that their susceptibilities are determined and counter-countermeasures (CCM) are developed to assure their effectiveness in a hostile ECM environment. Hostile missile systems must also be analyzed in order that their electronic warfare (EW) susceptibilities may be exploited by the United States. The objective of this project is to: (1) determine the susceptibility to ECM of all us Army surface-to-surface and surface-to-air missile systems; (2) determine the ECM vulnerability of enemy tactical missiles that are a threat to the tactical commander; (3) develop prototype electronic warfare systems to exploit the ECM vulnerability of the enemy missile systems; and (4) 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. (U) RELATED ACTIVITIES: The work performed under this project directly affects the development work being performed by the US Army Missile Command and other weapons systems developers. The developing organizations are informed of the results of the EW analyses through formal reports and day-to-day informal personal contacts. ticularly at the project engineer level. 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 funded 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) and through the exchange of technical reports and attendance at scientific meetings and conferences.

C. (U) WORK 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 (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 Co., Culver City, CA; American Electronics Laboratories, Lansdale, PA; Kentron International, Inc., Fort Worth, TX; and Hycor, Inc., Woburn, MA. Additional unidentified contractors will perform on approximately 33 other contracts with a total dollar value of $4,490,000 for the project.

Project: #D267 Title: Missile Vulnerability/Susceptability
Program Element: #6.37.18.A Title: Electronic Warfare Vulnerability/Susceptability
DOD Mission Area: #454 - Other Test and Evaluation Support Budget Activity: #6 - Defensewide Mission Support

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1979 and Prior Accomplishments: Electronic countermeasures (ECM) vulnerability studies have been conducted on SAFEGUARD, PERSHING, LANCE, NIKE-HERCULES, SHILLELAGH, DRAGON, TOW, HELLFIRE, COPPERHEAD, Improved HAWK, REDEYE, STINGER, CHAPARRAL, US ROLAND, PATRIOT, and other Army missile systems and missile radar fuzes. PATRIOT ECM Phase II testing was completed and PATRIOT missile system testing for contractor Product Qualification Tests have been completed; indepth studies of system effectiveness against ECM threat specifications were completed and the results published. Investigations have been initiated on the Division Air Defense (DIVAD) Gun System and on the dual band (infrared/ultraviolet) STINGER/Passive Optical Seeker Technique (POST) system. Vulnerability investigations of Improved HAWK product improvements were conducted. US ROLAND system Development Test/Operational Test (DT/OT) II tests were completed and the results of studies of the system effectiveness in an ECM threat environment were published. Vulnerability investigations on the TOW system led to the development of a hardened solid-state track link and ECM testing of that technique has been completed. Assistance was provided the Project Manager in the ECM analysis of the TOW Product Improvement Program proposals. Testing of electro-optically guided weapons (TOW, DRAGON, and beamrider concepts) under smoke and aerosol conditions have been conducted with efforts directed toward improved effectiveness in these environments. ECM investigations of the advanced development (AD) PERSHING II system have been completed, and engineering development (ED) PERSHING II ECM investigations were begun. Joint Army/Air Force tests were conducted, which demonstrated the effectiveness of ground-based ECM against aircraft radars (attack, terrain following, terrain avoiding) and the feasibility of passive tracking (Hardware development is being initiated under another project under the cognizance of the US Army Electronic Warfare Laboratory, Fort Monmouth, NJ). Susceptibility tests and vulnerability analyses were completed on the COPPERHEAD ED laser seeker. Susceptibility tests and analyses were used in comparing ECM capability of competing HELLFIRE ED laser seekers. Several ECCM recommendations have already been implemented on both COPPERHEAD and HELLFIRE with others pending. A susceptibility assessment of the Target Acquisition and Designation System/Pilot Night Vision System (TADS/PNVS) for the Advanced Attack Helicopter (AAH) was completed.

The feasibility of using a structurally sound radar absorbent material was demonstrated through flight tests of a scale model missile. Investigations under the Tri-Service Special Electromagnetic Interference (SEMI) program were completed on several weapons systems, most recently on the STINGER and AN/TAS-4 night sight; tests were begun on the COPPERHEAD and GRAYROCK. Field firing tests demonstrated predicted SEMI effects.

Tri-Service ECM analyses and field testing of foreign

missile systems are continuing, and a handbook on susceptibility data of Soviet antitank guided missiles was completed. Comprehensive and versatile facilities have been established to conduct vulnerability analyses including a dynamic infrared/electro-optical countermeasures simulation laboratory; infrared, radio frequency and radar cross section measurement capabilities; a mobile instrumentation laboratory to support field tests; and a large anechoic chamber for support of Special Electromagnetic Interference (SEMI) investigations. Emerging technologies such a ultraviolet and millimeter wave applications require continuing upgrade of facilities to maintain reliable EW assessment capabilities.

2. FY 1980 Program: The Electronic Countermeasures (ECM) design analysis of PATRIOT will continue with advanced threats integrated and Development/Operational Tests (DT/OT) II Electronic Warfare (EW) field tests will be completed. STINGER/POST ECM simulations will be initiated, and EW assessments of Division Air Defense (DIVAD) Gun System competitive candidates will be conducted in support of the selection process. Special ECM tests to verify ECCM fixes will be conducted on the US ROLAND System. Laboratory susceptibility tests will be performed on first production COPPERHEAD laser seekers. Vulnerability analysis of the HELLFIRE engineering development (ED) laser seeker will be completed. Work will continue on a vulnerability assessment of the Target Acquisition Designation System/Pilot Night Vision System (TADS/PNVS) for the Advanced Attack Helicopter (AAH). A dynamic infrared (IR) background generator will be developed for the Dynamic Analysis Laboratory (DAL). Field tests will be performed to verify the ECM hardness of TOW-PIP and the ECCM Sense and Destroy Armor (SADARM) sensor. ECM analysis of Assault Breaker will be initiated. SEMI investigations will be completed on COPPERHEAD, GRAY ROCK, and the AN/TAS-5 Night Sight; and initiated on STINGER-POST, HELLFIRE, and the XM1 tank. ECM evaluations of the PERSHING II ED will continue with emphasis on the digital correlator. ECM investigations of the General Support Rocket System (GSRS) will be initiated. ECM analyses will be conducted on the modified PATRIOT, ROLAND, and CHAPARRAL fuzes.

3. FY 1981 Planned Program: Assessment of the vulnerability of PATRIOT to the 1987 advanced threat will continue with field testing of hardware and software product improvements. Continued ECM support will be provided to STINGER-POST firing tests, US ROLAND tests, and DIVADS product verification testing. Vulnerability investigations of the CHAPARRAL will be initiated. Static and dynamic ECM lab/field tests and flight simulations will be performed on both COPPERHEAD and HELLFIRE production laser seekers. Lab/field investigations and susceptibility/vulnerability assessment of TADS/PNVS will be completed. Major hardware components will be developed

for the DAL. A prototype TOW-PIP threat device will be developed. ECM investigations of SADARM and Assault Breaker will continue. Initiate ECM susceptibility/vulnerability analysis of the Cannon Artillery Weapon System (CAWS) antiradiation projectile (ARP). Laboratory investigations of PERSHING II ED hardware will be completed and captive flight tests started. Simulation model for fuze evaluations will be updated to incorporate responses to chaff and artillery fuze studies will be started. SEMI investigations on STINGER-POST, HELLFIRE, and the XM1 tank will be completed and efforts on other electronic devices/systems will be initiated. Signature measurements will be continued in support of EW vulnerability analyses.

4. FY 1982 Planned Program: Conduct advanced Electronic Countermeasure/Electronic Counter Countermeasures (ECM/ECCM) Division Air Defense Gun (DIVAD) System during Initial Production Tests using threat level responsive coherent deception techniques and formulate Electronic Warfare (EW) vulnerability conclusions for DIVAD Gun System. Conduct advanced ECM and Infrared (IR) CM testing on US ROLAND during confirmatory tests. Develop ECM test systems for use in DIVAD and ROLAND vulnerability assessments. Vulnerability studies of PATRIOT missile system will be continued structured around the enhancement program.

EW analysis of the PATRIOT extended range program will also be pursued. The STINGER-POST EW vulnerability program will address advanced jamming and decoying techniques supported by the development of demonstration/experimental hardware. The simulation capabilities will be upgraded to permit closed loop semiphysical simulations of CHAPARRAL ROSETTE,

The IR portion of the Dynamic Analysis Laboratory will be completed and dynamic lab investigations will be performed on the IRIS. Special electromagnetic interference (SEMI) tests will also be performed on IRIS. The EW portion of the Development Tests and the SEMI tests will both be performed on the TOW product improved. ECM and ECCM investigations will continue on Sense and Destroy Armor (SADARM) and Assault Breaker. ECM portion of PERSHING II captive flight program will be completed, and the missile flight program will be started. General Support Rocket System (GSRS) studies will provide inputs to support DSARC I decision. PATRIOT fuze EW evaluation will be completed. EW studies of artillery fuzes will be completed and laboratory analysis started. SEMI efforts will be incorporated as an integral part of the communications-electronics EW vulnerability investigations and will continue as a part of the missile EW vulnerability investigations. Signature measurements will continue to be provided in support of EW vulnerability analyses.

General ECCM techniques for laser guided weapon systems will be evaluated. Generic classes of Army

missile systems that have common threat environments will be developed. Contract validation tests and assessment of ECCM techniques in support of the various army missile system project managers. EW vulnerability analyses will be conducted on selected foreign missile systems.

5. (U) Program to Completion: This is a continuing program.

6. (U) Major Milestones: Not Applicable.

7. Resources ($ in thousands):

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	12120	14884			Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	14097	14908		Not Shown	Continuing	Not Applicable

Decrease in FY 1979 is due to reprogramming to meet higher priority requirements. The decrease in FY 1980 is due to a general reduction made by Congress. The increase in FY 1981 is due to new requirements for a classified project and higher costs in the development and procurement of threat environment generating instrumentation.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.37.38.A
DOD Mission Area: #430 - Non-Systems Training Devices

Title: Non-Systems Training Devices (NSTD) Development
Budget Activity: #6 - Defensewide Mission Support

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional To Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	5671	2950	2771	4843	Continuing	Not Applicable
D115	NSTD Infantry	2494	0	0	0	Continuing	Not Applicable
D224	NSTD Armor/Anti-Armor	3177	2000	2771	3027	Continuing	Not Applicable
D225	NSTD Artillery/Air Defense Engineer	0	0	0	0		
D226	NSTD Combined Arms	0	950	0	1816	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This Program provides for the Advanced Development (AD) of Non-Systems Training Devices (NSTD). Non-System Training Devices are developed to support general military training and training on more than one item/system, as compared with System Devices that are developed in support of a specific item/system. The combat effectiveness of Army personnel is key to both compensating for the numerical superiority of opposing forces and for maintaining a ready force. This combat effectiveness can only be achieved by innovative, efficient, and results-oriented training. Modern technology, manifested in this instance by modern training devices, can provide the means to accomplish this required training. The major thrust in the development of new training devices is to develop devices allowing a high transfer of knowledge and experience from the training situation to a combat situation. The Army must train as it is to fight. Studies have indicated that units training with REALTRAIN, a first generation-engagement simulation system, become significantly more combat effective than units training with previously standard methods. The results reflect progress in meeting the basic challenge of providing learning situations which have the requisite fidelity to require the same decisions and techniques in training as those required in combat. Training devices also offer another potential for improving the combat effectiveness of the Army. Studies have indicated that the proficiency of individuals and units decreases significantly during periods between field or weapons live-firing exercises. Constrained training resources preclude a more frequent occurrence of these live-firing activities. Training devices afford the potential to simulate aspects of these "refresher" activities within garrison locations. Improved training devices, now available through modern technology, must continue to be developed to allow the training required to prepare US soldiers to fight outnumbered and win.

Program Element: 6.37.38.A
DOD Mission Area: 7430 - Non-Systems Training Devices

Title: Non-Systems Training Devices (NSTD) Development
Budget Activity: 6 - Defensewide Mission Support

C. (U) BASIS FOR FY 1981 RDTE REQUEST: Continue Advanced Development (AD) of the Armor Remoted Target System (ARETS) and initiate Advanced Development of the Eye-Safe Simulated Laser Rangefinder (ESSLR).

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1980 Submission
ARETS - IOC	Dec 86	None Shown
ESSLR - Progress from 6.3 to 6.4	Sep 81	None Shown

D. (U) BASIS FOR CHANGE BETWEEN FY 1981 and FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1979	FY 1980	FY 1981	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	5671	2950	2771	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	5300	11300	10500	Continuing	Not Applicable

The increased funding in FY 1979 is due to the reprograming of funds from lower priority projects in order to complete Advanced Development and Operational Testing of the Infantry Remoted Target System. The reduced funding in FY80 reflects reprogramming of funds into a higher priority program (PE 6.42.27.A, Tactical Computer System). The reduced funding in FY 1981 reflects the termination of the Armor Full Crew Research Simulator (AFCRS) project. Due to excessive costs, the AFCRS project requirement was reevaluated and terminated.

Program Element: #6.37.38.A
DOD Mission Area: #430 - Non-Systems Training Devices

Title: Non-Systems Training Devices (NSTD) Development
Budget Activity: #6 - Defensewide Mission Support

E. (U) OTHER APPROPRIATION FUNDS: ($ in thousands)

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional To Completion	Total Estimated Costs
Military Construction, Army:						
Funds (current requirements)	0	0	0	0	0	0
Funds (as shown in FY 1980 submission)	924	0	0	0	0	924

The funds for FY79 were required to construct facilities at Fort Knox, KY, for the Armor Full Crew Research Simulator (AFCRS) project which has been terminated due to excessive costs.

Program Element: #6.37.38.A
DOD Mission Area: #410 - Non-Systems Training Devices
Title: Non-Systems Training Devices (NSTD) Development
Budget Activity: #6 - Defensewide Mission Support

F. (U) DETAILED BACKGROUND AND DESCRIPTION: This continuing Program provides for the Advanced Development (AD) of training devices which are developed to support general military training, and training on more than one item/system. The Program Element is divided into four projects which serve to separate the devices according to the branch of the Army primarily concerned. One or more training devices may be under development within each project. One of the items to be discussed in the FY 1981 program is the Armor Remoted Target System (ARETS). Targets represent a major problem area in the current tank gunnery training system. Pop-up, pop-down, and moving targets and target mechanisms have not been centrally developed and are not available through normal training devices supply channels. As a result, armor targets are not available at all required locations to provide effective training. Not only must this situation be remedied, but emphasis must be placed on realistic targets and threat scenarios to allow a high transfer of knowledge and experience from the training situation to a combat situation. The Armor Remoted Target System will provide challenging training under simulated battle conditions in tactical gunnery, including target acquisition and engagement against massed enemy formations portraying threat scenarios. The other item within this program is the Eye-Safe Simulated Laser Rangefinder (ESSLR). ESSLR will be an attachment for tank laser rangefinders to provide eye-safe laser ranging. The laser power reduction to assure eye-safe operation may be effected by inserting a filter at the exit point of the laser beam.

G. (U) RELATED ACTIVITIES: Close coordination is maintained with other Services through Training and Personnel Technology Conferences, Topical Reviews, a Joint Service Technical Coordinating Group - Simulators and Training Devices, worldwide staffing of Training Device Requirements, and the collocation of the office of the Project Manager for Training Devices (PM TRADE) and the Naval Training Equipment Center (NTEC). The devices contained in this program element progress from efforts in Non-Systems Training Devices Exploratory Development (PE 6.27.17.A) and proceed to Non-Systems Training Devices Engineering Development (PE 6.47.15.A). Related Program Elements are: 6.27.22.A, Army Training Technology; 6.37.51.F, Innovation in Education and Training; 6.32.27.F, Advanced Simulation Technology; and 6.37.20.N, Education and Training.

H. (U) WORK PERFORMED BY: In-house activities are performed by the Project Manager for Training Devices (PM TRADE), Orlando, FL, and the Naval Training Equipment Center (NTEC), Orlando, FL. Contractors for planned programs have not been determined.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: Completed Advanced Development (AD) to include Operational Test (OT) of the Infantry Remoted Target System (IRETS) and the Marksmanship and Gunnery Laser Device (MAGLAD). IRETS and MAGLAD progressed to Engineering Development in FY 1980.

Program Element: #6.37.38.A Title: Non-Systems Training Devices (NSTD) Development
DOD Mission Area: #410 - Non-Systems Training Devices Budget Activity: #6 - Defensewide Mission Support

2. (U) FY 1980 Program: Initiate Advanced Development of the Armor Remoted Target System (ARETS). ARETS is designed to provide an integrated solution to the target needs of the armor community. Components will include control devices, stationary and moving target mechanisms, two- and three-dimensional targets, hostile fire simulators, muzzle flash simulators, and hit indicators. ARETS will be designed to sense and subsequently score service ammunition and laser energy. The control unit will be capable of automatic scoring and recording so that accurate and complete evaluation can be accomplished. Initiate and complete Advanced Development of the Automatic Weapons Effects Signature Simulator (AWESS). The AWESS will be a training device to simulate the firing signature of the Army's full family of machine guns (cal .50 and 7.62 mm) the 20 mm, machine cannon, and the M16 Rifle. The devices will be used in lieu of blank ammunition to simulate the visual and aural effects of weapons firing during both conventional and engagement simulation field training exercise. Key design criteria are a credible signature, troop safety, and reduced life cycle costs.

3. (U) FY 1981 Planned Program: Continue the design and engineering effort on the Armor Remoted Target System (ARETS). Initiate and complete advanced development of the Eye-Safe Simulated Laser Rangefinder (ESSLR). The ESSLR will be an attachment for the tank laser rangefinder to provide eye-safe laser ranging. The laser power reduction may be effected by inserting a filter at the exit point of the laser beam.

4. (U) FY 1982 Planned Program: Complete the design and engineering effort on the Armor Remoted Target System (ARETS), install the ARETS at Fort Knox, KY, and conduct operational testing. Initiate and complete Advanced Development of Electronic Warfare (EW) simulators. The EW training devices are a family of devices dealing with the various aspects of EW in a tactical environment. Communications devices include an automatic signal jammer to emulate threat technical and doctrinal capabilities, a transmission timer/counter to provide feedback to commanders on radio usage, a voice-activated audio recorder for event reconstruction and after-action feedback on radio communications, and a power amplifier for effective jamming over an extended area. Noncommunications devices include a corner-cube reflector and radar signal jammer.

5. (U) Program to Completion: This is a continuing program.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: 06.42.68.A
Title: Component Improvement Program
DOD Mission Area: 0471 - General Management Support
Budget Activity: 06 - Defensewide Mission Support

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	0	8700	15400	13016	Continuing	Not Applicable
D106	Component Improvement Program	0	8700	15400	13016	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program provides for continuing improvements in aircraft engines encompassing the areas of reliability, maintainability, durability and the correction of service-revealed deficiencies. This effort is essential to enhance the time between overhauls and foster a general reduction in maintenance man-hours and resources required to sustain aircraft engines in service. The purpose of this program is to fix those problems detected after the engines have demonstrated production suitability following acceptance of the first procurement-funded aircraft.

C. (U) BASIS FOR FY 1981 RDTE REQUEST: Continue ongoing program of accelerated mission profile testing for low cycle fatigue and endurance testing of the T55-L-712 engine as part of engine qualifications continues reliability improvement testing for the T55 series engine. The accelerated engine testing is required to reduce the risk of major problems when the T55-L-712 engine is installed and fielded in the CH-47C and CH-47D helicopter. Support continues for the T700 engine used in the UH-60A and YAH-64 helicopters. Funds provide for qualification test of critical components and engine assessories redesigned to solve problems which occur in continued testing and field service. Improvements will be conducted in the areas of bearings, seals, fuel control system and hot section (combustor) module. Additional improvements in the inlet particle separator and engine sand ingestion sections to increase engine reliability are also planned.

Program Element: #6.42.68.A Title: Component Improvement Program
DOD Mission Area: #471 - General Management Support Budget Activity: #6 - Defensewide Mission Support

D. (U) BASIS FOR CHANGE BETWEEN FY 1981 AND FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1979	FY 1980	FY 1981	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	Not Applicable	8700	15400	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable

FY 1980 Defense Appropriation Bill moved the Component Improvement Program funds from the Procurement Appropriation to the RDTE account. This is a new Congressional Descriptive Summary reflecting an FY 1980 Congressional decision.

E. (U) OTHER APPROPRIATION FUNDS: ($ in thousands): Not applicable

Program Element: #6.42.68.A
Title: Component Improvement Program
DOD Mission Area: #471 - General Management Support
Budget Activity: #6 - Defensewide Mission Support

F. (U) DETAILED BACKGROUND AND DESCRIPTION: First year funded in RDTE is FY 1980 as a result of Congressional decision to fund the effort in the RDTE account. Background of the program follows the rationale that engineering tests and redesigns are inherent to fielding of aircraft where engine problems are detected primarily due to service/field usage.

G. (U) RELATED ACTIVITIES: This program has been reoriented from Aircraft Procurement Army (APA) to the RDTE account based on an FY 1980, Congressional decision. Prior to FY 1980, this effort was funded in a program called Component Improvement Program. The same scope/purpose prevails in the program now funded in RDTE.

H. (U) WORK PERFORMED BY: This work is performed by the Product Managers for UH-60A BLACKHAWK, YAH-64 Advanced Attack Helicopter, and CH-47 Modernization. Prime contractors involved in support of this project include AVCO-Lycoming Company of Stratford, CT, (T55-L-712) and the General Electric Company, Lynn, MA. Also participating is in-house engineering of the US Army Aviation Research and Development Command, St Louis, MO.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: For the T700 engine, as part of a continuing effort, (previously funded in Aircraft Procurement, Army account), a 1500-hour test has been completed, and all known service-revealed difficulties have been investigated and corrective action taken. These investigations include running of the discrepant engine in the test cell, laboratory analysis of materials, review of manufacturing practices and processing procedures, and engineering analysis of data. Attention has been given to the improvement of seals and bearing to maintain all engine component life at 5000 hours. Specific efforts include improving sump pressurization to insure adequate sealing at low engine power and an improved seal to the fourth and fifth compressor stage. The FY 1979 effort also included test to evaluate the effect of very fine sand particles on turbine blade cooling. This work responds to field reports from the Mideast reporting on short turbine life due to clogging of the passages of air-cooled turbine blades. For the T-55 engine, the component improvement program has been oriented to redesign/qualification of engine components that have caused premature engine removals in the field. Engine component improvements for the T55-L-712 engine are directed towards maintaining the predicted the Mean Time Between Depot Removal for all Causes (MTBDA) of 1150 hours and a Mean Allowable Operating Time (MAOT) of 2400 hours. These efforts have been underway since FY 1976. For FY 1979 ongoing T55 improvement efforts included various testing/evaluation (performance, mission profile and endurance). T-55-L-712 qualification resulted in a configuration many times superior to the present T55; however, specific areas which have been identified for further improvement include: #4 and 5 bearing temperature problems, improved torque mixer, improved 450 stator material for the first and second stage compressor disc and the first stage gas producer nozzle in conjunction with an improved combustor liner.

Program Element: #6.42.68.A Title: Component Improvement Program
DOD Mission Area: #471 - General Management Support Budget Activity: #6 - Defensewide Mission Support

2. (U) FY 1980 Program: T700: For FY 1980 the Component Improvement Program (CIP) led to qualification of the inlet particle separator (IPS). Analysis of data to determine ways to desensitize the engine to sand ingestion is planned since the IPS cannot separate 100% of all sand and dust from the engine core. Studies and testing for turbine blade cooling will be conducted based on results of FY79 testing. As greater field experience is gained from the FY 1980 program, additonal improvement programs will be incorporated as deemed appropriate oriented to maintenance and reliability enhancement. T-55: continuation of testing (150 hours of general development testing) will be conducted concluding engineering and field support for the field fleet. Analysis of FY 1979 data continues for formulation of future T-55-L-712 testing. Items required include Mission Profile Testing, Endurance Testing, and Low Cycle Fatigue testing prior to fielding.

3. (U) FY 1981 Planned Program: T700: Continuation of engine component and necessary accessory redesign/corrections resulting from problems detected from field/operational usage and from fleet leader and low cycle fatigue testing. Investigative, assurance and qualification testing required to support the UH-60 production contracts. These efforts are required to maintain the projected reliability and durability of the T700 engine. T-55: During FY 1981 the fielding of the T55-L-712 engine will anticipate new anomolies not detected in test cell testing. Funds will be necessary to continue evaluations to uncover new field problems.

4. (U) FY 1982 Planned Program: Continuation of ongoing effort to maintain projected/required engine reliability and durability goals.

5. (U) Program to Completion: This is a continuing effort.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: 6.47.15.A
Title: Non-Systems Training Devices (NSTD) Engineering
DOD Mission Area: 430 - Non-Systems Training Devices
Budget Activity: 6 - Defensewide Mission Support

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional To Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	5400	8837	11820	16749	Continuing	Not Applicable
	QUANTITIES						Not Applicable
D237	NSTD Artillery/Air Defense/ Engineer	100	3996	2223	1616	Continuing	Not Applicable
D239	NSTD Infantry	1450	396	1852	1421	Continuing	Not Applicable
D241	NSTD Combined Arms	1739	1996	5163	5651	Continuing	Not Applicable
D572	NSTD Armor/Antiarmor	811	463	0	4948	Continuing	Not Applicable
D573	PM-Trade (Project Manager for Training Devices) and Naval Training Equipment Center (NTEC) Support	1300	1986	2582	3113	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This Program provides for the Engineering Development (ED) of Non-Systems Training Devices (NSTD). Non-Systems Training Devices are developed to support general military training, and training on more than one item/system, as compared with System Devices that are developed in support of a specific item/system. The combat effectiveness of Army personnel is key to both compensating for the numerical superiority of opposing forces and for maintaining a ready force. This combat effectiveness can only be achieved by innovative, efficient, and results-oriented training. Modern technology, manifested in this instance by modern training devices, can provide the means to accomplish this required training. Studies have indicated that units training with REALTRAIN, a first generation engagement simulation system, have become significantly more combat effective than units training with previously standard methods. These results reflect progress in meeting the basic challenge of providing learning situations which have the requisite fidelity to require the same decisions and techniques in training as those required in combat. Training devices also offer another potential for improving the combat effectiveness of the Army. Studies have indicated that, the proficiency of individuals and units decreases significantly during periods between field or weapons live-firing exercises. Constrained training resources preclude frequent occurrence of these live firing activities. Training devices afford the potential to simulate aspects of those "refresher"

Program Element: #6.47.15.A
DOD Mission Area: #430 - Non-Systems Training Devices

Title: Non-Systems Training Devices (NSTD) Engineering
Budget Activity: #6 - Defensewide Mission Support

activities within garrison locations. Improved training devices, now available through modern technology, must continue to be developed to allow the training required to prepare United States soldiers to fight outnumbered and win.

C. (U) BASIS FOR FY 1981 RDTE REQUEST: Provides funds to support the personnel costs of the Office of the Project Manager for Training Devices (PM TRADE), the agency responsible for executing the Army Non-Systems Training Devices (NSTD) program. Continues funding a joint Army/Navy agreement which makes available for Army use the resources of the Naval Training Equipment Center (NTEC), which is collocated with PM TRADE. Continues Engineering Development (ED) of the following: Air-Ground Engagement Systems (AGES), Air Defense Simulator (ADS), Army Training Battle Simulation System (ARTBASS), Infantry Remoted Target System (IRETS), and the Marksmanship and Gunnery Laser Device (MAGLAD). Initiates ED of Mine/Countermine Casualty Producing Simulation (MICAPS) and the Automatic Weapons Effects Signature Simulator (AWESS).

D. (U) BASIS FOR CHANGE BETWEEN FY 1981 and FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1979	FY 1980	FY 1981	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	5400	8837	11820	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	10006	9416	16100	Continuing	Not Applicable

The reduction of funding in FY79 is a result of the decision to defer initiation of Engineering Development (ED) of the Marksmanship and Gunnery Laser Device (MAGLAD), project D239, the Air-Ground Engagement System (AGES) and Air Defense Simulator (ADS), project D237, and to fund other higher priority Army projects. The reduction in FY81 project D237 results from a delay in the Indirect Area Fire project. A technological breakthrough is required in order to allow finalization of the requirement. Reduction in projects D241 and D573 reflects a reprograming of funds into higher priority Army projects. Reduced funding levels in FY80 reflect a general reduction by Congress. Reduction of project D527 in FY80 was the result of internal Army reprograming.

Program Element: 6.47.15.A
Title: Non-Systems Training Devices (NSTD) Engineering
DOD Mission Area: 4430 - Non-Systems Training Devices
Budget Activity: 6 - Defensewide Mission Support

E. (U) OTHER APPROPRIATION FUNDS: Not Applicable

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional To Completion	Total Estimated Cost
Other Procurement, Army:						
Funds (current requirements)	29800	49500	11100	48500	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	32800	49500	70200	Not Shown	Continuing	Not Applicable
Quantities*						

*It is not feasible to list the quantities because of the diversity of type and quantity of the different training devices. The reduction of funds in FY 1979 reflects a delay in procurement of the Observed Fire Trainer (OFT) until FY 1981. In FY 1981 the reduction reflects the delay in procurement of Infantry Remoted Target System (IRETS) and Marksmanship and Gunnery Laser Devise (MAGLAD) pending successful completion of ED and type classification action.

Program Element: #6.47.15.A Title: Non-Systems Training Devices (NSTD) Engineering
DOD Mission Area: #430 - Non-Systems Training Devices Budget Activity: #6 - Defensewide Mission Support

F. (U) DETAILED BACKGROUND AND DESCRIPTION: This program provides for the Engineering Development (ED) of training devices which are developed to support general military training, and training on more than one item/system. The Program Element is divided into five projects, four of which serve to separate the training devices according to the branch of the Army primarily concerned, and one of which provides funds to support the personnel costs of the Office of the Project Manager for Training Devices (PM TRADE) and to continue funding a joint Army/Navy agreement which makes available for Army use the resources of the Naval Training Equipment Center (NTEC). The training devices encompassed within this Program Element in FY 1981 may be categorized into two general areas. The first area is engagement simulation. Devices are required which allow a two-sided, free-play field exercise with realtime casualty assessment. The Multiple Integrated Laser Engagement System (MILES), which is in procurement, will meet this requirement. Currently lacking in this engagement simulation system are two key elements in the combined arms team, air-to-ground weapons and air defense weapons. Simulators for these two types of weapon systems will be developed within this Program Element. The Air-Ground Engagement System (AGES) will provide a realistic means of simulating helicopter and ground support aircraft operations during tactical training, and the Air Defense Simulator (ADS) will provide a realistic means of simulating air defense measures against helicopters and low-performance aircraft. Additionally, the Automatic Weapon Effects Signature Simulator (AWESS) will be developed. The AWESS will be a training device to simulate the firing signature of the Army's full family of machine guns (cal .50 and 7.62mm), the 20mm Machine Cannon, and the M16 rifle. The devices will be used in lieu of blank ammunition to simulate the visual and aural effects of weapons firing during both conventional and engagement simulation field training exercises. Another development to be utilized with MILES is the Mine/Countermine Casualty Producing Simulator (MICAPS). The MICAPS system will encompass three mine families, directional, omnidirectional, and mass scatterable mines. The system will afford high-fidelity casualty assessment. This Program Element also supports development efforts specifically designed to avoid some of the extremely high costs associated with engagement simulation. Training devices also have for significant cost avoidance/reduction in the training of command groups. The Army Training Battle Simulation System (ARTBASS) will provide a two-sided, free-play, highly realistic, realtime environment, and allow the training of leaders and staffs in the critical aspects of combined arms employment without the requirement for deploying large troop units to the field. The second general area encompassed by this Program Element concerns marksmanship systems. The Army's current inventroy standard target mechanisms and range control systems for fixed infantry marksmanship ranges are rapidly becoming obsolete. The Infantry Remoted Target System (IRETS) will provide a modern, realistic, threat-oriented solution to the small arms marksmanship target needs of the Infantry community. A second marksmanship device under development is the Marksmanship and Gunnery Laser Device (MAGLAD). This device can be used either on reduced-scale indoor ranges or on full-scale ranges when used in conjunction with IRETS. This device will offer a cost-effective means to improve marksmanship training. An additional item which will improve tank crew training is the Tank Appended Crew Evaluation Device (TACED). The TACED will allow an instructor/trainer to objectively assess individual and collective tank gunnery tasks.

Program Element: #6.47.15.A
Title: Non-Systems Training Devices (NSTD) Engineering
DOD Mission Area: #430 - Non-Systems Training Devices
Budget Activity: #6 - Defensewide Mission Support

G. (U) RELATED ACTIVITIES: Close coordination is maintained with other Services through Training and Personnel Technology Conferences, Topical Reviews, a Joint Service Technical Coordinating Group-Simulators and Training Devices, worldwide staffing of Training Device Requirements, and the collocation of the Office of the Project Manager for Training Devices (PM TRADE) and the Naval Training Equipment Center (NTEC). The devices contained in this program have normally progressed to Engineering Development from related Non-System Training Devices Advanced Development (Program Element (PE) 6.37.38.A) and/or Non-Systems Training Devices Exploratory Development (PE 6.27.27.A). This Program also funds a Service agreement that makes available for Army use the resources of the Naval Training Equipment Center (NTEC), which is collocated with Project Manager for Training Devices (PM TRADE).

H. (U) WORK PERFORMED BY: Primary contractors: Xerox Electro-Optical Systems, Inc., Pasadena, CA, and Sperry Rand Corp., Huntsville, AL. In-house activities are performed by the PM TRADE, Orlando, FL; the Army Armament Research and Development Command, Picatinny Arsenal, Dover, NJ; and the Naval Training Equipment Center, Orlando, FL.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: Completed engineering, fabrication, development, and operational testing of the Observed Fire Trainer. Completed engineering, fabrication, development testing and initiate operational testing of the Multiple Integrated Laser Engagement System (MILES) and the Antitank Weapons Signature Simulator (ATWESS). The results of operational and development testing indicated a successful development. User testing was conducted during the months of October and November 1979 in US Army Europe with the achievement of outstanding results. Also, completed development of the caliber .50 Subcaliber Training Device XM179.

2. (U) FY 1980 Program: Initiate Engineering Development (ED) of the Air-Ground Engagement System (AGES). The development of this system will allow the introduction of air weapons into tactical engagement simulation exercises. The objective is to provide a realistic means of simulating helicopter and ground support aircraft operations during the course of tactical training by the inclusion of realtime casualty assessment in combined arms exercises. The air-to-ground weapons simulated will include TOW, HELLFIRE, 20/30mm machine cannons, and other air-delivered munitions. Initiate ED of the Army Training Battle Simulation System (ARTBASS). This device will allow the training of leaders and staffs to cope with the complex and sophisticated environments they will face in future battlefields. It will incorporate such features as varied terrain, accurate portrayal of both friendly and enemy weapons effects, and diagnostic feedback, while using a minimum number of dedicated controllers. Initiate ED of Air Defense Simulators (ADS). This program will provide laser systems to simulate the firing characteristics of the CHAPARRAL, VULCAN, REDEYE, and STINGER air defense weapons. The objective is to provide a realistic means of simulating air defense measures against helicopters and ground support aircraft and allow the inclusion of

Program Element: #6.7.15.A
DOD Mission Area: #430 - Non-Systems Training Devices
Title: Non-Systems Training Devices (NSTD) Engineering
Budget Activity: #6 - Defensewide Mission Support

realtime casualty assessment in combined arms exercises. Initiate and complete ED of the Blank Firing Adapter (BFA) for the 7.62mm M240 (MAG 58) machine gun. The BFA will allow the M240 machine gun to fire blank ammunition, and hence play its full role in engagement simulation exercises, as it would in actual combat. Initiate ED of the Infantry Remoted Target System (IRETS). This program will provide an integrated solution to the small arms marksmanship target needs of the infantry community. IRETS will feature automated control devices, stationary and moving target mechanisms, two- and three-dimensional targets, hostile fire simulators, and hit indicators. This target system will provide a realistic threat scenario and allow a high transfer of training value to a combat situation. Initiate ED of the Marksmanship and Gunnery Laser Device (MAGLAD). This device, which simulates the firing characteristics of the M16A1 rifle, will supplement live-fire marksmanship training in a cost-effective manner, and allow marksmanship training to be conducted without the requirements for normal range facilities. Upon completion of operational testing, type classification of the remaining MILES items will occur. Initiate and complete ED on the Radiac Training Device for an AN/PDR-56 radiacmeter. This device will allow Alpha radiation and Explosive Ordnance Disposal (EOD) teams to practice Alpha radiation monitoring and survey techniques without being exposed to hazardous radiation. The simulator will represent exactly the operational equipment in appearance, operating controls, and meter readings. All necessary experimental work will be performed and the proposed programs mentioned above will be ready for full-scale development.

3. (U) FY 1981 Planned Program: Continue Engineering Development (ED) of the Air-Ground Engagement System (AGES) and Air Defense Simulators (ADS). Continue ED on the Army Training Battle Simulation System (ARTBASS), Infantry Remoted Target System (IRETS), and the Marksmanship and Gunnery Laser Device (MAGLAD). Initiate Engineering Development of the Mine/ Countermine Casualty Producing Simulation (MICAPS). The MICAPS program provides the capability to accurately simulate the casualty-producing effects of mines during engagement simulation exercises. The system will afford high-fidelity casualty assessment. Initiate ED on the Automatic Weapons Effect Signature Simulator (AWESS). The AWESS will be a training device to simulate the firing signatures of the Army's full family of machine guns (calibers .50 and 7.62mm machine gun), the 20mm machine cannon, and the M16 rifle. The devices will be used in lieu of blank ammunition to simulate the visual and aural effects of weapons firing during both conventional and engagement simulation field exercises. All necessary experimental work will be performed for AWESS and MICAPS, and the proposed devices will be ready for full-scale development.

4. (U) FY 1982 Planned Program: Complete Engineering Development (ED) of the Automatic Weapons Effect Signature Simulator (AWESS), the Air-Ground Engagement System (AGES), Air Defense Simulators (ADS), Infantry Remoted Target System (IRETS), and Marksmanship and Gunnery Laser Device (MAGLAD). Initiate and complete ED of the Armor Remoted Target System (ARETS) and Eye-Safe Simulated Laser Rangefinder (ESSLR). Continue ED on the Army Training Battle Simulations System (ARTBASS), and the Mine/Countermine Casualty Producing Simulation (MICAPS). Initiate ED on the Tank-Appended Crew Evaluation Device (TACED). The TACED will allow an instructor/trainer to objectively assess individual and collective Tank Gunnery tasks.

Program Element: #6.47.15.A
DOD Mission Area: #430 - Non-Systems Training Devices

Title: Non-Systems Training Devices (NSTD) Engineering
Budget Activity: #6 - Defensewide Mission Support

The devices will be used at the unit level on M60 tanks and will be used in all types of gunnery training exercises from dry firing through live firing. All necessary experimental work will be performed for the ARETS, TACED, and the proposed devices will be ready for full-scale development.

5. (U) Program to Completion: This is a continuing program.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D241 Title: Non-Systems Training Devices Combined Arms
Program Element: #6.47.15.A Title: Non-Systems Training Devices (NSTD)
DOD Mission Area: #430 - Non-Systems Training Devices Budget Activity: #6 - Defensewide Mission Support

A. (U) DETAILED BACKGROUND AND DESCRIPTION: This continuing project provides for the Engineering Development (ED) for Combined Arms-related training devices that are developed to support general military training and training on more than one item/system. The first item to be discussed in the FY 1981 program is the Army Training Battle Simulation System (ARTBASS). Current analysis of the threat battle scenarios indicates that the future battlefield will be characterized by extraordinary lethality and high casualties during short periods of time. Extremely rapid combat action requiring immediate decisions, and the requirement for maneuver commanders to control and coordinate combat, combat support, and combat service support assets against a numerically superior force necessitate a new approach to exercising decisionmaking skills. A training system is required that will allow a battalion commander and his staff to properly manage resources and consider time-space relationships under the pressures of a realtime simulated combat environment. This high-fidelity, computer-driven, battle simulator will train maneuver battalion commanders and their staffs. ARTBASS will create an unclassified training environment in which existing and future friendly/threat organizations, flexible force ratios, tactics, command and control, and weapon effects will be realistically simulated. This system will be a part of the command group training support system. The second item to be discussed is the Automatic Weapons Effects Signature Simulator (AWESS). Both current conventional training and the Multiple Integrated Laser Engagement System (MILES) use blank ammunition to provide weapons firing signatures. The AWESS will be a training device to simulate the firing signatures of the Army's full family of machine guns (cal .50 and 7.62mm), the 20mm machine cannon, and the M16 rifle. The devices will be used in lieu of blank ammunition to simulate the visual and aural effects of weapons firing during both conventional and engagement simulation field training exercises. Key design criteria are a credible signature, troop safety, and reduced life cycle costs.

B. (U) RELATED ACTIVITIES: Close coordination is maintained with other Services through Training and Personnel Technology Conferences, Topical Reviews, a Joint Service Technical Coordinating Group - Simulators and Training Devices, worldwide staffing of Training Device Requirements, and the collocation of the Office of the Project Manager for Training Devices (PM TRADE) and the Naval Training Equipment Center (NTEC). The devices contained in this project have normally progressed from efforts in Non-Systems Training Devices Exploratory Development (PE 6.27.27.A), and Non-Systems Training Devices Advanced Development (PE 6.3.38.A). Related program elements are: 6.27.22.A, Army Training Technology; 6.37.51.F, Innovation in Education and Training; 6.32.27.F, Advanced Simulation Technology; and 6.37.20.N, Education and Training.

C. (U) WORK PERFORMED BY: In-house activities are performed by the Project Manager for Training Devices (PM TRADE), Orlando, FL, and the Naval Training Equipment Center (NTEC), Orlando, FL. Primary Contractors for these items have not been determined.

Project: #D241 Title: Non-Systems Training Devices Combined Arms
Program Element: #6.47.15.A Title: Non-Systems Training Devices (NSTD)
DOD Mission Area: #430 - Non-Systems Training Devices Budget Activity: #6 - Defensewide Mission Support

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: This program has provided administrative support of the Project Manager for Training Devices (PM TRADE), the agency responsible for executing the Non-Systems Training Devices program. Funds utilized to pay personnel and equipment costs for PM Trade and Department of the Army usage of the Naval Training Equipment Center.

2. (U) FY 1980 Program: Engineering Development (ED) of the Army Training Battle Simulation System (ARTBASS) will be initiated. This device will allow the training of leaders and staffs to cope with the complex and sophisticated environments they will face on future battlefields. The Army Training Battle Simulation System (ARTBASS) will provide a two-sided, free play, highly realistic, realtime environment. It will incorporate such features as varied terrain, accurate portrayal of both friendly and enemy weapons effects and diagnostic feedback while using a minimum number of dedicated controllers. All necessary experimental work will be performed, and the proposed system will be ready for full-scale development.

3. (U) FY 1981 Planned Program: Continue Engineering Development (ED) of the Army Training Battle Simulation System (ARTBASS). Initiate ED on the Automatic Weapons Effects Signature Simulator (AWESS). The AWESS will be a training device to simulate the firing signatures of the Army's full family of machine guns (cal .50 and 7.62mm), the 20mm machine cannon, and the M16 rifle. The devices be used in lieu of blank ammunition to simulate the visual and aural effects of weapons firing during both conventional and engagement simulation field exercises. All necessary experimental work will be performed, and the proposed device will be ready for full-scale development.

4. (U) FY 1982 Planned Program: Continue Engineering Development (ED) on the Army Training Battle Simulation System and complete ED on the Automatic Weapons Effects Signature Simulator.

5. (U) Program to Completion: This is a continuing program.

Project: #D241 Title: Non-Systems Training Devices Combined Arms
Program Element: #6.47.15.A Title: Non-Systems Training Devices (NSTD)
DOD Mission Area: #430 - Non-Systems Training Devices Budget Activity: #6 - Defensewide Mission Support

6. (U) Major Milestones:

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1980 Submission
AFTBASS - IOC	Aug 84	None
AWES - IOC	Aug 83	None

7. (U) Resources ($ in thousands):

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	1739	1996	5163	5651	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	2820	2000	4000	Not Shown	Continuing	Not Applicable

Decrease in FY 1979 reflects deferral of Army Training Battle Simulation System (ARTBASS) due to lack of validated requirement. Increase in FY 1981 reflects an increased fund requirement for ARTBASS due to the delayed start. Decrease in FY80 is the result of a general reduction by Congress.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.26.A
DOD Mission Area: #420 - Global Military Environmental Support

Title: Meteorological Equipment and Systems
Budget Activity: #6 - Defense Wide Mission Support

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional To Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	4808	8077	2886	1990	Continuing	Not Applicable
	Quantities						Not Applicable
D511	Meteorological Equipment and Systems	4808	8077	2886	1990	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program provides for the engineering development of meteorological equipment and systems to obtain observations and other data of the atmosphere required for effective planning and conduct of Army combat operations. This data is of particular significance for artillery ballistic computations, sound ranging, nuclear fallout prediction, Chemical Biological defense, helicopter operational activities, severe storm warnings, and ground mobility prediction. The Automatic Atmospheric Sounding System, AN/TMQ-31 (formerly FAMAS), is urgently required by the Field Artillery to provide Ballistic Meteorological support of forward area Artillery. Artillery ballistic and target acquisition Meteorological messages in the division forward area are of paramount interest. The AN/TMQ-31 system will replace the present AN/GMD-1 Rawinsonde system which 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 development Artillery systems. The AN/TMQ-31 meteorological equipment includes mobile weather radar, which provides three-dimensional measurements and display of natural and nuclear clouds, and precipitation out to a radius of 150 miles; portable weather-observing pack, which provides capability for an individual observer at a forward base to make measurements of wind direction and speed, temperature, humidity, and pressure in order to furnish air density, altimeter settings, and wind information for helicopter operations, and other activities requiring such measurements; and the meteorological data sounding system, the hydrogen generator, and meteorological balloon systems to provide atmospheric soundings every two hours to 60,000 feet for wind, temperature, and humidity measurements to support artillery fire; winds to 100,000 feet for nuclear fallout prediction; and for other uses.

Program Element: #6.47.26.A
DOD Mission Area: #420 - Global Military Environmental Support

Title: Meteorological Equipment and Systems
Budget Activity: #6 - Defense Wide Mission Support

C. (U) BASIS FOR FY 1981 RDTE REQUEST: This development is in keeping with the Army's requirement to have qualitative equivalents with Soviet fielded systems by 1985. A highly mobile, lightweight, near-realtime meteorological data acquisition system is urgently required to support the forward area artillery. The present AN/GMD-1 Rawinsonde system utilizes obsolete electron tube technology, is cumbersome, and does not possess the necessary mobility to be employed in the forward area of the battlefield. The Rawinsonde system uses manual data reduction requiring a 14-man section and does not interface with Tactical Fire Direction System (TACFIRE). Greatly increased ranges of developmental artillery will cause projectiles to be exposed to atmospheric effects for increased periods of time. Increased ranges and time of projectile flight demand the forward placement of a modern, highly mobile automatic data processing (ADP) Meteorological (MET) system to provide MET data required for obtaining the first volley fire for effect necessary to offset the numerical superiority of the threat forces. Further, expanded Corps/Division frontages and the requirement for highly mobile forces necessitate the employment of additional Meteorological sections in the forward battle area to reduce the effect of single station degradation of Meteorological data.

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1980 Submission
Complete Engineering Development (ED) of AN/TMQ-31	1Q FY 1982	None Shown
Complete Development Test (DT) II of AN/TMQ-31	3Q FY 1982	None Shown
Complete Type Classification Standard	4Q FY 1982	None Shown
Contract Awarded for Low Rate Initial Production	4Q FY 1982	None Shown
IOC	1Q FY 1984	None Shown
Contract Awarded for Full-Scale Production	1Q FY 1985	None Shown

Milestone dates and major milestones were not submitted in FY 1980 since a firm procurement plan and schedule had not been developed for inclusion in the FY80 Congressional Descriptive Summary.

D. (U) BASIS FOR CHANGE BETWEEN FY 1981 and FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

Program Element: #6.47.26.A
DOD Mission Area: #420 - Global Military Environmental Support

Title: Meteorological Equipment and Systems
Budget Activity: #6 - Defense Wide Mission Support

	FY 1979	FY 1980	FY 1981	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	4808	8077	2886	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	3209	8079	3293	Continuing	Not Applicable

Funds were increased in FY 1979 to expedite the fielding of the Automatic Atmospheric Sounding System, AN/TMQ-31, which is urgently required by the Field Artillery to provide ballistic meteorological support of forward area artillery. The additional FY 1979 funds are required to meet the expedited schedule of conditionally fielding ten AN/TMQ-31 systems to Europe, by the first quarter of FY 1984. Expeditious fielding of this system and equipment will allow the Army to achieve or exceed qualitative equivalence with Soviet fielded meteorological systems by 1985 and superiority through product improvement by 1990. Specifications were prepared for converting Advanced Development (AD) contract to Engineering Development (ED) contract, and four ED models of the AN/TMQ-31 systems were added to the contract for FY 1980. In addition, both the AN/TMQ-31 systems AD contract and ED contract have been combined in FY 1980 to reduce development costs and accelerate development schedule. The decrease in funding requested for FY 1981 is due primarily to the expected reduction in development which should occur by combining both the AD contract and ED contract efforts.

E. (U) OTHER APPROPRIATION FUNDS: ($ in Thousands)

	FY 1979	FY 1980	FY 1981	FY 1982	Additional to Completion	Total Estimated Cost
Other Procurement, Army:						
Funds (current requirements)	0	0	0	13200	70510	83710
Funds (as shown in FY 1979 submission)	0	0	0	12600	61740	74340
Quantities (current requirement)	0	0	0	20	150 systems (AN/TMQ-31)	
Quantities (as shown in FY 1980 submission)	0	0	0	20	150 systems (AN/TMQ-31)	

Program Element: #6.47.26.A
DOD Mission Area: #420 - Global Military Environmental Support

Title: Meteorological Equipment and Systems
Budget Activity: #6 - Defense Wide Mission Support

(U) No procurement was programmed in FY 1980 and FY 1981 since a firm procurement plan had not been developed for inclusion in the FY 1980 RDTE Congressional Descriptive Summary. The initial procurement of 20 AN/TMQ-31 systems is currently programmed in FY 1982, at an estimated cost of $13.2 million (inflated) as listed in the OMA/OSD FY 1981 Budget submission, dated 18 Sep 79.

Program Element: #6.47.26.A
DOD Mission Area: #420 - Global Military Environmental Support

Title: Meteorological Equipment and Systems
Budget Activity: #6 - Defense Wide Mission Support

F. (U) DETAILED BACKGROUND AND DESCRIPTION: The 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. The system under development during this reporting timeframe is the Automatic Atmospheric Sounding System, AN/TMQ-31. The AN/TMQ-31 system will provide the Field Artillery with a highly mobile, lightweight, automated data processing and meteorological data acquisition system with nonradiating ground-based components, to assure maximum combat effectiveness of the Field Artillery (FA) on the modern-day battlefield. Predominantly tank-oriented forces coupled with numerically superior support artillery pose the major threat. US Field Artillery will be especially vulnerable to counterbattery fires. Rapid, accurate US field artillery fires are a must in an effort to neutralize the threat force. The fluid battlefield situation demands quick response and a capability to deliver first-volley effective fires. Dynamic weather conditions in the threat area of operations dictates the need for timely, accurate meteorological data for the correction of US artillery fires. The system will operate in any type of climatic area and over any type of terrain where Army tactical operations require the employment of FA. While the system will be used primarily within the tactical area, it shall also be employed in the communications zone and CONUS. The system will sound the atmosphere for artillery Meteorological purposes at hourly intervals over extended periods. The system will be capable of varying sounding intervals and/or altitudes depending upon the operational need. The system shall produce the required met messages for artillery weapon systems, target acquisition systems, Air Weather Service (AWS) support of the Army in the field, and radiological fallout prediction with an improved reliability, timeliness, and accuracy of data as compared to the AN/GMD-1 system it will replace. These improvements will enhance the FA's predicted fire accuracy and will provide MET data tailored to the needs of the users. The system will be highly mobile and normally will be employed where it can best support field artillery fires; i.e., it will be located between 3 and 8 km behind the Forward Edge of the Battle Area (FEBA). Scheduling of soundings will be coordinated by the DIVARTY and the Corps FAS to provide hourly updating of artillery Meteorological data. Meteorological data will be digitally transmitted in the appropriate format from the Meteorological section to TACFIRE and BCS, as well as the present Army tactical area communications systems.

G. (U) RELATED ACTIVITIES: 6.11.02.A, Project B53A, Atmospheric Sciences; 6.21.11.A, Atmospheric Investigations; and 6.37.11.A., Project D158, Meteorological Equipment Development. Coordination of requirements for development of meteorological equipment is effected through the US Army Training and Doctrine Command (TRADOC) and US Air Force Air Weather Service Meteorological Equipment Coordination Commands. 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 non-military organizations developing meteorological equipment for civilian use is accomplished through participation in the Interdepartment Committee for Applied Meteorological Research (ICMR), and the Annual Symposium on Meteorological Observations and Instrumentation, sponsored by the American Meteorological Society.

Program Element: #6.47.26.A
DOD Mission Area: #420 - Global Military Environmental Support

Title: Meteorological Equipment and Systems
Budget Activity: #6 - Defense Wide Mission Support

H. (U) WORK PERFORMED BY: This program is the responsibility of the US Army Atmospheric Sciences Laboratory, White Sands Missile Range, New Mexico, with work performed by the Combat Surveillance and Target Acquisition Laboratory, Ft Monmouth, NJ. Contracts have been awarded to Bendix Corporation, Baltimore, MD, the successful bidder for Engineering Development models of the AN/TMQ-31.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: Meteorological Balloon, ML-3371; 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/TFQ-41, was successfully completed, and a Development Acceptance In-Process Review Package was prepared. Meteorological Balloon, ML-635, was developed for low-altitude soundings of the atmosphere. FY 1978 funds were utilized to purchase Government Furnished Equipment (GFE) which will be provided to the successful bidder of the contract for inclusion in the Engineering Development (ED) models of the AN/TMQ-31. The program to field the AN/TMQ-31 was continued with the award of engineering development models contract and preparation of development test plans.

2. (U) FY 1980 Program: AN/TMQ-31 contractor test plans will be approved; fabrication of ED models will be continued, and "C" level specifications for software will be approved. Test plans for Development Test/Operational Test II will be prepared and staffed. Preparation of the procurement data package will be initiated.

3. (U) FY 1981 Planned Program: Classroom training for AN/TMQ-31 test crews will be conducted. Small and large trials of Skill Performance Aids will be initiated. Fabrication of ED models will be completed, and acceptance testing will be conducted at the contractor's facility. Manuals will be finalized/validated and instructor training for key personnel conducted.

4. (U) FY 1982 Planned Program: AN/TMQ-31 Development Acceptance In-Process Review will be held during 4Q-FY82. Skill Performance Aids training of test crews will be completed and tests conducted. DT/OT II will be conducted, and first-year initial production contract awarded.

5. (U) Program to Completion: The fielding of the AN/TMQ-31 will be completed with Initial Operational Capability in FY 1984. Other meteorological systems required to support the field Army will be accomplished under this program element such as the Remote Sensing Systems to provide near-realtime meteorological data to increase combat effectiveness.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.51.02.A

Title: US Army Training and Doctrine Command (TRADOC) Studies and Analyses

DOD Mission Area: #440 - Technical Integration Studies and Analyses

Budget Activity: #6 - Defensewide Mission Support

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional To Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	2000	2200	1847	2091	Continuing	Not Applicable
280	TRADOC Studies and Analyses	2000	2200	1847	2091	Continuing	Not Applicable

B. (U) 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) to investigate specifically defined problems related to materiel systems that require the application of sophisticated analytical techniques and which, when solved, will make substantive contributions to TRADOC planning, programing, and decisionmaking. Department of the Army guidance leads to prioritization of these problems. This program funds studies and analyses that address high priority problems which require capabilities not available in-house.

C. (U) BASIS FOR FY 1981 RDTE REQUEST: Individual contract efforts will focus on force structuring, missions, mission requirements, assessment of doctrine, and Cost and Operational Effectiveness Analyses (COEA) for DIVAD gun, PATRIOT, and I-HAWK air defense systems, and the all-source analysis center. These efforts will provide both new and updated analyses and assessments to enable decisionmakers to make sound and rational decisions regarding matters related to materiel systems, such as resources allocation, doctrine, and training.

D. (U) BASIS FOR CHANGE BETWEEN FY 1981 and FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

Program Element: #6.51.02.A

Title: US Army Training and Doctrine Command (TRADOC) Studies and Analyses

DOD Mission Area: #440 - Technical Integration Studies and Analyses

Budget Activity: #6 - Defensewide Mission Support

	FY 1979	FY 1980	FY 1981	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	2000	2200	1847	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	2000	2300	3020	Continuing	Not Applicable

The current FY 1981 estimate is reduced compared to last year's FY 1981 estimate as a result of elimination of several contract efforts (OVX(MOHAWK) survivability; OVX(MOHAWK) reconnaissance, surveillance and target acquisition sensor mix; heads-up display for Army helicopter COEA; Cost and Training Effectiveness Analysis (CTEA) for the Remotely Piloted Vehicle (RPV); and Cost and Operational Effectiveness Analysis (COEA) for multifunctional transponder beacon) due to higher priority requirements in other programs and the transfer of Project M992, Combined Arms Training Center to PE 6.57.12, Support of Operational Testing. The difference in the FY 1980 estimate results from a Congressional reduction.

E. (U) OTHER APPROPRIATION FUNDS: Not Applicable.

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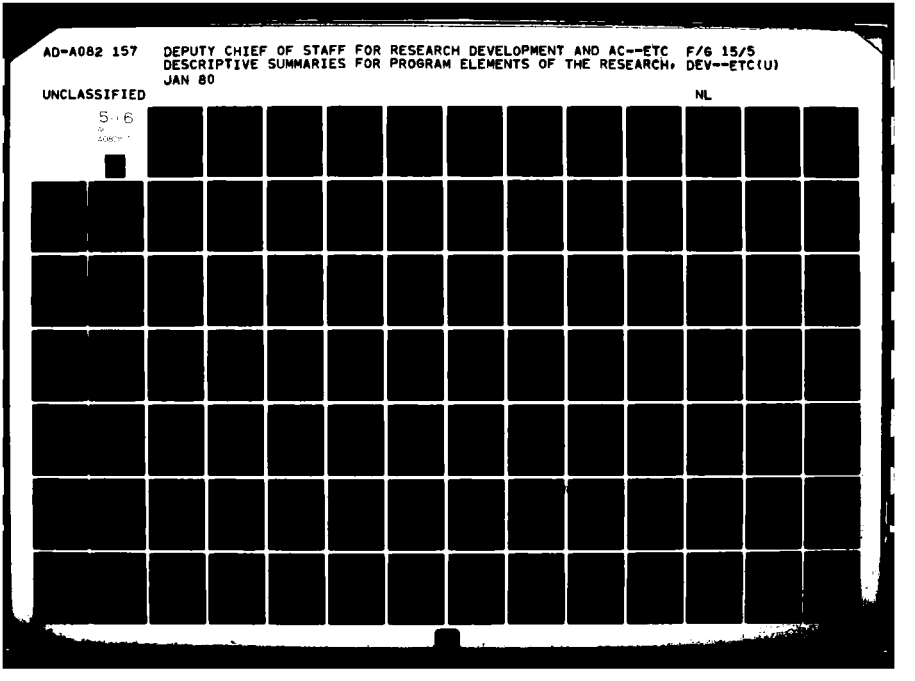

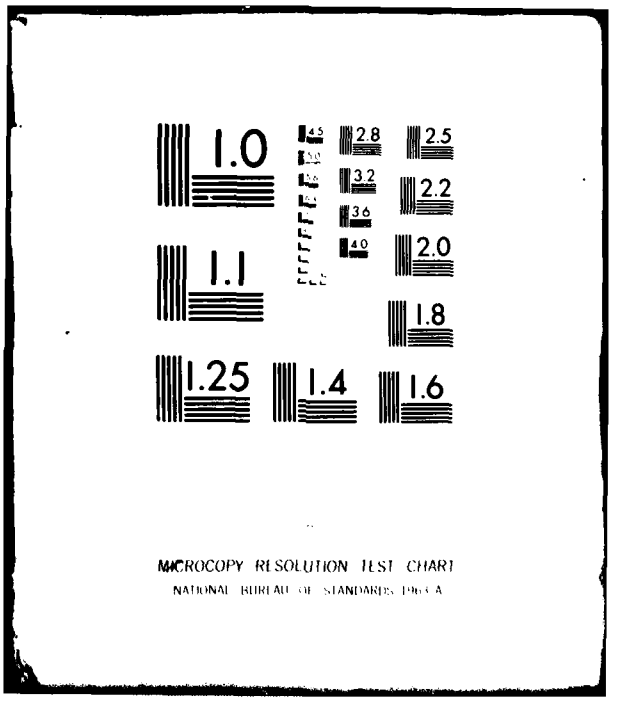
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Program Element: 06.51.02.A

Title: US Army Training and Doctrine Command (TRADOC) Studies and Analyses

DOD Mission Area: 0440 - Technical Integration Studies and Analyses

Budget Activity: 06 - Defensewide Mission Support

F. (U) 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). Sophisticated analytical techniques are used to integrate and analyze a variety of factors. These techniques lead to conclusions and recommendations which make substantive contributions to Army and TRADOC planning, programing, and decisionmaking. Study contributions include assistance in improving the understanding of materiel systems in the areas of: alternative organizations, tactics, doctrine, policies, and procedures; cost effectiveness of existing and proposed systems or programs; and allocation of resources. The studies organize and evaluate data and information already available or which can be inferred or extrapolated from existing data.

G. (U) RELATED ACTIVITIES: The program is coordinated with other Department of the Army Study Programs by the Office of the Chief of Staff of the Army. Interservice efforts are coordinated by the Office of the Under Secretary of Defense for Research and Engineering. Prior to initiating a new study, the Defense Documentation Center is queried to determine if existing studies might answer or provide insight to the question under consideration. Completed studies are filed with the Defense Documentation Center. Nonmateriel studies are funded by the Operations and Maintenance, Army appropriation.

H. (U) WORK PERFORMED BY: All RDTE funded work is done under contract. Primary contractors are: Mellonics System Development Division, Sunnyvale, CA; TRW Defense and Space Systems Group, West Huntsville, AL; Decisions and Design, Inc., McLean, VA; Science Applications, Inc., McLean, VA; BDM Corporation, McLean, VA; Martin Marietta Aerospace, Orlando, FL; Systems Development Corporation, Huntsville, AL; Vector Research, Inc., Ann Arbor, MI. The TRADOC integrating centers (i.e., Combined Arms Combat Developments Activity, Personnel and Administration Center, and Logistics Center) assist Headquarters, TRADOC, in formulating the TRADOC study and analysis program. The TRADOC Service Schools and Integrating Centers monitor the execution of the program by the contractors.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: An evaluation of Air Defense Force requirements for US Army Divisions in the 1980-1990 timeframe resulted in an improved manual system for tactical command and control. 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. An analysis provided data required to make forecasts of training ammunition requirements, justify forecasts and explore alternatives to the use of blank ammunition. The Retail Stockage Policy (Bulk Supplies) study provided a comparative analysis of alternative bulk petroleum retail distribution system. Methodology was developed for correlating combat effectiveness with logistics support.

Program Element: #6.51.02.A

Title: US Army Training and Doctrine Command (TRADOC) Studies and Analyses

DOD Mission Area: #440 - Technical Integration Studies and Analyses

Budget Activity: #6 - Defensewide Mission Support

A cost and training effectiveness analysis for the ground/vehicular laser locator designator resulted in the design of a cost-effective training program for the system. The Tactical Operations System (TOS) at Corps and Subordinate Echelons (CASE) Requirements Definition study completed definition of TOS CASE requirements. Another study describes sources and recipients of information on the corps battlefield (information requirements by echelon and format requirements). The Division Electronic Warfare Intelligence Functional Analysis establishes the automation baseline of related management and analysis functions. Studies were conducted to determine the optimal organization, tactics, and doctrine to be employed by Army divisions in the 1986 timeframe. Model improvement efforts, which will promote more integrated analysis of Army organizations and systems and higher quality study results, were initiated for Intelligence/Electronic Warfare, Terrain Analysis, Communications and Battlefield Intelligence Operations. The Commanders' Operational Security (OPSEC) Support System study provides a means for assisting the Corps Commander in assessing the enemy's ability to understand incipient US Operations, estimating the enemy's perception of US Operations and evaluating alternative OPSEC and deception strategies. The Army Air Defense Command and Control study derives doctrine, organization, and systems requirements that maximize utilization of air defense systems.

2. (U) FY 1980 Program: Cost-effective training programs will be determined for the XM1 tank. The TRADOC model improvement program will continue for the purpose of providing combined arms model gaming from battalion through division/corps level. A tactical fire (artillery TACFIRE) system simulator model will be developed for the purpose of measuring specific and total TACFIRE system performance. Current Reliability, Availability, and Maintainability (RAM) data and data sources will be evaluated to determine their adequacy for establishing RAM requirements for developmental systems. The improved HAWK software study will provide the system materiel developer with user requirements for subsequent versions of HAWK software. Definition of tactical requirements for the division air defense (DIVAD) gun will assist in developing tactical software specifications for firing doctrine, identification procedures, and command and control. Validation of tactical software requirements for PATRIOT will enable evaluation of the PATRIOT system firing doctrine and operating procedures, and insure soundness of these aspects. The increased effectiveness and survivability of field observers in an armored vehicle equipped with an elevated sensor/designator will be evaluated to support modification of the vehicle. Optional deployments of Intelligence/Electronic Warfare systems will be studied, shortfalls identified, and solutions/actions recommended.

3. (U) FY 1981 Planned Program: Cost and Training Effectiveness Analyses will identify methods and resources for training in the General Support Rocket System (GSRS); field artillery command, control and communication; fire support; and air defense systems. Cost-effectiveness analyses will be performed in order to provide a basis for recommending training devices to be used in the training of Army personnel in the operation and maintenance of developmental/new military systems. Roles and missions of special forces in the mid-1980's and early 1990's will be studied with particular emphasis on short-war

Program Element: #6.51.02.A

Title: US Army Training and Doctrine Command (TRADOC) Studies and Analyses

DOD Mission Area: #440 - Technical Integration Studies and Analyses

Budget Activity: #6 - Defensewide Mission Support

survivability and special forces operations in urban areas. Airmobility operations, doctrine and tactics analyses will assess the role of Army aviation in the suppression of enemy air defenses and the air mobility requirements for military police. The TRADOC model improvement program will be continued with emphasis on gaming of missile and artillery fire support. The application of space technology to special forces will be initiated. Command, control and communications requirements for emerging new military systems and potential revisions of force structures will be assessed resulting in recommendations in these areas. Analysis will be initiated of force mobility requirements and of required Army capabilities to counter enemy mobility capabilities and will employ updated threat data. Emerging Army electronic warfare (EW) systems and enemy EW capabilities will be evaluated for the purpose of providing recommendations relative to Army EW system. Combat service support (CSS) systems, current and proposed, will be evaluated in order to provide recommendations relative to CSS structures. As part of the implementation of the Army Command and Control Master Plan, communications will be studied in order to provide insight for development of future communications systems.

4. (U) FY 1982 Planned Program: The FY 1982 program will be oriented toward performing analyses which will assist in solving priority problem areas for the Army. These will include analyses of weapon systems logistic support, personnel support and training aspects. Evaluation will be made of combined arms force-on-force tactical engagements to validate Army program requirements. Analyses will continue relative to the roles and missions of special forces; airmobility operations; air defense structure, systems and training; reconnaissance/surveillance and target acquisition; command, control and communications; mobility and counter-mobility requirements; and electronic warfare systems. The purpose of these analyses is to provide user recommendations relative to preferred equipments within Army resource constraints.

5. (U) Program to Completion: This is a continuing program.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.52.01.A Title: Aviation Engineering Flight Activity
DOD Mission Area: #454 - Other Test and Evaluation Support Budget Activity: #6 - Defensewide Mission Support

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional To Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	5405	3959	4689	5199	Continuing	Not Applicable
D066	Aviation Engineering Flight Activity	5405	3959	4689	5199	Continuing	Not Applicable

B. (U) 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, CA. AEFA provides the only capability within the US Army to conduct the engineering flight tests required for: preliminary airworthiness evaluation, support of development and procurement of new aircraft systems, and modifications to existing aircraft. Funds are included for civilian employee wages and benefits, temporary duty per diem and travel, rents and utilities, contractual services including computer maintenance and housekeeping functions, supplies and materials, and replacement of capital equipment.

C. (U) BASIS FOR FY 1981 RDTE REQUEST: FY 1981 funds are required to provide the continuing engineering flight test capability to support the planned development and product improvement program for Army aviation.

D. (U) BASIS FOR CHANGE BETWEEN FY 1981 and FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1979	FY 1980	FY 1981	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	5405	3959	4689	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	3785	4000	4100	Continuing	Not Applicable

Program Element: #6.52.01.A Title: Aviation Engineering Flight Activity
DOD Mission Area: #454 - Other Test and Evaluation Support Budget Activity: #6 - Defensewide Mission Support

The FY79 increased funding provided for replacement of capital equipment including funds for a replacement flight test data processing system. The FY 1981 increased funding reflects adjustments to meet support cost increases driven principally by inflation. These costs represent increased contractual services to include increases in off site rents, utilities and communications. Adjustments for replenishment of supplies and equipment are also included in the FY 1981 increased cost estimates. The FY80 decrease reflects a general reduction by Congress.

E. (U) OTHER APPROPRIATION FUNDS: Not Applicable

Program Element: 06.52.01.A Title: Aviation Engineering Flight Activity
DOD Mission Area: 0454 - Other Test and Evaluation Support Budget Activity: 06 - Defensewide Mission Support

F. (U) DETAILED BACKGROUND AND DESCRIPTION: The mission of the Activity which this program supports is to conduct engineering flight testing of Army aircraft being developed or procured. This includes Development Test I and II; flight tests to evaluate air vehicles incorporating advanced concepts with potential military application; and tests to determine airworthiness of proposed engineering change proposals or modifications to existing aircraft systems. Engineering flight testing consists of precision flight to collect airborne data to be used for engineering evaluation and includes such items as aircraft performance, structural integrity, and handling qualities. The data are normally collected using a specially designed and installed data acquisition package. Data from the flight testing are used as a basis for the US Army Aviation Research and Development Command (AVRADCOM) Statement of Airworthiness Qualification which assures compliance with pertinent design standards. Thirty to forty flight test projects are normally accomplished in each fiscal year. This program also provides for the conduct of an orientation course for Army aviators which reviews academic fundamentals and flight test techniques in preparation for attendance at the US Naval Test Pilot School.

G. (U) RELATED ACTIVITIES: This Activity provides flight test support as required on a reimbursable basis to agencies such as the United States Forest Service, the US Navy, US Air Force, and the National Aeronautics and Space Administration (NASA), on joint NASA-Army projects, such as development of the XV-15 tilt rotor research aircraft.

H. (U) WORK PERFORMED BY: United States Army Aviation Engineering Flight Activity, Edwards Air Force Base, CA.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: During FY 1977 and FY 1978, the US Army Aviation Engineering Flight Activity (AEFA) major test programs included the Utility Tactical Aircraft System (UTTAS) designated the UH-60 (BLACKHAWK), and the Advanced Attack Helicopter (AAH) designated the AH-64. During FY 1979, AEFA worked on going projects and completed several test programs including the following: Advanced Attack Helicopter (AH-64) Engineer Design Test (EDT) II, Kaman AH-1S Rotor Blade Airworthiness and Flight Characteristics (A&FC), and various OH-58 product improvement evaluations on the OH-58C. At the close of FY 1979 there were thirty-eight assigned projects in either the planning, instrumentation, flying or reporting stages.

2. (U) FY 1980 Program: Major helicopter test programs for FY 1980 include UH-60A (BLACK HAWK) and CH47D Preliminary Airworthiness Evaluation (P&E); artificial and natural icing testing of the UH-60A, and the CH-47D; and icing tests of various ice phobic coatings and calibration of the helicopter icing spray system (HISS) using an instrumented UH-1H.

3. (U) FY 1981 Planned Program: FY 1981 major test programs for FY 1981 include AH-64 EDT IV and V, Airworthiness and Flight Characteristics (A&FC), and icing tests and climatic hanger tests. The CH-47D is also scheduled for Airworthiness and Flight Characteristics (A&FC) testing.

Program Element: #6.52.01.A Title: Aviation Engineering Flight Activity
DOD Mission Area: #454 - Other Test and Evaluation Support Budget Activity: #6 - Defensewide Mission Support

4. (U) FY 1982 Planned Program: FY 1982 major test programs are expected to include UH-60 variant (Stand-Off Target Acquisition System) Airworthiness and Flight Characteristics and preliminary airworthiness evaluation and other programs as required to support new development and product improvement programs.

5. (U) Program to Completion: This is a continuing program.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.53.01.A Title: Kwajalein Missile Range
DOD Mission Area: #431 - Major Ranges and Test Facilities Budget Activity: #6 - Defensewide Mission Support

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional To Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	87620	93642	119264	130750	Continuing	Not Applicable
D614	Kwajalein Missile Range	87620	93667	119264	130750	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Kwajalein Missile Range (KMR) is a national missile range managed and operated by the Army for strategic offensive missile, ballistic missile defense, and space defense testing. KMR uses eleven islands in the Kwajalein Atoll located approximately 2100 nautical miles southwest of Honolulu. The principal range users are the Air Force and Navy Intercontinental Ballistic Missile/Sea Launched Ballistic Missile Programs and the Army Ballistic Missile Defense Systems and Advanced Technology Center programs. Test firing to tactical ranges in tactical configuration with complete engineering data collected during the terminal portion of the trajectory is essential to the development and later operational testing of all ICBM/SLBM programs. Because of its location and sophisticated data collection facilities, KMR is the only range where these experiments can be done. An added advantage is that these targets are used by the Army programs at no added cost to the government for targets. KMR will participate in the

— Geographic location and sophisticated radar data collection capability makes this role possible.

C. (U) BASIS FOR FY 1981 RDTE REQUEST: The FY 1981 funds are required for the continued operation of Kwajalein Missile Range in support of all Services. During FY81, the Army and Air Force have substantial programs planned with significant test and measurement data required to be gathered at KMR. Air Force programs require firing at ICBM range with complete data collection during terminal trajectory. Army programs require project sensors to collect data from the terminal trajectory of ICBM targets. This test data cannot be obtained except through use of technical facilities available on and in the geographic location of KMR.

Program Element: #6.53.01.A Title: Kwajalein Missile Range
DOD Mission Area: #451 - Major Ranges and Test Facilities Budget Activity: #6 - Defensewide Mission Support

D. (U) BASIS FOR CHANGE BETWEEN FY 1981 and FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1979	FY 1980	FY 1981	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	87620	93642	119264	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	87620	93667	99300	Continuing	Not Applicable

The increased FY81 funding provides for an estimated $4.7 million increase in payments to the Government of the Marshall Islands, $5.5 million reduction of the backlog of maintenance and repair projects, inflation increased costs for materials and services, and the need for continuing technical improvement and modernization (I&M). The current guidance allows completion of I&M projects deferred as a result of prior year funding limitations and those planned for FY81. These I&M projects are based on the need for satisfaction of test data requirements, replacement of obsolete equipment and/or maintenance and operating cost reduction considerations. The decrease in FY80 is the result of a general Congressional reduction.

E. (U) OTHER APPROPRIATION FUNDS:

	FY 1979	FY 1980	FY 1981	Additional To Completion		Total Estimated Cost	
Military Construction, Army:							
Funds (current requirements)		6571	2900	5740	2034	0	Not Applicable
Funds (as shown in FY 1980 submission)		6571	8110	5259	-	0	Not Applicable

The change in program estimate results from project deferrals and revised cost estimates. The Barracks Modernization and Marine Shop originally scheduled for FY80 at a combined cost of $5.235M have been deferred to FY81 and FY82, respectively.

Program Element: #6.53.01.A Title: Kwajalein Missile Range
DOD Mission Area: #451 - Major Ranges and Test Facilities Budget Activity: #6 - Defensevide Mission Support

Revised estimates are $4.450M for the Barracks and $1.264M for the Marine Shop. The Gymnasium and Army Optical Station estimated at a combined cost of $4.920M in FY81 have been deferred. The Water Pollution Abatement Facility Project estimated at $.930M has been programmed as a new FY81 requirement while the Live Explosives Facility cost estimate has increased by $.021M. The other FY82 project is a Small Rocket/Missile Assembly Building estimated at $.770M.

Program Element: #6.53.01.A Title: Kwajalein Missile Range
DOD Mission Area: #451 - Major Ranges and Test Facilities Budget Activity: #6 - Defensewide Mission Support

F. DETAILED BACKGROUND AND DESCRIPTION: KMR is a national range managed and operated by the Army primarily for strategic offensive missile and ballistic missile defense research and development testing.

KMR is managed by a small military and civilian staff with the majority of members in Huntsville, AL, the rest being resident on Kwajalein in the Marshall Islands. Operation both technically and logistically is through the use of five major and two minor contractors. Eleven islands of the Kwajalein Atoll are used for KMR operations including all logistics, data collection instrumentation, and other technical facilities. Principal range user programs with equipment and personnel on KMR are the Ballistic Missile Defense (BMD) Systems Technology Program and the BMD Advanced Technology Center. Data essential to the success of both is dependent on the availability of full-scale Intercontinental Ballistic Missiles/Sea Launched Ballistic Missiles targeted to impact in the general vicinity of data collecting sensors. These data collecting sensors include both those of the range user programs and the sophisticated sensors of KMR. KMR is the sole range in the free world offering this capability. Other major range users are the Air Force ICBM and Navy SLBM programs. Air Force programs include all Advanced Ballistic Reeentry Systems (ABRES) research and development programs and the Strategic Air Command (SAC) MINUTEMAN Operational and Training test firings. Plans are being made to support the MX program in the future. The Navy programs have included development firings for the POSEIDON and TRIDENT programs in the past. Plans are being made to support testing of the TRIDENT II. KMR is the only free world range where the ICBM/SLBM can be fired to full range in tactical configuration with sophisticated technical data collection during the terminal part of the trajectory. The BMD programs require data collected by their own sensors from tactically configured ICBM/SLBM during the terminal portion of the trajectory. Locating these BMD experiments on KMR allows data collection from ICBM/SLBM test missiles already scheduled as part of strategic offensive program testing without added cost to the government. In addition to the support of development programs, KMR also provides

G. (U) RELATED ACTIVITIES: There are no related activities. No other DOD facility duplicates capabilities available at KMR.

H. (U) WORK PERFORMED BY: KMR is managed by the Ballistic Missile Systems Defense Command, Huntsville, AL. Contractors are: Global Associates, Oakland, CA; Kentrol International, Dallas, TX; Lincoln Laboratory, Massachusetts Institute of Technology, Lexington, MA; Radio Corporation of America, Moorestown, NJ; GTE Sylvania, Needham Heights, MA; and two other contractors (together totaling $2,620.00).

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

Program Element: #6.53.01.A Title: Kwajalein Missile Range
DOD Mission Area: #451 - Major Ranges and Test Facilities Budget Activity: #6 - Defensewide Mission Support

1. (U) FY 1979 and Prior Accomplishments: KMR was established as a National Range on 1 July 1964 under the management of the Army. The Advanced Research Projects Agency installed the TRADEX radar system during 1963 and both the ALCOR and the ALTAIR radar systems during 1970. The Army has maintained these sophisticated "one of a kind in the world" radar systems at "state-of-the-art" with an active improvement program through the years. These radars and associated data processing equipment have been used successfully in obtaining detailed data on the signatures produced on atmospheric reentry by ballistic missile warheads and accompanying equipment and debris. This data is essential to the development of techniques to discriminate between the actual warhead, decoys, and other penetration aids, and debris. These radars were also used to test waveforms and radar techniques that were eventually incorporated into the SAFEGUARD BMD System. The NIKE-ZEUS BMD and SAFEGUARD BMD programs with full system interceptor firings were completed at KMR. Three additional instrumentation radar systems, two MPS-36 and one TPQ-18, have been installed to improve trajectory measurement and other data collection. Sophisticated recording optical trackers (RADOTS), as well as other optical instruments needed, are installed on several islands in the Atoll to satisfy automatic data reduction, and permit replacement of ten instruments with six with cost savings potential. Prior year budget constraints, a severe budget cut in FY 1978, and less than adequate funding during FY 1979 have contributed to a continuing deferral of both modernization and physical plant maintenance projects. Telemetry and impact-locating radars are installed on appropriate islands to serve user needs. The operations control center is on Kwajalein Island and is supported by a communication center and an inter-range communication network including a satellite communication terminal. A central data processing facility for technical support is also on Kwajalein Island. Missile launch pads are on both Kwajalein and Roi Namur Islands to satisfy users' needs. During this period, KMR supported all Air Force ABRES experimental and developmental firing programs, all SAC MINUTEMAN Operation and Training, and Special Test Missile firings, and US Navy SLBM programs.

2. (U) FY 1980 Program: KMR has 23 ICBM firings scheduled for FY80. Air Force programs include SAC operational testing of MINUTEMAN II and III missiles, and the Ballistic Missile Organization's (BMO) ABRES and MINUTEMAN Research and Development testing. The System Technology Reentry Experiment Program (STREP) and the Advanced Technology Center Designating Optical Tracker (DOT) are the BMD programs scheduled. Modifications to the ALTAIR radar for operation as a contributing sensor to SPADATS will continue.

3. FY 1981 Planned Program: Test activity decreases to 18 major firing missions resulting from completion of the BMD STREP and BMO MINUTEMAN R&D programs; SAC, ABRES, and the BMD DOT programs continue at the FY79 level. Modifications will be completed, which will provide data on new space object identification, deep space surveillance, and satellite catalog maintenance. Range I&M plans include a major modernization of the TPQ-18 radar, completion of the digital microwave system, replacement of a weather surveillance radar and a controller, and procurement of the final Super Recording Automatic

Program Element: #6.53.01.A Title: Kwajalein Missile Range
DOD Mission Area: #451 - Major Ranges and Test Facilities Budget Activity: #6 - Defensewide Mission Support

Digital Optical Tracker. Facility maintenance and repair projects scheduled include replacement of 20-year-old electrical feeder cables on the islands of Kwajalein and Roi Namur, rehabilitation of POL tanks in the fuel farm, overhaul of diesel engines in the power plant, and repair of the shoreline damaged by Tropical Storm Alice. An interim use agreement between the Government of the Marshall Islands and the Government of the United States concerning KMR as a DOD test facility expires 30 September 1980. Renegotiation is expected in FY81 to extend the use agreement.

4. (U) FY 1982 Planned Program: The FY82 program is forecast to remain at about the same level of test activity as FY81. The Homing Overlay Experiment (HOE), a BMD Systems Technology Program, is a range-funded new start. Range I&M projects are programmed at a $5M level.

5. (U) Program to Completion: This is a continuing program.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.57.02.A Title: Support of Development Testing
DOD Mission Area: #454 - Other Test and Evaluation Support Budget Activity: #6 - Defensewide Mission Support

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional To Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	21468	22231	23524	31853	Continuing	Not Applicable
D026	Test Design and Evaluation	2798	3030	3793	3657	Continuing	Not Applicable
D127	Meteorological Support to RDTE Activities	4490	4098	5726	8901	Continuing	Not Applicable
D204	Field Smoke Assessment	4599	4597	1334	2751	Continuing	Not Applicable
D618	Aviation Development Test Activity	5564	6281	6895	8127	Continuing	Not Applicable
D621	United States Army Test Facilities Register	0	143	232	261	Continuing	Not Applicable
D623	United States Army Test and Evaluation Command (TECOM) Instrumentation Development	2525	2583	3760	4881	Continuing	Not Applicable
D625	TECOM Test Methodology	1492	1499	1784	3275	Continuing	Not Applicable

B. (U) 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. Indirect test support at such DARCOM facilities is funded by Program Element (PE) 6.58.04.A, DARCOM Ranges/Test Facilities. 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: #454 - Other Test and Evaluation Support Budget Activity: #6 - Defensewide Mission Support

C. (U) BASIS FOR FY 1981 RDTE REQUEST: Provides for continuation of projects to support Army development test and evaluation.

D. (U) BASIS FOR CHANGE BETWEEN FY 1981 and FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1979	FY 1980	FY 1981	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	21468	22231	23524	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	20453	23790	23181	Continuing	Not Applicable

FY 1979 funding was increased compared to last year's estimate as a result of addition to the FY 1979 program of major tests of Advanced Attack Helicopter (AAH), HELLFIRE Fire-and-Forget Missile System, and Target Acquisition Designation System (TADS) under obscured battlefield conditions. The current FY 1980 estimate is less than last year's FY 1980 estimate primarily as a result of deferral of several instrumentation development and test methodology projects to FY 1981 and FY 1982. The FY 1981 estimate was increased to provide for cost escalation due to inflation; however, this was largely offset by adjustments to reflect incremental funding policies.

E. (U) OTHER APPROPRIATION FUNDS: Not Applicable

Program Element: #6.57.02.A Title: Support of Development Testing
DOD Mission Area: #454 - Other Test and Evaluation Support Budget Activity: #6 - Defensewide Mission Support

F. (U) DETAILED BACKGROUND AND DESCRIPTION: Seven projects are funded under this program for FY 1980 and FY 1981. The first project provides funds to the United States (US) Army Materiel Systems Analysis Activity (AMSAA) for independent design of development tests and for subsequent independent analyses and evaluations of the results of these tests. These evaluations 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 civilian 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 contractors. Consideration is given to test sample size, duration, costs and risks and how they interrelate in the decisionmaking process. AMSAA test design and evaluation efforts now encompass about 60 systems (e.g., Advanced Attack Helicopter, PATRIOT air defense missile system, and General Support Rocket System). The second project (D127) 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. Army participation in the Meteorological Rocket Network is provided by the operation of rocket launching sites at three locations: White Sands Missile Range, NM; Poker Flat, AK; and Fort Sherman, CZ. This network provides upper air measurements between 30 and 100 kilometers. The third project (D204) provides for the conduct of Smoke Weeks during which the vulnerabilities of electro-optical (EO) items to smoke/obscurant countermeasures are determined under realistic, analytically characterized, battlefield obscurant environment scenarios. It also provides for the development of test technology, methodology, and instrumentation to determine the effectiveness of EO items in such environments. The Aviation Development Test Activity (ADTA), Fort Rucker, AL, conducts tests of aircraft and components and gathers data to aid in determining component service life, repair parts consumption, and required inspection cycles. ADTA funding (D618) provides for an aircraft maintenance contract, salaries of civilian test personnel, host support, instrumentation and supplies. The fifth project (D621) provides for the publication and distribution of the US Army Test Facilities Register to include gathering the necessary data and keeping it current. The Register contains descriptions and locations of Army test facilities, instrumentation, and test equipment and provides a means to reduce unnecessary or duplicative instrumentation procurement. The sixth project (D623) provides for development of instrumentation that is unique to the testing of complex weapon systems at more than one TECOM test activity, that is commensurate with technological advances in materiel developments, and that applies modern technology to cost- and labor-intensive areas to enable more efficient testing at lower manning levels. The seventh project (D625) provides for the development and improvement of test methodology for all TECOM test activities, to include 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.

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G. (U) 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 Program Element (PE) 6.58.04.A, US Army Materiel Development and Readiness Command (DARCOM) Ranges/Test Facilities; activities of the US Army Operational Test and Evaluation Agency (OTEA) and testing activities of the US Army Training and Doctrine Command (TRADOC) funded by PE 6.57.12.A, Support of Operational Testing. 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. 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 structured to support only development testing. Since the test boards now primarily support operational testing, they have been transferred to TRADOC. The Office of the Secretary of Defense (OSD) 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.

H. (U) WORK PERFORMED BY: Approximately 80 percent of the effort is performed in-house by civilian and military personnel assigned to DARCOM. There is an aircraft maintenance contract with Northrop Worldwide Aviation Services ($3.3 million) at the Aviation Development Test Activity, Fort Rucker, AL, and numerous other smaller contracts.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: In FY 1976, when the Army's test boards were transferred from the US Army Test and Evaluation Command (TECOM) to the US Army Training and Doctrine Command (TRADOC), a new project, D026, Test Design and Evaluation, was established 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. In FY 1979, independent test design and evaluation effort included: Advanced Attack Helicopter, PATRIOT air defense missile system, Tactical Operations System, XM1 tank, COPPERHEAD Cannon-Launched Guided Projectile, Infantry Fighting Vehicle and General Support Rocket System. Meteorological support services were provided to important Department of Defense (DOD) projects including demilitarization and detoxification; electro-optic program at Grafenwoehr, West Germany, and Fort A. P. Hill, VA; Smoke/Aerosol program at Dugway Proving Ground, UT; Ground Laser Locator Designator; ROLAND; and STINGER air defense missile systems. Modernization of instrumentation and data acquisition systems included improvement of automatic wind-measuring radars and real-time systems; automation of seven Meteorological Team Central Observatories and acquisition of prototype instrumentation for remote meteorological sites. A Smoke Week (the second) was conducted at Eglin Air Force Base, FL, in November 1978, to allow developers of a large number of electro-optic (EO) devices to evaluate their hardware in a realistic smoke/battlefield debris

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environment; the relationships between the characteristics of smoke/obscurants and performance of EO devices are being used to improve mathematical models for predicting effects of smoke/obscurant environments upon EO devices. Subsequent Smoke Weeks will be conducted approximately annually. Testing at Aviation Development Test Activity (ADTA) included Advanced Attack Helicopter and CH-47 Modifications. A major effort was made in project D623, TECOM Instrumentation Development, 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. Also, a projectile dynamic measurement system was developed to accurately measure the nutation, precession, yaw and spin of an artillery projectile in flight, thus providing potential savings of millions of dollars by discovering stability problems during projectile development. Other efforts included a significant improvement to the Miss-Distance Radar and a system to precisely measure the angle between gun pointing and target location, both required for testing the Division Air Defense Gun. Test methodology efforts included improvement of procedures for testing lasers under extreme climates and developing the capability to test electromagnetic systems in complex environments created by deliberate enemy countermeasures as well as by friendly electromagnetic generating systems.

2. (U) FY 1980 Program: United States (US) Army Materiel Systems Analysis Activity (AMSAA) will continue to provide appropriate evaluations regarding the adequacy of materiel systems at significant milestone points during the development cycle and to enhance/utilize such cost saving techniques as modeling, simulation, statistical design of experiments, system analysis, engineering and operations analysis, and appropriate data bases in lieu of, or to supplement the various and sundry tests. AMSAA makes assessments of all factors pertinent to the decision process, to include contractor results, Development Test (DT) and Operational Test (OT) results, producibility, life cycle costs, and logistics factors. Specific materiel items include STINGER air defense missile system, Single Channel Ground and Airborne Radio System, Lightweight Company Mortar System and Remotely Piloted Vehicles. Meteorological support services are provided to high priority programs, to include electro-optical (EO), Smoke/Aerosol, Advanced Attack Helicopter (AAH), High Energy Laser (HEL), NAVSTAR Global Positioning System, and General Support Rocket System Terminal Guided Warhead. Meteorological rocket and balloonsonde data impact prediction ballistic support will continue at White Sands Missile Range (WSMR). The systematic Army Meteorological Rocket Network (MRN) sounding schedule (three per week) will be continued. In addition, special event sounding will be made to support programs such as the Satellite/Rocketsonde Comparison Program, Defense Nuclear Agency programs, and the US/USSR meridional network data exchange agreement. Configuration of labor and cost reducing automated upper air sounding systems for installation at meteorological team permanent sites will be determined. The annual Smoke Week will be conducted to provide smoke/battlefield debris environment and results of Smoke Week tests will be provided to developers of smoke and electro-optic (EO) hardware for use on their programs. Improved instrumentation and methodology will be developed, or otherwise acquired, for characterization of smoke/dust/battlefield debris. Major tests of Advanced Attack Helicopter (AAH), HELLFIRE Fire-and-Forget Missile System and Target Acquisition Designation System (TADS) will be conducted under obscured (battlefield) conditions. Aviation Development

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Test Activity (ADTA) will conduct development and production acceptance tests of aircraft systems and components such as UH-1H Main Rotor Assembly and Missile Detector System. Project D621, US Army Test Facilities Register, will provide for the salaries and administrative operations of personnel in the United States (US) Army Materiel Development and Readiness Command (DARCOM) Test Facilities Management Office to carry out the registration of new or modified test facilities/equipment to avoid duplication. Project D623, US Army Test and Evaluation Command (TECOM) Instrumentation Development, efforts will include: development of a target simulation facility to reduce the need for costly live tests of such systems as XM1 Tank and Division Air Defense Gun System; development of on board instrumentation for missiles and vehicles; a multi-target modification to instrumentation radars; and a cooperative project with the US Army Training and Doctrine Command (TRADOC) for an indirect fire artillery and mortar scoring system. Test methodology efforts will be conducted in high priority areas such as communications in a countermeasure environment, determining environmental pollution effects of testing, assessment of human factors, nuclear effects, environmental quality control and software simulation (e.g., for testing computer-controlled systems).

3. (U) FY 1981 Planned Program: Independent test design and evaluation will be expanded to address 70 systems. Meteorological support will be provided to programs such as: Smart Direct Fire Antitank Projectile, Remotely Piloted Vehicles (RPV), and Tactical Satellite Communication System. A four year program will be initiated to modernize meteorological support equipment with emphasis on automation. Upper air sounding systems will be automated by FY 1983, while modernization of remaining equipment for the meteorological teams will be completed by FY 1985. Remote wind sensor systems will be procured for Fort Greely, AK, and Yuma Proving Ground, AZ, and a digital radar to support near millimeter propagation investigations will be procured for WSMR. The annual Smoke Week will be conducted for the developers of electro-optical (EO) devices. Emphasis will be upon improving prediction capability of mathematical models and use of models in lieu of costly field tests. Engineering tests of AAM/HELLFIRE/TADS under obscured conditions will be completed. The Aviation Development Test Activity (ADTA) will continue to conduct development tests of aircraft systems and components. Equipment planned for testing includes CH-47 reliability, availability, maintainability, and durability (RAM-D); CH 47C modifications; infrared suppressors; T55-L-712 Engine, Model 212 tail rotor hub and blade installation on AH-1G; and advanced helicopter tail rotor shaft hangar bearings (UH-1H). Funding for the DARCOM Test Facilities Management Office will be continued with emphasis on avoiding duplication and pursuing standardization and joint efforts, whenever possible. Project D623 efforts will include multi-computer data communications, advanced video techniques, electro-optical target development, wideband coherent electro-optical information processing system and ballistic holography. Test methodology efforts will continue in areas such as: development of realistic mathematical models of component performance and of simulation techniques to stress components in a controlled fashion so as to enable evaluation under complex environments, reduce test costs and duration, and shorten the materiel development cycle; and development of techniques for test of directed energy systems and of countermeasures equipment.

4. (U) FY 1982 Planned Program: Test design and evaluation will address new systems that are programed for testing and will continue to provide evaluations regarding the adequacy of previously assigned systems. Meteorological support will

Program Element: 6.57.02.A Title: Support of Development Testing
DOD Mission Area: 0454 - Other Test and Evaluation Support Budget Activity: 06 - Defensewide Mission Support

provide critical customer-oriented environmental measurements and meteorological services in support of Army Research, Development, Test and Evaluation (RDTE) activities, continue the modernization program, begin the installation of automated systems for the vertical characterization of the atmosphere, and train personnel in the operation and maintenance of these systems. The annual Smoke Week will be conducted for the developers of EO devices. Emphasis will be upon improving production capability for EO developers. ADTA will continue the testing of aircraft, aircraft components, subsystems and ancillary equipment. Major instrumentation procurement will include airborne acquisition equipment, test and calibration equipment, a data van, telemetry, video system, nondestructive lab equipment and data processing and display equipment. A new edition of the Test Facilities Register will be published. Instrumentation development (D623) will provide an extension of effort into areas of advanced miss-distance scoring, mobile real-time data analysis and control, and advanced data collection systems. Development will begin of advanced weapons systems evaluation instrumentation, such as position location and proximity detection; remotely piloted vehicles data acquisition; and augmentation of electro-optical, electromagnetic compatibility, and vulnerability assessment capability. Test methodology (D625) efforts will include review and update of environmental test procedures to make the results more readily interpretable in terms of reality, with emphasis on the development and validation of procedures for incorporation into military standards.

5. (U) Program to Completion: This is a continuing program.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D127 Title: Meteorological Support to RDTE Activities
Program Element: #6.57.02.A Title: Support of Development Testing
DOD Mission Area: #454 - Other Test and Evaluation Support Budget Activity: #6 - Defensewide Mission Support

A. (U) DETAILED BACKGROUND AND DESCRIPTION: This project provides for meteorological support to Army Research, Development, Test and Evaluation (RDTE) activities (14 permanent test sites) and to users of the national range at White Sands Missile Range (WSMR); and for operation of three sites in the Meteorological Rocket Network (MRN). Meteorological teams provide user-oriented meteorological services to a wide range of RDTE activities at sites both in and out of the continental United States. Meteorological observations needed by Army RDTE activities include measurements of solar radiation at various wave lengths, refractive index, air density, soil moisture, temperature, humidity and wind, both near the ground and at the very high altitudes of missile flights. User-oriented meteorological support and services provided at WSMR to Army, Navy, Air Force, Defense Nuclear Agency (DNA), National Aeronautics and Space Administration (NASA) and Department of Defense (DOD) contractor projects include meteorological observations on vehicles operating in space, impact predictions and ballistic correction computations specified in approved National Range Documents. Support is provided for on-range rocket firings as well as for off-range firings that impact on range. Army participation in the MRN is provided by the operation of rocket launching sites at three locations: WSMR, NM; Poker Flat, AK; and Fort Sherman, Canal Zone. This network provides upper air measurements of temperature, humidity and winds between 30 and 100 kilometers required by Department of Defense, DNA, NASA, and the National Oceanographic and Atmospheric Administration in support of research and test programs. The Army's prime requirement for these data is for missile design and testing. Obsolescent equipment is modernized to support the testing of numerous advanced systems. Many of these new systems, especially electro-optical and laser, are highly sensitive to atmospheric conditions. This modernization also reduces testing costs, particularly as labor intensive equipment is replaced.

B. (U) RELATED ACTIVITIES: 6.11.02.A, Defense Research Sciences, Project B53A-Atmospheric Sciences; 6.21.11.A, Atmospheric Investigations; and 6.47.26.A, Meteorological Equipment and Systems. The Army-operated WSMR is part of the National Range System, which includes the Air Force-operated Eastern Test Range and the Navy-operated Pacific Missile Range. Meteorological support requirements are coordinated by the Inter-Range Instrumentation Group (IRIG). The operations of the MRN, in which the Navy, Air Force, and NASA also participate, are coordinated by a Scientific Advisory Group of the Interdepartmental Committee on Applied Meteorological Research (ICAMR). One of the functions of both the IRIG and the ICAMR is to avoid the duplication of meteorological support.

C. (U) WORK PERFORMED BY: Approximately 80% of the work is performed in-house by the meteorological teams and the staff of the Atmospheric Sciences Laboratory at WSMR. Major contractors include: Physical Sciences Laboratory, New Mexico State University, Las Cruces, NM and Geo Atmospheric Corporation, Lincoln, MA.

Project: #D127 Title: Meteorological Support to RDTE Activities
Program Element: #6.57.02.A Title: Support of Development Testing
DOD Mission Area: #454 - Other Test and Evaluation Support Budget Activity: #6 - Defensewide Mission Support

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: Meteorological support was provided to an average of 630 RDTE projects each year to 55 Army RDTE activities at 14 permanent test sites both within and outside the continental United States and at special test sites as required. Complete weather services are provided, including equipment, supplies, and personnel for weather observing, forecasting, and advisory services. Highly specialized instrumentation and meteorological support data collection and analyses were also provided before, during and after test. Professional consultation support services were provided to important Department of Defense (DOD) projects including: demilitarization and detoxification; electro-optic program at Grafenwoehr, West Germany, and Fort A. P. Hill, VA; smoke/aerosol program at Dugway Proving Ground, UT; Ground Laser Locator Designator; and ROLAND; and STINGER air defense missiles. Modification of instrumentation and data acquisition systems included improvement of automatic wind-measuring radars and real-time systems automation of seven Meteorological Team Central Observatories and acquisition of prototype instrumentation for remote meteorological sites.

2. (U) FY 1980 Program: Continue to provide environmental measurements and meteorological services in support of Army RDTE activities. Modernization program continues with emphasis on evaluation of systems to provide precise and timely vertical characterization of the atmosphere. Major programs supported are high energy laser, electo-optics, precision guided and conventional munitions, conventional and special purpose weapons, surface/air launched missiles, remotely piloted vehicles and smoke/aerosol. Customer-oriented services continue to include meteorological and special purpose environmental measurements; weather forecasts, advisories, and severe weather warnings; professional/technical consultation and post test analysis; and missile impact prediction at permanent and temporary test locations both within and outside the Continental United States.

3. (U) FY 1981 Planned Program: Provide critical customer-oriented environmental measurements and meteorological services in support of Army RDTE activities. Continue modernization program and installation of automated systems for the vertical characterization of the atmosphere and train personnel in the operation and maintenance of these systems. Upper air sounding systems will be automated by FY 1983 while modernization of remaining equipment for the meteorological teams will be completed by FY 1985. Remote wind sensor systems will be procured for Fort Greely, AK, and Yuma Proving Ground, AZ, and a digital radar to support near millimeter propagation investigations will be procured for WSMR. Programs supported will be high energy laser, electro-optics, global positioning system, terminal guided warhead, near millimeter target designator/locator, advanced attack helicopter, high energy laser air defense system, electro-optic climatology, and tactical missiles.

Project: #D127 Title: Meteorological Support to RDTE Activities
Program Element: #6.57.02.A Title: Support of Development Testing
DOD Mission Area: #454 - Other Test and Evaluation Support Budget Activity: #6 - Defensewide Mission Support

4. (U) FY 1982 Planned Program: Program includes continuation of meteorological support for 600-plus RDTE projects, specialized consultation and technical support of new advances in high energy laser testing, smoke obscuration programs and new requirements for solar energy and insolation data. Two teams will be required to support an approved global atmospheric research program experiment. Modernization of central meteorological observatories and remote sites will be improved through the procurement of equipment for upper air sounding systems and remote sensor systems.

5. (U) Program to Completion: This is a continuing program.

6. (U) Major Milestones: Not applicable.

7. (U) Resources ($ in thousands):

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	4490	4098	5726	8901	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	4490	4100	5583	-	Continuing	Not Applicable

The FY 1980 funding level in the submission is decreased as a result of a general Congressional reduction. A comparison of the FY 1980 and FY 1981 Congressional Descriptive Summaries reveals that FY 1981 funding is increased. This is required to provide for cost escalation due to inflation.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D618 Title: Aviation Development Test Activity
Program Element: #6.57.02.A Title: Support of Development Testing
DOD Mission Area: #454 - Other Test and Evaluation Support Budget Activity: #6 - Defensewide Mission Support

A. (U) DETAILED BACKGROUND AND DESCRIPTION: This project provides for the fixed and recurring costs of the Aviation Development Test Activity (ADTA) (formerly part of the Aviation Test Board), Ft Rucker, AL, a field element of the US Army Test and Evaluation Command (TECOM), during the conduct of development testing (DT) and production acceptance of Army aircraft. Fixed and recurring costs include an aircraft maintenance contract, salaries of civilian test personnel, host support, instrumentation and supplies. DT is conducted to demonstrate that design risks have been minimized, that the engineering development process is complete, and that the system will meet specifications. The technical performance, safety, reliability, and maintainability characteristics of the system 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 project DV02, Test Boards. Effective 1 July 1976, the operational testing (OT) activities of the sixth board, the Aviation Test Board, were transferred to TRADOC, also under Project DV02. Most of the effort of the old Aviation Test Board consisted of DT activities. Responsibility for these activities was assigned to the new Aviation Development Test Activity, which remained under TECOM and continued to be financed by Project D618.

B. (U) RELATED ACTIVITIES: Close and continuous coordination exists with other 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 operation of all Department of Defense test facilities to avoid unnecessary duplication of effort among the Services.

C. (U) WORK PERFORMED BY: Testing is performed by in-house military and civilian personnel. Aircraft (fixed and rotary) maintenance is performed on a contractual basis at a cost of $3.3 million annually. Current contractual effort is performed by Northrop Worldwide Aviation Services, AL.

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: Examples of equipment tested include: Advanced Attack Helicopter (AAH), AH-1Q Flight Simulator, Radar Jammer (AN/ALQ-136), Radar Warning Receiver (AN/APR-39), portable analyzer/diagnostic equipment, rotor assemblies, aviator helmets, training devices, and simulators for UH-60 and AH-1Q. Procurement of instrumentation included a high frequency data acquisition system and data reduction equipment.

Project: #D618 Title: Aviation Development Test Activity
Program Element: #6.57.02.A Title: Support of Development Testing
DOD Mission Area: #454 - Other Test and Evaluation Support Budget Activity: #6 - Defenseuide Mission Support

2. (U) FY 1980 Program: The level of effort is expected to remain approximately the same as the FY 1979 level of effort. Examples of equipment under test are: CH-47C/D reliability, availability, and maintainability (RAM) data collection; BLACKHAWK RAM data collection; UH-1H Main Rotor Assembly and Gearbox; (AN/ALQ-156) Missile Detector System; (AN/ALQ-144) Countermeasure Set; and CH-47 helicopter modifications. Instrumentation improvement and modernization includes completion of prior improvements in order to enhance airborne data acquisition and analysis capabilities.

3. (U) FY 1981 Planned Program: Equipment planned for testing includes: CH-47 modifications, infrared suppressors, tail rotor hub and blade installation on the AH-1G and AAH, and tail rotor shaft hangar bearings for the UH-1H. Improvement and modernization will include procurement of calibration equipment, a mobile data reduction system, and photo/video equipment. This equipment will provide real time data acquisition and analysis at reduced costs.

4. (U) FY 1982 Planned Program: Scheduled tests will include development and production acceptance testing of aircraft and aircraft components and subsystems. Major instrumentation procurements are planned for FY 1982 to include: space positioning equipment, video systems, nondestructive laboratory equipment, data vans, simulation equipment, and replacement of special purpose equipment which has become obsolete and expensive to maintain.

5. (U) Program to Completion: This is a continuing program.

6. (U) Major Milestones: Not applicable.

7. (U) Resources ($ in thousands):

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	5564	6281	6895	8127	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	5971	6285	6283	--	Continuing	Not Applicable

The basis for change between FY 1980 and FY 1981 Congressional Descriptive Summaires is as follows. The current FY 1979 estimate is decreased compared to last year's estimate to reflect actual FY 1979 costs. FY 1981 funding is increased compared to last year's estimate as a result of escalating costs for fuel, utilities, maintenance contracts and host support.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.57.06.A Title: Materiel Systems Analysis
DOD Mission Area: #440 - Technical Integration/Studies Analyses Budget Activity: #6 - Defensewide Mission Support

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional To Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	9300	10169	14073	15497	Continuing	Not Applicable
#541	Materiel Systems Analysis	9300	10169	14073	15497	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program provides the central independent technical capability in US Army Materiel Development and Readiness Command (DARCOM) for the conduct of major materiel systems performance effectiveness analyses and cost effectiveness evaluations. US Army Materiel Systems Analysis Activity (AMSAA) provides similar support to US Army Training and Doctrine Command (TRADOC), US Army Operational Test and Evaluation Agency (OTEA), Headquarters, Department of the Army, and Office of the Secretary of Defense. Such support is either funded by the customer or absorbed by AMSAA out of this program element. As the DARCOM lead activity for survivability, as well as its center for reliability, availability, and maintainability (RAM) methodology, AMSAA conducts analyses of these aspects of materiel systems. AMSAA maintains direct contact with Army materiel users in the field to ascertain requirements for improvements.

C. (U) BASIS FOR FY 1981 RDTE REQUEST: Complete the analyses and evaluations started in FY 1979 and FY 1980. Initiate new analyses and evaluations in support of taskings from DARCOM and other commands/activities noted in paragraph B. Emphasis will be on review of major systems, alternatives and trade-offs that might be considered in order to reduce cost of procurement and systems operations and support.

D. (U) BASIS FOR CHANGE BETWEEN FY 1981 and FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1979	FY 1980	FY 1981	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	9300	10169	14073	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	9300	10279	11179	Continuing	Not Applicable

Program Element: #6.57.06.A Title: Materiel Systems Analysis
DOD Mission Area: #440 - Technical Integration/Studies Analyses Budget Activity: #6 - Defensewide Mission Support

The FY 1981 estimate has been increased to reduce the dependency on customer funding and to provide for cost escalation due to inflation. The decrease in FY 1980 is a result of a general Congressional reduction.

E. (U) OTHER APPROPRIATION FUNDS: Not Applicable.

Program Element: #6.57.06.A Title: Materiel Systems Analysis
DOD Mission Area: #440 - Technical Integration/Studies Analyses Budget Activity: #6 - Defensewide Mission Support

F. (U) DETAILED BACKGROUND AND DESCRIPTION: US Army Materiel Systems Analysis Activity (AMSAA) is a subactivity of the US Army Materiel Development and Readiness Command (DARCOM). Its primary objective is to conduct independent systems analyses and cost effectiveness evaluations of major materiel systems. It provides estimates of Army materiel performance for the total spectrum of combat environments. 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. The Advanced Attack Helicopter, XM1 tank, PATRIOT 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.

G. (U) RELATED ACTIVITIES: 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 HQ, DARCOM and the military service. This involves systems analysis and 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 program element 6.58.05.A, DOD Munitions Effectiveness and Explosive Safety, Project D620, DOD Munitions Effectiveness. AMSAA also designs developmental tests to provide the basis for independent evaluations which contribute to decisions with respect to acquisition of major and selected nonmajor materiel systems. Inherent in this responsibility is monitoring of developmental tests and providing a complete and independent evaluation of the worth of the system. AMSAA is currently tasked with approximately 70 such systems. Test design and evaluation is financed by project D026, Test Design and Evaluation, Program Element 6.57.02.A, Support of Development Testing.

H. (U) WORK PERFORMED BY: Approximately 5% of the effort, representing expertise not available in-house, is conducted under a number of small contracts; the rest is performed in-house by AMSAA personnel.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: Examples of tasks completed are: recommended design changes to the M60A1E3 series tanks, feasibility of employing anti-aircraft weapons for nuclear site defense, COBRA investigation regarding the critical issues relating to helicopter mast-mounted sights, determination of the susceptibility of the Advanced Attack Helicopter (AAH) to attack by Red artillery, methodology for assessing logistics and the air-to-surface war (AFSOUTH wargame), evaluation

Program Element: 6.57.06.A Title: Materiel Systems Analysis
DOD Mission Area: 0440 - Technical Integration/Studies Analyses Budget Activity: 06 - Defensewide Mission Support

of relative performance of 8-inch lightweight gun as a candidate to replace 5-inch guns on Navy ships. Evaluations were accomplished in support of new main battle tank and surface-to-air missile development programs. Studies of useful life of 2 1/2-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. Major contributions were made in the area of smoke and its influence on the battlefield; AMSAA serves as consultant to Program Manager, Smoke.

2. (U) FY 1980 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. Provide a basis for trading off firepower, mobility, and survivability for lightweight armored combat vehicles. Continue participation in preparation of analysis plan for North Atlantic Treaty Organization (NATO) small arms evaluation to select a second caliber of ammunition for standardization. Perform effectiveness analyses of Advanced Attack Helicopter (AAH) weaponization and scout helicopters. Analyze effectiveness of air defense systems in electronic 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 the air defense STINGER, ROLAND, and PATRIOT missile systems survivability. Analyze survivability of aircraft (AAH, AH1 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 of properly analyzed field operational and support data will be emphasized to guide design 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 Product Improvement Programs and various follow-on concepts, assist SHAPE task force regarding improving NATO antitank posture, determine alternatives 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 VIPER, Ground Emplaced Mine Scattering System, Air Defense Gun, ROLAND and PATRIOT Air Defense Systems, Vulcan Air Defense Gun Product Improvement Programs, second prototype of Advanced Medium STOL Transport aircraft, and the Family of Military Engineer Construction Equipment. The workload represents a level of effort of approximately 330 man-years to support the systems analysis of Army materiel requirements.

3. (U) FY 1981 Planned Program: Continued analyses 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, firepower, mine emplacement concepts, artillery optimization, utilization of missiles, and various

antiarmor techniques. Emphasis will be placed on reviewing major systems and alternatives and trade-offs that might be considered in order to lower the cost of materiel procurement and system operations and support. Conduct producibility evaluations for conventional ammunition and explosive items under development or product improvement. Continue assistance to SHAPE task force regarding improvement of NATO antitank posture and continue examination to determine best alternatives for NATO in a limited visibility battlefield environment. There will also be emphasis on maximizing survivability, reliability, availability, and maintainability of developed items. Specific projects are: Battlefield Availability of Artillery; Advanced Forward Area Communications; battlefield performance of antitank guided missile systems (Tactical Operation System, DRAGON, TOW-COBRA, foreign threat missile, TOW on Armored Personnel Carrier, HELLFIRE, and COPPERHEAD); chemical warfare assessment; helicopter weapons systems assessment; communications, electronic, and command and control systems assessments; armor weapon system performance quantification (tank armor, tank fire control, and antitank munitions); and lethality updates of ROLAND, PATRIOT, and DIVAD gun (air defense systems).

4. (U) FY 1982 Planned Program: Continue independent systems analyses and cost-effectiveness evaluations of developmental materiel systems with emphasis in the same general areas as in FY 1981.

5. (U) Program to Completion: This is a continuing program.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: 6.57.08.A
Title: Theater Nuclear Force Survivability (TNF/S) Analysis
DOD Mission Area: 610 - Technical Integration
Budget Activity: 6 - Defensewide Mission Support

A. (U) RESOURCES (PROJECT LISTING): ($ in Thousands)

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	1999	0	0	0	0	5499
A987	Theater Nuclear Force Survivability (TNF/S) Analysis	1999	0	0	0	0	5499

B. (U) BRIEF DESCRIPTION OF PROJECT: The survivability of present and future theater nuclear capable forces including combat, combat support, and combat service support elements was studied in the context of a NATO/Warsaw Pact conflict. This effort was undertaken to identify necessary changes in doctrine, tactics, and hardware required for achieving increased survivability. The effort included vulnerability assessment of selected Army equipment subject to a nuclear environment. Analytical models were developed to assess the vulnerability of various items of equipment. Data generated from the models was used to determine unit survivability and total force survivability.

C. (U) EXPLANATION OF CANCELLATION OR DEFERRAL: This program was cancelled by Congress (joint conference of the HASC and SASC).

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.57.09.A Title: Exploitation of Foreign Items
DOD Mission Area: #460 - International Cooperative RDTE Budget Activity: #6 - Defensewide Mission Support

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional To Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	1511	1500	1726	1920	Continuing	Not Applicable
D650	Exploitation of Foreign Items	1511	1500	1726	1920	Continuing	Not Applicable

B. (U) 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 enhancement. The program pursues the utilization of foreign technology in support of RDTE projects and threat analysis. Program objectives are to assist in the transfer of foreign technology to US and further maximum use of foreign inventiveness and technology to increase the option range for US designs.

C. BASIS FOR FY 1981 RDTE REQUEST: The request for $1.726 million for Project D650 will support evaluation of forty foreign items, to include:

Program Element: 6.57.09.A Title: Exploitation of Foreign Items
DOD Mission Area: 460 - International Cooperative RDTE Budget Activity: 6 - Defensewide Mission Support

D. (U) BASIS FOR CHANGE BETWEEN FY 1981 and FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1979	FY 1980	FY 1981	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	1511	1500	1726	Continuing	Not Applicable
Funds (as shown in FY 1980 *submission*)	1500	1500	1500	Continuing	Not Applicable

FY79 and FY81 increases due to refined cost estimates.

E. (U) OTHER APPROPRIATION FUNDS: Not Applicable.

Program Element: #6.57.09.A Title: Exploitation of Foreign Items
DOD Mission Area: #460 - International Cooperative RDTE Budget Activity: #6 - Defensewide Mission Support

F. (U) 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, and advanced and engineering development. Evaluation and exploitation of threat materiel is conducted to assess the state-of-the-art of threat technology in support of long range threat analyses. The Army must be prepared to exploit or defeat foreign materiel through a thorough knowledge of their capabilities, characteristics and vulnerabilities. Results of evaluation are published in reports and disseminated to all interested parties throughout the Department of Defense.

G. (U) RELATED ACTIVITIES: Exploitation evaluation is coordinated with Defense Intelligence Agency, all Services, and other interested agencies. Program Element 6.57.14.A, Foreign Weapons Evaluation, insures that foreign Free World military materiel, which appears to satisfy US Army needs, is adequately evaluated as a viable acquisition alternative to a US development program and to enhance North Atlantic Treaty Organization (NATO) standardization through the acquisition of NATO common materiel.

H. (U) 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 responsibility for counterpart US materiel. Other government 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 Agent, 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, VA, has overall management responsibility for Project D650, Exploitation of Foreign Items.

I. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1979 and Prior Accomplishments:

Program Element: #6.57.09.A
DOD Mission Area: #460 - International Cooperative RDTE

Title: Exploitation of Foreign Items
Budget Activity: #6 - Defensewide Mission Support

information gained from projects completed has materially benefited on going R and D projects to include approximately forty (40) major projects in various phases of development.

2. FY 1980 Program: Evaluation and exploitation of foreign materiel will continue.

Program Element: #6.57.09.A Title: Exploitation of Foreign Items
DOD Mission Area: #460 - International Cooperative RDTE Budget Activity: #6 - Defensewide Mission Support

3. (U) FY 1981 Planned Program: Evaluation and exploitation of foreign materiel technology will continue. The thrust of this program is to contribute to the reduction of dollars/time devoted to the costly areas of basic research and exploratory development; demonstrate new and unique approaches to the solution of developmental problems; and furnish examples of foreign ideas/innovations for incorporation into the United States technology base. The request will support evaluation of forty (40) items for exploitation. Targets of opportunity will be considered as the occasion arises.

4. (U) FY 1982 Planned Program: Testing and evaluation of foreign materiel will continue. The FY 1982 program will be flexible so that as foreign materiel becomes available it will be exploited, tested, and evaluated in a timely manner. The program offers a high pay off for the resources invested.

5. (U) Program to Completion: This is a continuing program.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.57.12.A
Title: Support of Operational Testing
DOD Mission Area: #454 - Other Test and Evaluation Support
Budget Activity: #6 - Defensewide Mission Support

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional To Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	11189	36374	38893	48089	Continuing	Not Applicable
DV02	Test Boards	11896	12167	14044	15835	Continuing	Not Applicable
DV03	US Army Training and Doctrine Command (TRADOC) Initial Operational Test and Evaluation (IOTE)	3962	5555	5039	6905	Continuing	Not Applicable
D001	US Army Operational Test and Evaluation Agency (OTEA) IOTE	9199	11613	11081	14500	Continuing	Not Applicable
D918	Communications-Electronics User Testing	-	535	593	885	Continuing	Not Applicable
D985	Concepts Evaluation of Materiel	1738	2139	1762	2423	Continuing	Not Applicable
D986	TRADOC Support Equipment	4394	4365	5922	7541	Continuing	Not Applicable
D992	National Training Center Support	-	-	452	-	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The objective of this program is to conduct the operational testing (OT) of Army systems under development so as to support decisionmaking related to materiel acquisition programs. In FY 1981, the program consists of seven projects which provide for the recurring costs of operating the TRADOC Test Boards; for the direct costs of operational tests of developmental materiel prior to production; for an economical test vehicle via quick reaction testing of materiel to resolve issues related to potential Army needs; and for development of instrumentation for TRADOC test organizations. The three projects that provide for the direct costs of operational tests are not programed on a level of effort basis. Rather, the funds programed for each of these projects for a given year are equal to the sum of the

Program Element: #6.57.12.A
DOD Mission Area: #454 - Other Test and Evaluation Support

Title: Support of Operational Testing
Budget Activity: #6 - Defensewide Mission Support

anticipated costs of conducting the tests scheduled for that year. Further, the funds programed for these projects are not proportional to the number of tests scheduled because the costs of individual tests vary widely. Remaining projects account for approximately 55% of program element funds and are programed on a level-of-effort basis with some adjustments (e.g., to develop specific items of instrumentation which provide an effective test capability).

C. (U) BASIS FOR FY 1981 RDTE REQUEST: Requested funds provide for operational testing on developmental systems, for operation and maintenance of the Test Boards, and for the development of instrumentation, targets and simulators to enable efficient and effective testing.

D. (U) BASIS FOR CHANGE BETWEEN FY 1981 and FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1979	FY 1980	FY 1981	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	31189	36374	38893	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	9199	12613	10850	Continuing	Not Applicable

1. (U) This program element (PE) has been restructured in FY 1981 to include all projects which were in Pe 6.57.12.A, (then entitled) OTEA Operational Testing, and in PE 6.57.07.A, TRADOC Operational Testing; and project D992, National Training Center Support, which was formerly included in PE 6.51.02.A, TRADOC Studies and Analyses. The FY 1979 and FY 1980 "current requirements" include these projects to provide a base for comparing the FY 1981 estimate.

2. (U) The additional $21,990 thousand shown at "current requirements" for FY 1979, is for the projects added by the restructuring. Funding for these projects has not changed from last year's estimate (i.e., $21,990 thousand was last year's FY 1979 estimate for PE 6.57.07.A).

3. (U) For FY 1980, project D001, OTEA IOTE, has been reduced $1,000 thousand from last year's estimate of $12,613 thousand by a Congressional reduction. Last year's estimate for PE 6.57.07.A was $26,935 thousand. This was decreased $2,000 thousand ($1,000 thousand in TRADOC IOTE and $1,000 thousand in TRADOC Support Equipment) by a Congressional reduction and Test Boards were decreased $174 thousand as a result of reductions in travel and overtime.

Program Element: #6.57.12.A Title: Support of Operational Testing
DOD Mission Area: #454 - Other Test and Evaluation Support Budget Activity: #6 - Defensewide Mission Support

4. (U) For FY 1981, project D001, OTEA IOTE, has been increased $554 thousand to provide for cost escalation due to inflation. Project DN01, Operational Test and Evaluation Support Equipment, was funded at $350 thousand in last year's estimate. This project provides for development of special mobile instrumentation to permit conducting tests at locations where instrumented ranges do not exist, but which have special terrain and operational environment and/or available troops. This enables providing a more realistic test, reducing travel costs, and avoiding potential delays at heavily sceduled sites. Project DN01 funding is deferred until FY 1983 in favor of higher priority requirements. Project D992, National Training Center Support, has been increased $52 thousand to provide for cost escalation due to inflation. Last year's estimate for PE 6.57.07.A was $28,173 thousand. Current requirements are decreased by about $0.8 million as a result of adjustments in accordance with incremental funding policies.

E. (U) OTHER APPROPRIATION FUNDS: Not Applicable.

Program Element: #6.57.12.A
Title: Support of Operational Testing
DOD Mission Area: #454 - Other Test and Evaluation Support
Budget Activity: #6 - Defensewide Mission Support

F. (U) DETAILED BACKGROUND AND DESCRIPTION: Project DV02, Test Boards, provides for the fixed and recurring costs of the US Army Training and Doctrine Command (TRADOC) Test Boards which conduct operational testing (OT) and force development testing and experimentation (FDTE) in support of TRADOC, US Army Operational Test and Evaluation Agency (OTEA) and other agencies, to include Office of the Secretary of Defense (OSD) joint tests. The direct costs of FDTE are funded under the Operations and Maintenance, Army Appropriation. Organization of the boards under TRADOC was begun in FY 1976 and was completed in FY 1979, with FY 1980 being the first full year of operation with fully staffed test boards. Project DV03, TRADOC Initial Operation Test and Evaluation (IOTE), provides for the direct costs of operational tests of nonmajor developmental materiel prior to production. RDTE funding for this purpose was initiated in FY 1977. Project D001, OTEA IOTE, provides for the direct costs of operational tests of major (and selected nonmajor) developmental materiel systems, prior to production. Project D918, Communications-Electronics User Testing, provides resources for testing of US Army Communications Command equipment. Such testing is conducted primarily on-site. FY 1980 is the first year in which such testing is being funded under a separate project. Project D985, Concepts Evaluation of Materiel, provides TRADOC 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, TRADOC 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). Prior to FY 1977, a separate project, D952, TRADOC Combined Arms Test Activity (TCATA), formerly Modern Army Selected Systems Test, Evaluation and Review (MASSTER), 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 1977. Project D992 is funded in FY 1981 only and provides TRADOC's share of a joint effort with Defense Advanced Research Projects Agency to develop instrumentation for the National Training Center.

G. (U) 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 OTEA to insure the 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 development of support equipment to insure integration of testing by the Services and to avoid duplicative 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 the other services. High level centralized management of resources for user testing is provided by the US Army Test Schedule and Review Committee, whose principal product is the Army Five Year Test Program. The Five Year Test Program includes the Army's plan for Initial Operational

Program Element: #6.57.12.A
DOD Mission Area: #454 - Other Test and Evaluation Support

Title: Support of Operational Testing
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Test and Evaluation (IOTE) and Follow-On Evaluation of all materiel items and for testing in support of force development for the following five years. Its execution is supervised by OTEA. Operational tests of the acceptability of nonmajor developmental materiel items are conducted by US Army Training and Doctrine Command (TRADOC) under Program Element (PE) 6.57.07.A, TRADOC Operational Testing, in FY 1980 and prior years. All projects in PE 6.57.07.A are transferred into PE 6.57.12.A, starting in FY 1981, in order to consolidate all RDTE,A-funded operational testing activities into one PE. In FY 1978, project DV02, Test Boards, and Project M985, Concepts Evaluation of Materiel, were transferred into PE 6.57.07.A from PE 6.57.02.A, Support of 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 PE starting in FY 1979 (under projects DV02 and DV03).

II. (U) WORK PERFORMED BY: 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; Jet Propulsion Lab, Pasadena, CA; General Electric, Syracuse, NY; International Laser Systems, Orlando, FL; and MILCO, Inc., Miami, FL. Some instrumentation development is performed in-house by Harry Diamond Laboratories, Adelphi, MD; Naval Postgraduate School, Monterey, CA; and the US Army Missile Command, Redstone Arsenal, AL. TRADOC Combined Arms Test Activity (TCATA), Combat Developments Experimentation Command (CDEC), and the Test Boards are staffed by military and civilian personnel.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: A major effort was begun in FY 1973 to upgrade user test instrumentation. 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 on targets for a live firing range and on 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 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 1976 for conduct of Initial Operational Test and Evaluation (IOTE) by US Army Operational Test and Evaluation Agency (OTEA) and in FY 1977 for conduct of IOTE by TRADOC. During FY77, 78 and 79, approximately 300 IOTE's were conducted and funded by RDTE. The impact of TRADOC concept evaluations has increased each year since the start of the program; examples of recent evaluations are

Program Element: #6.57.12.A
Title: Support of Operational Testing
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helicopter map-of-the-earth communications, airborne infantry equipment, non-radio communications, commercial engineer equipment, trainers for sophisticated systems, safety devices and laser utility. These efforts proved highly useful in resolving issues related to military application of new or modified equipment.

2. (U) FY 1980 Program: OTEA will conduct 14 operational tests and TRADOC will conduct approximately 78 operational tests in FY 1980. These include tests of the XM-1 Tank, Improved CH-47, Defense Satellite Communications System, Division Air Defense Gun System, General Support Rocket System, Heliborne Fire and Forget Missile System, Cavalry Fighting Vehicle, and Laser Target Designator; of nonmajor systems such as Aerial Radiac System, AH-1S Fire Control/Weapons Subsystems, and Facility Intrusion Detection System; and of Automated Technical Control and Electromagnetic Radiation Warning Device for the US Army Communications Command (USACC). Concept evaluations will include: Infantry Fighting Vehicle seating kit, Simulation Trainer Anti-Armor, On-Bridge Launch Control Unit Radar Display, Heavy Machine Gun Candidate for Rear Area Combat Operations, and Parachute Inflation Assistance Device. Instrumentation, targets, and simulators essential to effective operational testing of materiel systems in a realistic environment, to include threat, will also be developed. Development of a Mobile Automated Field Instrumentation System will be initiated.

3. (U) FY 1981 Planned Program: US Army Operational Test and Evaluation Agency (OTEA) plans to conduct 20 operational tests and US Army Training and Doctrine Command (TRADOC) approximately 82 operational tests in FY 1981. Tests include: Advanced Attack Helicopter, Position Location Reporting System, COPPERHEAD Cannon Launched Guided Projectile, vehicle/ground laser locator designator, Stand-Off Target Acquisition System, STINGER Man-Portable Air Defense System, PATRIOT Air Defense Missile System, and TRI-TAC family of joint tactical communications equipment; Vehicle-Mounted Road Mine Detector System, High Mobility Weapons Carrier, Armor Remoted Target System, and XM-1 Unit Conduct of Fire Trainer; and Megabit Digital Troposcatter System for USACC. Funds programmed will support the fully staffed Test Boards and support continued development of a Mobile Automated Field Instrumentation System. This system will provide TRADOC with the capability to move instrumentation to the troop locations, reducing the impact of operational testing on readiness and substantially reducing transportation and travel costs, while increasing realism. Project D992 provides funds for a joint Defense Advanced Research Projects Agency/TRADOC effort to develop an instrumentation system for the National Training Center which will: Collect and report data on the performance of commanders, staffs, and units in a simulated combat environment; and record, consolidate and process these data.

4. (U) FY 1982 Planned Program: Continue to support operational testing for the US Army. Some tests scheduled to be conducted are: General Support Rocket System, Single Channel Ground and Airborne Radio System; and Automatic Communications Central Office; Tactical Single Station Locator, Topographic Support System, AH-64 Flight and Weapons Simulator, Electromagnetic Radiation Hazards Monitoring System and Lighter Air Cushion Vehicle; satellite terminals and other USACC equipment.

Program Element: #6.57.12.A
Title: Support of Operational Testing
DOD Mission Area: #454 - Other Test and Evaluation Support
Budget Activity: #6 - Defensewide Mission Support

5. (U) Program to Completion: This is a continuing program.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #DV02 Title: Test Boards
Program Element: #6.57.12.A Title: Support of Operational Testing
DOD Mission Area: #454 - Other Test and Evaluation Support Budget Activity: #6 - Defensewide Mission Support

A. (U) 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 (formerly titled Test Boards), under Program Element (PE) 6.57.02.A, Support of Development Testing. These six development test activities, or test boards, performed engineering and service tests 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 was intended to provide the test agency with unqualified independence from the Army materiel developing agency. The transfer was 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 five TRADOC test boards were financed by this project, DV02. The five boards were: Air Defense Board, Ft. Bliss, TX; Armor and Engineer Board, Ft. Knox, KY; Airborne - Communications - Electronics (ACE) Board, Ft. Bragg, NC; Field Artillery Board, Ft. Sill, OK; and Infantry Board, Ft. Benning, GA. In FY 1977, a sixth board, the Aviation Board, Ft. Rucker, AL, was formed by TRADOC to conduct operational tests of aviation systems (formerly conducted by TECOM). In FY 1978, a seventh testing element was added, the Intelligence and Security Board, Ft. Huachuca, AZ, which performed operational testing of signal intelligence and electronic warfare equipment, formerly performed by the US Army Security Agency Test and Evaluation Center. In FY 1978 and prior years, this type of testing was supported under PE 6.57.01.A, Communications-Electronics Testing Activities. An eighth test board, the Communications - Electronics Board was activated October 1978 at Ft. Gordon, GA, with the nucleus obtained from reorganization of the Airborne-Communications-Electronics (ACE) Board, which was redesignated as the Airborne Board. Each board relies upon local troop support personnel during the conduct of tests. The collocated center and school is the principal source of those personnel.

B. (U) 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 testing activities. High-level centralized management of resources for user testing is

Project: #DV02 Title: Test Boards
Program Element: #6.57.12.A Title: Support of Operational Testing
DOD Mission Area: #454 - Other Test and Evaluation Support Budget Activity: #6 - Defensewide Mission Support

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 operational testing activities, the 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 the US Army Training and Doctrine Command (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) and the Combat Developments Experimentation Command (CDEC). Operational tests of the acceptability of major developmental materiel systems are conducted by the US Army Operational Test and Evaluation Agency (OTEA) under project D001, OTEA IOTE, in this same program element (PE). 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, also in this PE.

C. (U) WORK PERFORMED BY: The salaries of civilian personnel assigned to the test boards are paid primarily from this project. A 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. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: Oganization of the Test Boards under TRADOC was initiated in FY 1976 and completed in FY 1979. The eight boards conducted most operational test and evaluations described under project DV03, Initial Operational Test and Evaluation (IOTE). The boards also conducted tests of US Army Communications Command equipment, concept evaluations of materiel, force development testing and experimentation (FDTE) funded by the Operations and Maintenance, Army appropriation, and other tests financed by the customers.

2. (U) FY 1980 Program: FY 1980 will be the first time that the test boards will be fully staffed for the entire year. This project will continue to provide for the fixed and recurring costs of the eight test boards. The boards will continue to

Project: #DV02 Title: Test Boards
Program Element: #6.57.12.A Title: Support of Operational Testing
DOD Mission Area: #454 - Other Test and Evaluation Support Budget Activity: #6 - Defensewide Mission Support

conduct operational testing (OT) and force development testing and experimentation (FDTE) in support of the US Army Training and Doctrine Command (TRADOC), US Army Operational Test and Evaluation Agency (OTEA), and other agencies, to include Office of the Secretary of Defense (OSD)-directed joint tests.

3. (U) FY 1981 Planned Program: This project will continue to provide for the operation and maintenance of the eight TRADOC test boards. The boards will continue to conduct operational testing (OT) and force development testing and experimentation (FDTE).

4. (U) FY 1982 Planned Program: This project will continue to provide for the operation and maintenance of the TRADOC test boards.

5. (U) Program to Completion: This is a continuing program.

6. (U) Major Milestones: Not Applicable.

7. (U) Resources ($ in thousands):

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	11896	12167	14044	15835	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	11718	12218	12169	-	Continuing	Not Applicable

The basis for change between FY 1980 and FY 1981 Congressional Descriptive Summaries is as follows: FY 1979 funding has been increased slightly to provide for actual costs of operating the Test Boards. The FY 1980 estimate has been decreased slightly to reflect reductions in planned travel. The FY 1981 estimate has been increased to provide for cost escalation due to inflation and sharp increases in host support costs where the board is a tenant at another installation.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #DV03 Title: US Army Training and Doctrine Command (TRADOC) Initial Operational Test and Evaluation (IOTE)

Program Element: #6.57.12.A Title: Support of Operational Testing

DOD Mission Area: #454 - Other Test and Evaluation Support Budget Activity: #6 - Defensewide Mission Support

A. (U) DETAILED BACKGROUND AND DESCRIPTION: The objective of this project is to provide for the direct costs of conducting operational testing of Army nonmajor materiel systems. All TRADOC operational tests are programed through the Test Schedule and Review Committee (TSARC) whose principal function is to schedule and manage the Army Five-Year Test Program. The TSARC meets semiannually to update user testing for the Army. TRADOC test organizations conduct programed tests which address specific materiel system acquisition programs, assessing military utility, operational effectiveness and suitability, including compatibility, interoperability, reliability, maintainability, and logistic and training requirements. Funds programmed for a given year are equal to the sum of the anticipated cost of conducting the tests scheduled for that year and are not proportional to the number of tests scheduled because the costs of individual tests vary widely. Test organizations rely on the US Army Forces Command (FORSCOM) to provide representative user troops for the conduct of these tests. Each test organization has a distinct area of expertise as indicated by its name. Test organizations also conduct customer evaluations for organizations outside of the TRADOC community on a reimbursable basis. Test activities connected to this project are:

US Army Airborne Board, Ft Bragg, NC
US Army Air Defense Board, Ft Bliss, TX
US Army Armor and Engineer Board, Ft Knox, KY
US Army Field Artillery Board, Ft Sill, OK
US Army Communications-Electronics Board, Ft Gordon, GA
US Army Infantry Board, Ft Benning, GA
US Army Aviation Board, Ft Rucker, AL
US Army Intelligence and Security Board, Ft Huachuca, AZ
US Army TRADOC Combined Arms Test Activity, Ft Hood, TX

B. (U) RELATED ACTIVITIES: Close and continuous coordination exists between the various TRADOC proponents and test organizations, the US Army Test and Evaluation Command (TECOM) development test activities, materiel developing agencies and the US Army Operational Test and Evaluation Agency (OTEA), to ensure greatest possible effectiveness of Army testing activities and to avoid duplicative instrumentation development efforts. The Office of the Under Secretary of Defense for Research and Engineering reviews planned testing to ensure integration of testing by the 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. IOTE of major developmental materiel items are conducted by OTEA with funding provided under project D001, OTEA IOTE, and the fixed and recurring costs incurred in connection with IOTE by the test boards are financed by project DV02, Test Boards, both in this same Program Element 6.57.12.A.

Project: #DV03 Title: US Army Training and Doctrine Command (TRADOC) Initial Operational Test and Evaluation (IOTE)

Program Element: #6.57.12.A Title: Support of Operational Testing

DOD Mission Area: #454 - Other Test and Evaluation Support Budget Activity: #6 - Defensewide Mission Support

C. (U) WORK PERFORMED BY: Work is performed primarily by in-house personnel (civilian and military) assigned to TRADOC and by personnel (civilian and military) assigned to the various Army installations where tests are conducted. By definition, operational tests use regular Army troops as players; no contractor personnel or development technicians are used.

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: Operational tests supported by this project in FY 1978 totaled 75. These included tests of: Steerable Null Antenna Processor; Advanced Radar Warning Receiver, AN/APR-39; Multiple Integrated Laser Engagement System; "Soft" Ring Airfoil Grenade; Surface-Launched Unit, Fuel-Air Explosive; and Ultra High Frequency Tactical Satellite Communications Manpack. In FY 1979, 65 operational tests were supported. Examples of items tested are: Ground Emplaced Mine Scattering System; Ribbon Bridge Erection Boat; Lightweight Doppler Navigation Subsystem; Small Unit Transceiver; Telephone Signaling Interface Unit, TA-978; and AN/TSQ-109 Automated Ground Transportable Emitter Location Identification System. In FY 1979, this project also supported the Combat Vehicle Technology Program and operational tests for the US Army Communications Command.

2. (U) FY 1980 Program: Approximately 78 operational tests are scheduled. Tests will be conducted primarily at the eight TRADOC test boards and the TRADOC Combined Arms Test Activity. The current test schedule includes XM1 Trainers; AH-1S (FULL-UP); Technical Control and Analysis Center (Division); Tactical Water Distribution System; Countermeasures System, Special Purpose, AN/APR-33 QUICKFIX; AH-1S Fire Control/Weapons Subsystems; Facility Intrusion Detection System; and Aerial Radiac System, AN/ADR-6. Support of the Combat Vehicle Technology Program will continue in FY 1980.

3. (U) FY 1981 Planned Program: TRADOC will conduct approximately 82 operational tests. Examples of tests scheduled include Vehicle-Mounted Road Mine Detector System, M60A3 One-Station Unit Training and XM1 Unit Conduct of Fire Trainers, Armor Remoted Target System, Ground Transportable Tactical Electronic Intelligence Search and Analysis Set, and High Mobility Weapons Carrier.

4. (U) FY 1982 Planned Program: Tests planned include Tactical Single Station Locator, Tactical Electro-Optics Collection and Processing System, AH-64 Flight and Weapons Simulator, Tank Appended Crew Evaluation Device, Conduct of Fire Trainers, Topographic Support System, Electromagnetic Radiation Hazards Monitoring System, and 30-ton Lighter Air Cushion Vehicle.

Project: #DV03 Title: US Army Training and Doctrine Command (TRADOC) Initial Operational Test and Evaluation (IOTE)

Program Element: #6.57.12.A Title: Support of Operational Testing

DOD Mission Area: #454 - Other Test and Evaluation Support Budget Activity: #6 - Defensewide Mission Support

5. (U) Program to Completion: This is a continuing program.

6. (U) Major Milestones: Not Applicable.

7. (U) Resources ($ in thousands):

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	3962	5555	5039	6905	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	4837	6617	5764	--	Continuing	Not Applicable

FY 1979 funding decreased from last year's estimate as a result of slippage of several operational tests to later fiscal years (e.g., AH-1S Fire Control Weapons Subsystem, Telephone Signaling Interface Unit, Transceiver Multicoupler, Protective Mask and BLACKHAWK Operational Flight Simulator). The FY 1980 estimate decreased as a result of Congressional reduction. The FY 1981 estimate is decreased as a result of adjustment of scheduled testing.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: D001

Title: US Army Operational Test and Evaluation Agency (OTEA) Initial Operational Test and Evaluation (IOTE)

Program Element: #6.57.12.A

Title: Support of Operational Testing

DOD Mission Area: #454 - Other Test and Evaluation Support

Budget Activity: #6 - Defensewide Mission Support

A. (U) DETAILED BACKGROUND AND DESCRIPTION: Provides for the conduct of IOTE on 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. OTEA actively participates in the conduct of tests and provides an independent evaluation of each prospective system's military utility, operational effectiveness, and suitability directly to the appropriate decision review. Funds programed for a given year are equal to the sum of the anticipated costs of conducting the tests scheduled for that year and are not proportional to the number of tests scheduled because the costs of individual tests vary widely. Prior to FY 1976, IOTE was funded by the Operations and Maintenance, Army (OMA) appropriation, Program 2 (208015). Funds were transferred from OMA to this program in accordance with decisions to fund IOTE from the RDTE appropriation.

B. (U) RELATED ACTIVITIES: Close and continuous coordination exists between OTEA and development test activities, materiel developing agencies, and US Army Training and Doctrine Command (TRADOC) agencies. This coordination ensures greatest possible effectiveness of Army testing activities and avoids duplication of instrumentation development efforts. The Office of the Under Secretary of Defense for Research and Engineering reviews planned testing and development of support equipment to ensure 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 IOTE and Force Development Testing and Experimentation (FDTE) programs. IOTE of most nonmajor developmental materiel items are conducted by TRADOC with funding provided under project DV03, TRADOC IOTE, and the fixed and recurring costs incurred in connection with IOTE by the TRADOC Test Boards are financed by project DV02, Test Boards, both in this same Program Element 6.57.12.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 D001 funds.

C. (U) WORK PERFORMED BY: 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 tests are conducted. By definition, operational tests use regular Army troops as players and not contractor personnel or development technicians.

Project: D001

Title: US Army Operational Test and Evaluation Agency (OTEA) Initial Operational Test and Evaluation (IOTE)

Program Element: #6.57.12.A

Title: Support of Operational Testing

DOD Mission Area: #454 - Other Test and Evaluation Support

Budget Activity: #6 - Defensewide Mission Support

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: Operational tests have been conducted on such systems as the new Army main battle tank, lightweight artillery and company mortar systems, mechanized infantry combat vehicle, BLACK HAWK utility tactical transport aircraft system, advanced attack helicopter, artillery and mortar locating radars, air defense command and control system, COPPERHEAD cannon-launched guided projectile, improved TOW vehicle, family of military engineer construction equipment, vehicle rapid fire weapon system, NAVSTAR global positioning system, infantry fighting vehicle system, squad automatic weapon system, PATRIOT air defense guided missile system, automatic communications central office and message switch, improved armored personnel carrier, and all-weather missile system. RDTE funding for this purpose (i.e., the conduct of IOTE) 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.

2. (U) FY 1980 Program: OTEA will direct and participate in 14 operational tests on such systems as improved CH-47, TRI-TAC family of joint tactical communications equipment, defense satellite communications system, division air defense gun system, general support rocket system, heliborne fire and forget missile system, XM1 main battle tank, cavalry fighting vehicle system, laser target designator, improved 81mm mortar system, and VIPER improved light antitank/assault weapon.

3. (U) FY 1981 Planned Program: OTEA will direct and participate in about 20 operational tests on such systems as the advanced attack helicopter, COPPERHEAD cannon-launched guided projectile, PATRIOT air defense missile system, VIPER light antitank/assault weapon, standoff target acquisition system, STINGER manportable air defense system, communications nodal control element, squad automatic weapon, vehicle/ground laser locator designator, position location reporting system, and TRI-TAC family of joint tactical communications equipment.

4. (U) FY 1982 Planned Program: OTEA will direct and participate in 22 operational tests of such systems as the Automatic Communications Central Office, General Support Rocket System, VHF portion of the Single-Channel Ground and Airborne Radio System, tactical communications jamming system, XM1 tank 120mm gun system and fire support team vehicle system. Funding is increased compared to FY 1981, primarily due to increased test complexity and the need for more data (e.g., logistics, cost, and reliability data) to support decisionmaking on systems undergoing development.

Project: D001

Title: US Army Operational Test and Evaluation Agency (OTEA) Initial Operational Test and Evaluation (IOTE)

Program Element: #6.57.12.A

Title: Support of Operational Testing

DOD Mission Area: #454 - Other Test and Evaluation Support

Budget Activity: #6 - Defensewide Mission Support

5. (U) Program to Completion: Not applicable. This is a continuing program.

6. (U) Major Milestones: Not applicable.

7. (U) Resources ($ in thousands):

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	9199	11613	11081	14500	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	9199	12613	10500	-	Continuing	Not Applicable

The decrease in FY 1980 funding is a Congressional reduction. The small increase in FY 1981 funding is due to refinement of cost estimates.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D986 Title: US Army Training and Doctrine Command (TRADOC) Support Equipment

Program Element: #6.57.12.A Title: Support of Operational Testing

DOD Mission Area: #454 - Other Test and Evaluation Support Budget Activity: #6 - Defensewide Mission Support

A. (U) DETAILED BACKGROUND AND DESCRIPTION: A major effort was begun in FY 1973 to upgrade instrumentation at the Combat Developments Experimentation Command and US Army Training and Doctrine Command (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 on targets for a live firing range and for a family of threat weapon simulators. The Air Defense Artillery Threat Simulator (ADATS) program provides the Army with simulated threat equipment to support user testing by duplicating/simulating opposing force air defense threats to create a realistic test environment. At the beginning of FY 1976, the US Army Test and Evaluation Command (TECOM) transferred five Test Boards to TRADOC for conduct of operational testing (OT). Since then the test boards, including three boards established after FY 1976, have been rebuilding and reorienting their instrumentation to support their revised test mission. TRADOC test activities use the equipment developed under this project in support of US Army Operational Test and Evaluation Agency (OTEA) tests and Office of the Secretary of Defense (OSD)-directed joint tests as well as during conduct of TRADOC user tests.

B. (U) 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 OTEA to ensure greatest possible effectiveness of Army testing activities. The Office of the Under Secretary of Defense for Research and Engineering (OUSDRE) reviews planned testing and development of support equipment to ensure integration of testing by the Services. Army Staff and OUSDRE also seek to avoid duplication of instrumentation development efforts. Threat simulator requirements are coordinated with the other Services through a USDRE-chartered tri-Service committee (CROSSBOW-S). Coordination is also maintained with training development activities with respect to targets required for testing.

C. (U) WORK PERFORMED BY: Work is performed primarily by numerous contractors; however, a portion is performed in-house. In-house organizations include: Harry Diamond Laboratories, Adelphi, MD; Naval Postgraduate School, Monterey, CA: US Army Missile Command, Redstone Arsenal, AL; and Combat Developments Experimentation Command, Ft Ord, CA. Past contractors include: TRACOR, Austin, TX; General Dynamics Electronics, San Diego, CA; International Laser Systems, Orlando, FL; General Electric, Syracuse, NY; MILCO Inc., Miami, FL; and Jet Propulsion Laboratory, Pasadena, CA.

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

Project: #D986 Title: US Army Training and Doctrine Command (TRADOC) Support Equipment

Program Element: #6.57.12.A Title: Support of Operational Testing

DOD Mission Area: #454 - Other Test and Evaluation Support Budget Activity: #6 - Defensewide Mission Support

1. (U) FY 1979 and Prior Accomplishments: Combat Developments Experimentation Command (CDEC) and TRADOC Combined Arms Test Activity (TCATA) initiated and continued long term integrated instrumentation development programs to enable simulation of a total tactical environment for conduct of Force Development Testing and Experimentation (FDTE). Starting in FY 1976, this project also provided for development of instrumentation for the Test Boards. The instrumentation included sophisticated systems designed for particular test functions and provided for automatic collection of such data as system location and position, live fire hit/miss indication, simulated direct and indirect fire hit/miss, and range timing. Specific accomplishments include development of: Range Measuring System and Satellite Data Link at CDEC; and Automatic Data Collection System and Weapons Engagement Scoring System at TCATA; threat simulator systems at the US Army Air Defense School (Air Defense Artillery Threat Simulator program); Target Spotting System and Advanced Weapons Simulator at the Armor and Engineer Board; Range Control Instrumentation System at the Air Defense Board; data acquisition/reduction system at the Aviation Board; Tracking System for the Airborne Testing at Airborne Board; Direct Fire Laser System at TCATA and CDEC for hit/kill simulation; Noncommunications and communications threat environment equipment for the Intelligence and Security Board; and remote control target system at the Infantry Board.

2. (U) FY 1980 Program: Emphasis will be placed on improving the methodology for and accuracy of the collection of data for assessment of: equipment/systems mission performance, human factors, logistics, maintenance, and training. A substantial effort will be made to provide the Test Boards with modern instrumentation critical to their operational testing mission. Thirty instrumentation projects are planned. Examples are: threat simulators; Advanced Engagement Simulator at Armor and Engineer Board; Telemetry Acquisition System at Airborne Board; electronic warfare equipment, including threat communications and non-communications emitters, at Intelligence and Security Board; Hit Sensing Telemetry System for Moving Targets at Infantry Board; Target Attitude System at CDEC; equipment to establish communications-electronics test capability at new Communications- Electronics Board; and initiating development of Mobile Automated Field Instrumentation System (MAFIS) at TCATA. MAFIS will utilize the latest technology for position location, communications and navigation, real time casualty assessments, hit/kill probabilities; weapon simulation and scoring, data integration and analyses, and will interface efficiently with other modern test instrumentation. MAFIS will provide TRADOC with a highly mobile and self-contained capability to support force-on-force large scale testing at any installation where troop resources are available. This will reduce impact of testing on troop readiness, reduce travel costs, and increase realism.

3. (U) FY 1981 Planned Program: Thirty-six instrumentation projects are planned. Approximately half of FY 1981 funding will be devoted to continuation of MAFIS development. Other projects include integration of the range instrumentation at the Air Defense Board; upgrade of the electronic warfare monitoring equipment at the Intelligence and Security Board; and

Project: #D986 Title: US Army Training and Doctrine Command (TRADOC) Support Equipment

Program Element: #6.57.12.A Title: Support of Operational Testing

DOD Mission Area: #454 - Other Test and Evaluation Support Budget Activity: #6 - Defensewide Mission Support

development of communications and noncommunications threat systems, a target system at the Armor and Engineer Board, a data transmission system at the Airborne Board, smoke environment direct fire simulation at CDEC, and the range timing system at the Field Artillery Board.

4. (U) FY 1982 Planned Program: Planned projects include development of equipment such as: MAFIS, (which requires approximately half of FY 1982 funding, as well as prior efforts, to permit fielding in FY 1984), remote control portable targets, data acquisition and processing, smoke penetrating laser, smoke penetrating laser, and instrumentation for assessing the effects of the "dirty battlefield" and the urban environment on tactical systems and tactical doctrine.

5. (U) Program to Completion: This is a continuing program.

6. (U) Major Milestones: Not Applicable.

7. (U) Resources ($ in thousands):

RDTE	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
Funds (current requirements)	4394	4365	5922	7541	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	3435	5365	7440	--	Continuing	Not Applicable

FY 1979 funding was increased compared to last year's estimate to provide for development of urgently needed instrumentation as follows: command and control, range control, and vulnerability instrumentation for the Armor and Engineer Board; communications and noncommunications threat environment equipment for the Intelligence and Security Board; and additional Air Defense Artillery Threat Simulator effort. The FY 1980 estimate decreased as a result of a Congressional reduction. The decrease in the FY 1981 estimate is primarily due to adjustments in accordance with incremental funding policies.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.57.15.A
Title: Defense Systems Management College
DOD Mission Area: #471 - General Management Support
Budget Activity: #6 - Defensewide Mission Support

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional To Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	0	900	1243	1393	Continuing	Not Applicable
	QUANTITIES						
M199	Defense Systems Management College	0	900	1243	1393	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The Defense Systems Management College (DSMC) was established by the Deputy Secretary of Defense to conduct advanced education in the field of weapons system acquisition management to conduct associated research and special studies, and to assemble and disseminate system acquisition management information regarding policy and implementation. In order to accomplish the educational mission and provide the student with a real world scenario, the College has initiated a modest development program (System X II), which applies advanced computer learning technology in a real world simulation of the System Acquisition Life Cycle. This laboratory simulation provides students realistic practice as program managers while in the academic environment. The System X II development program involves the application of computerized decision exercises based on actual programs during the course of the total life cycle. Portions of this development effort will be analyzed and evaluated during FY 1980 and 1981 and the total laboratory simulation will be completed and classroom ready in FY 1982. When completed, System X II will be available to assist actual program managers to test and evaluate their acquisition strategies, develop new concepts, conduct life cycle trade-off analyses, and evaluate their program readiness for upcoming milestone decisions. DSMC also conducts acquisition management research in support of the Defense Acquisition Executive by anticipating future acquisition management problems, proposing concepts, and new management approaches that will have significant impact on future acquisition policy. Such research will also have a dual application in the furtherance of the curricula within the College.

C. (U) BASIS FOR FY 1981 RDTE REQUEST: The Acquisition Management Laboratory (System X II) requires continued funding to complete the development of the computer simulation design and provide the end product for educational use. The research program is of a continuing nature and will focus on key policy issues, model development for a systems acquisition strategy initiative, and data base expansion for major systems procured by the Department of Defense. These research efforts will support the DSMC educational program, the Joint Logistic Commanders, and priority Office, Secretary of Defense (OSD) subjects.

Program Element: #6.57.15.A
Title: Defense Systems Management College
DOD Mission Area: #471 - General Management Support
Budget Activity: #6 - Defensewide Mission Support

D. (U) BASIS FOR CHANGE BETWEEN FY 1981 and FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands): Not Applicable.

E. (U) OTHER APPROPRIATION FUNDS: Not Applicable.

Program Element: #6.57.15.A
Title: Defense Systems Management College
DOD Mission Area: #471 - General Management Support
Budget Activity: #6 - Defensewide Mission Support

F. (U) DETAILED BACKGROUND AND DESCRIPTION: The Defense Systems Management College has an approved requirement to develop a new educational simulation program (System X II), for teaching systems acquisition management to the next generation of defense program managers. This program is being designed to simulate the acquisition life cycle of a major defense weapons system and will include a series of case studies and computerized decision exercises which address the major issues and actions involving defense system acquisition program management on a real-world and real-time basis. System X II, when developed, will serve as a capstone management exercise to promote the development of acquisition strategy, analyze Mission Element Need Statements, conduct trade-off analyses relative to major programs and conduct sensitivity analyses of various decisions and strategies. This program is also being designed to assist actual defense program managers in conducting milestone analyses of their ongoing programs with the objective of promoting more cost effective approaches and providing real world alternatives through simulation. Other funded research projects within this program are directed towards the development and application of advanced program management techniques to enhance the development and deployment of major systems, and support Joint Logistic Commanders, and Office, Secretary of Defense policy initiatives.

G. (U) RELATED ACTIVITIES: None

H. (U) WORK PERFORMED BY: Project and program offices, DSMC. Major contractors are: Decision Sciences, Inc., Pasadena, CA; and Advanced Technologies, Inc., McLean, VA.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS: The DSMC System X II Simulation Development will be operational early in FY 1982. Adjustments or enhancements after that time frame will be minimal. The research program of DSMC will be a continuing effort and should be considered as such for future years planning.

1. (U) FY 1979 and Prior Accomplishments: Not Applicable

2. (U) FY 1980 Program: The FY 1980 request is required to continue contractor and in-house efforts to develop System X II and to continue selected research in direct support of the defense acquisition management mission.

3. (U) FY 1981 Planned Program: The FY 1981 request is required to complete contractor and in-house development efforts on System X II in anticipation of operation use in FY 1982 and to continue selected research projects in direct support of the defense acquisition mangement mission.

Program Element: #6.57.15.A
Title: Defense Systems Management College
DOD Mission Area: #471 - General Management Support
Budget Activity: #6 - Defensewide Mission Support

4. (U) FY 1982 Planned Program: The FY 1982 request is required to continue System X II development and continue to conduct selected research in direct support of the defense acquisition management mission.

5. (U) Program to Completion: To be determined.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.58.01.A Title: Programwide Activities
DOD Mission Area: #471 - General Management Support Budget Activity: #6 - Defensewide Support

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional To Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	44889	48495	57812	59352	Continuing	Not Applicable
MM88-01	Command Headquarters Support	37169	43612	43206	44588	Continuing	Not Applicable
MM88-02	General Administrative Activities	4942	2425	3032	3320	Continuing	Not Applicable
MM88-03	Special Purpose and Automatic Data Processing Equipment	2541	1831	10827	10889	Continuing	Not Applicable
MM88-04	Minor Construction	237	627	747	555	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program funds efforts directed toward support of Army RDTE installations, activities, and/or operations required to accomplish overall assigned general research and development missions (and which cannot be allocated to specific R&D projects). This is a continuing program which includes logistical and facility support to Army Management Headquarters Activities as established by Department of Defense Directive 5100.73 and Army RDTE programs at field command level; for operating costs of those RDTE headquarters type activities not classifed as Army Management Headquarters Activities; and support to R&D laboratories and research facilities for equipment items and minor construction projects which cannot be identified to a specific R&D project. Requested resources finance salaries and related costs for civilian personnel assigned to other than Army Management Headquarters Activities and for those personnel performing logistical type support at R&D commands; purchased base operations/facility support to R&D commands; purchase and installation of special purpose and automatic data processing equipment items which support two or more R&D projects and for RDTE-funded Occupational Safety and Health Act and Environmental Protection Agency minor construction requirements.

C. (U) BASIS FOR FY 1981 RDTE REQUEST: Requested program supports continuing requirements for activities outlined above. Requirements are based on continuation of FY 1980 level of support with funding requirements for authorized civilian personnel projected at October 1979 salary levels and other requirements inflated in accordance with OMB directives. The increase in the FY 1981 request over FY 1980 is in the Special Purpose and Automatic Data Processing Equipment project. Overall reduced FY

Program Element: #6.58.01.A Title: Programwide Activities
DOD Mission Area: #471 - General Management Support Budget Activity: #6 - Defensewide Support

1979 and FY 1980 funding levels in this program element permitted only emergency equipment repair/replacement. The FY 1981 request reinstates minimum funding for the first increment of a phased program for replacement of obsolete, outdated equipment in R&D laboratories. The major percentage of the equipment inventory was purchased during the FY 1950-60 timeframe and phased replacement/modernization is essential to maintaining state-of-the-art capabilities to support R&D missions.

D. (U) BASIS FOR CHANGE BETWEEN FY 1981 and FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1979	FY 1980	FY 1981	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	44889	48495	57812	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	43304	52210	66362	Continuing	Not Applicable

The change in FY 1979 actuals from the FY 1980 submission indicated above includes adjustments for -1.4 million transferred to program element 6.58.98.A, +0.5 million to reflect proper costing for the Corps of Engineers R&D Headquarters, and +2.5 million for the actual cost of Army Research Office operations (this was reflected in the 6.2 research area in the prior submission for comparability with the FY 1980 structure). The change in FY 1980 reflects the +0.5 million for proper costing of the Corps of Engineers R&D Headquarters offset by decreases of -0.9 million for Defense Systems Management College support now reflected in program element 6.57.15.A and Congressional reductions of -3.0 million to Programwide Activities and -0.2 million for travel and overtime. The reduction in FY 1981 from program reflected in FY 1980 submission includes the following changes: (1) -5.2 million transferred to program element 6.58.98.A to reflect proper costing of Army Management Headquarters Activities; (2) realignment of base operations support costs at Natick R&D Command (+2.2 million) and Aberdeen Proving Ground (-2.9 million from Test and Evaluation Command to program element 6.58.04.A); (3) Civilian payraise (+2.3 million); (4) Inflation adjustment (+4.6 million) for other than civilian pay which includes support costs such as purchased base operations, supplies, minor construction, special purpose equipment, etc; and (5) reduction to the special purpose/automatic data processing equipment program due to budget constraints (-9.6 million).

E. (U) OTHER APPROPRIATION FUNDS: Not Applicable.

Program Element: #6.58.01.A
DOD Mission Area: #471 - General Management Support

Title: Programwide Activities
Budget Activity: #6 - Defensewide Support

F. (U) DETAILED BACKGROUND AND DESCRIPTION: This program includes four general categories: (1) Operation of those Research, Development, Test, and Evaluation Commands not designated as Army Management Headquarters Activities; (2) Logistical support activities at or associated with Research, Development, Test, and Evaluation Commands to include 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 ($100,000 ceiling) which are not identifiable to single R&D projects. Category (1) supports operation of the Army Medical R&D Command, Corps of Engineers R&D Headquarters, US Army Test and Evaluation Command, Mobility Equipment Command, and Natick R&D Command; (2) includes logistical support at the US Army Materiel Development and Readiness Command and subordinate R&D command headquarters; support of Standardization Groups in Australia, Canada, and the United Kingdom; and reimbursement in support of utilities and maintenance provided to R&D commands 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.

G. (U) RELATED ACTIVITIES: Command headquarters perform staff management functions related to work performed by RDTE laboratories and test facilities.

H. (U) WORK PERFORMED BY: Subordinate commands and other activities of the US Army Materiel Development and Readiness Command, the US Army Medical R&D Command, and the Corps of Engineers R&D Headquarters.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: Provided funds for operation of US Army Test and Evaluation Command, USA Medical R&D Command, Corps of Engineers R&D Headquarters. Natick R&D Command, Mobility Equipment R&D Command, Army Research Office, and Standardization Groups (in Canada, Australia, and United Kingdom). Supported logistical and other support activities associated with operation of all R&D Commands to include reimbursement for base operations (facility) when RDTE headquarters are a tenant activity of another service or appropriation. Overall responsibility for this support becomes an RDTE-funded function upon establishment of separate R&D commands in accordance with the Army Materiel Acquisition Review Committee recommendations. Funds were also provided for procurement of special purpose and automatic data processing equipment needed by R&D laboratories for support of overall R&D projects (items not identifiable to specific projects). Minor construction projects (less than $100,000 associated with equipment installation, Environmental Protection Agency, and Occupational Safety and Health Act requirements were also supported within this program.

Program Element: #6.58.01.A Title: Programwide Activities
DOD Mission Area: #471 - General Management Support Budget Activity: #6 - Defensewide Support

2. (U) FY 1980 Program: Continue support of activities outlined in above paragraph (to include base operations/facility support for Commands). The FY 1980 program also reflects continued efforts to properly align R&D Command Headquarters functions between this program element and the 6.58.98.A Army Management Headquarters Activities.

3. (U) FY 1981 Planned Program: Continue support of activities outlined in above paragraphs. The FY 1981 program reflects realignment of base operations responsibilities at Natick R&D Command (to include overall base operations responsibility for all R&D activities on the installation) and for the Test and Evaluation Command (an R&D tenant for whom Aberdeen Proving Ground assumes responsiblity upon the OSD-direced decapitalization of the Aberdeen Army Industrial Fund). FY 1981 programing also includes minimal equipment required to maintain current R&D laboratory capabilities to support R&D missions.

4. (U) FY 1982 Planned Program: Continue support of RDTE activities outlined above.

5. (U) Program to Completion: This is a continuing program.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #MM88-01 Title: Command Headquarters Support
Program Element: #6.58.01.A Title: Programwide Activites
DOD Mission Area: #471 - General Management Support Budget Activity: #6 - Defensewide Mission Support

A. (U) DETAILED BACKGROUND AND DESCRIPTION: Resources programed in this project are required to fund logistic and other than Army Management Headquarters Activities for operation of or direct support to 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 for Army Management Headquarters activities. These personnel perform operational and management functions at RDTE commands not identified as Army Management Headquarters, and base operations/logistic support functions at all RDTE commands (e.g., data processing, security, legal, safety, clerical, and finance and accounting). The Army Materiel Acquisition Review Committee realignment of US Army Materiel Development and Readiness Command 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 overall Army funding availability.

B. (U) RELATED ACTIVITIES: Logistical functions funded in this project are in direct support of RDTE Army Management Headquarters Activities (see program element 6.58.98.A). Headquarters funded in this project perform staff management functions for work performed by RDTE laboratories and test facilities.

C. (U) WORK PERFORMED BY: Activities assigned to the US Army Materiel Development and Readiness Command, Headquarters and subordinate RDTE commands, US Army Medical R&D Command, and Corps of Engineers R&D Headquarters.

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: Provided support for logistical functions associated with US Army Materiel Development and Readiness Command Headquarters and subordinate R&D Army Management Headquarters, operation of and logistical support to US Army Test and Evaluation Command, Natick R&D Command, Mobility Equipment R&D Command, US Army Medical R&D Command, and Corps of Engineers R&D Headquarters. This includes salaries and benefits for authorized civilian personnel and related operating costs (e.g., travel, supplies and equipment), as well as base operations and other support costs reimbursed to other appropriations or Army Industrial Fund under host-tenant agreements and/or regulations. R&D Army Management Headquarters which are furnished logistic and other support services in this project include US Army Materiel Development and Readiness Command Headquarters, Armament R&D Command, Aviation R&D Command, Missile R&D Command, Tank Automotive R&D Command, Communications R&D Command, and Electronics R&D Command.

Project: #MM88-01 Title: Command Headquarters Support
Program Element: #6.58.01.A Title: Programwide Activites
DOD Mission Area: #471 - General Management Support Budget Activity: #6 - Defensewide Mission Support

2. (U) FY 1980 Program: Resources have been programed for: (1) Annual costs for operation of and logistical support to RDTE commands which are not designated as Army Management Headquarters Activities listed in above paragraph, and (2) for annual logistic/base operations support costs for support of DARCOM Headquarters and the six subordinate R&D Commands designated as Army Management Headquarters Activities.

3. (U) FY 1981 Planned Program: Continued support of RDTE activities outlined above.

4. (U) FY 1982 Planned Program: Continued support of RDTE activities outlined above.

5. (U) Program to Completion: This is a continuing program.

6. (U) Major Milestones: Not Applicable.

7. (U) Resources ($ in thousands):

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	37169	43612	43206	44588	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	35380	43424	43860	-	Continuing	Not Applicable

The increase in FY 1979 is associated with additional man-years for authorized civilian personnel. The FY 1979 request reflected in the FY 1980 submission was based on the assumption that realignment of R&D commands (mission and functions transfers, reassignments, and relocations), as a result of approved Army Materiel Acquisition Review Committee recommendations, would not be completed until late in FY 1979. Earlier completion of these actions resulted in additional man-years and costs in this project. The total increase reflects +1.4 million reprogramed from the equipment project within this program element and a +0.5 million for proper costing of the Corps of Engineers R&D Headquarters. Minor change in FY 1980 reflects up-to-date average salary costs and minor intra-appropriation functional changes. FY 1981 change is the combination of civilian pay raise (+2.3 million), base operations responsibility realignments (-0.7 million), further realignment of Army Management Headquarters Activities between this program element and 6.58.98 (-5.2 million), and inflation adjustment for nonpersonnel costs (+3.0 million).

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #MM88-03 Title: Special Purpose and Automatic Data Processing Equipment
Program Element: #6.58.01.A Title: Programwide Activities
DOD Mission Area: #471 - General Management Support Budget Activity: #6 - Defensewide Mission Support

A. (U) 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 and not identified to a single RDTE project. Included in this program is the acquisition of Automatic Data Processing and Special Purpose Equipment including replacement or modification of equipment required to maintain and perpetuate state-of-the-art capabilities in R&D 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 inventory in other laboratories; 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 multipurpose scientific and technical RDTE laboratory equipment which supports more than one R&D project.

B. (U) RELATED ACTIVITIES: Not Applicable.

C. (U) WORK PERFORMED BY: RDTE Army laboratories and facilities of the US Army Materiel Development and Readiness Command, US Army Medical R&D Command, and the Corps of Engineers R&D Headquarters.

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: Provided funding for special purpose and automatic data processing equipment as outlined in paragraph A above. FY 1979 funds basically supported continuing contracts (such as ongoing equipment rentals) and emergency repairs to aging equipment items.

2. (U) FY 1980 Program: Supports ongoing contractual costs and emergency repair of special purpose and automatic data processing equipment essential to continuance of day-to-day laboratory operations.

3. (U) FY 1981 Planned Program: Supports initial increment of equipment replacement in a phased plan to restore state-of-the-art capabilities in R&D laboratory facilities. In addition to emergency replacement as required of obsolete and/or inoperable equipment items, programed purchases include numerous low-dollar-value laboratory and scientific equipment items such as image display systems, calibration sensors, cameras, analyzing units, memory oscilloscopes, signal amplifiers, photo analyzers, diazo machines, signal monitoring systems, environmental testing apparatus, microscopes, chromatographs, spectrophotometers, fluorometers, colorimeters, simulators, and other specialized engineer, scientific, and medical equipment

Project: MM88-03 Title: Special Purpose and Automatic Data Processing Equipment
Program Element: #6.58.01.A Title: Programwide Activities
DOD Mission Area: #471 - General Management Support Budget Activity: #6 - Defensewide Mission Support

items. Program also includes upgrading tactical digital computers at the Missile Systems Tactical Software Center, the U1106 Computer System at Natick Laboratories and minor amounts for increasing automatic data processing equipment capabilities at Harry Diamond Laboratory, Ballistics Research Laboratory, and Mobility Equipment Research facilities.

4. (U) FY 1982 Planned Program: Supports continuation of the special purpose and automatic data processing equipment program outlined in paragraph 3, above.

5. (U) Program to Completion: This is a continuing program.

6. (U) Major Milestones: Not Applicable.

7. (U) Resources ($ in thousands):

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	2541	1831	10827	10889	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	5546	4831	19237	-	Continuing	Not Applicable

The decrease in FY 1979 results from necessary transfers for support of authorized/assigned civilian personnel (-1.4 million to program element 6.58.98.A for Army Management Headquarters Activities and -1.6 million to project MM88-01 within this program element). FY 1980 reduction represents Congressional reduction of -3.0 million to overall Programwide Activities (which had to be applied to this project since all other projects in this program element are for civilian pay and other fixed costs such as facility operation and maintenance). Reduction for FY 1981 represents maximum which could be programed for equipment repair/-replacement/modernization within the Army's funding constraints. Increased programing for FY 1981 over FY 1980 reflects reinstatement of a phased program for replacement of obsolete outdated equipment in R&D laboratories. (Reduced funding levels in FY 1979 and FY 1980 precluded support for this purpose.) The major percentage of the equipment inventory was purchased during FY 1950-60, and phased replacement/modernization is essential for continued state-of-the-art support to R&D missions.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.58.02.A Title: International Cooperative Research and Development
DOD Mission Area: #460 - International Cooperative RDT&E Budget Activity: #6-Defensewide Mission Support

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional To Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	600	600			Continuing	Not Applicable
M798	International Cooperative Research and Development	600	600			Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Covers exchange of research and development technology with selected US Allies to reduce duplicative efforts and costs through data exchange agreements and multinational forums, e.g., North Atlantic Treaty Organization (NATO) and American, British, Canadian, and Australian (ABCA) Standardization Program.

C. (U) BASIS FOR FY 1981 RDTE REQUEST: This program supports travel, US share of the NATO Industrial Advisory Group (NIAG) and other minor costs associated with international exchange of technology (e.g., negotiation of cooperative research and development projects). US cost share of cooperative projects is borne by applicable Research, Development, Test, and Evaluation program elements.

D. BASIS FOR CHANGE BETWEEN FY 1981 and FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1979	FY 1980	FY 1981	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	600	600		Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	600	600		Continuing	Not Applicable

Program Element: #6.58.02.A Title: International Cooperative Research and Development
DOD Mission Area: #460 - International Cooperative RDT&E Budget Activity: #6-Defensewide Mission Support

Difference in FY 1981 is the result of increased travel costs since last year. This difference stems primarily from inflation as reflected in higher fuel costs on transportation, lodging, and commensurate per diem increases.

E. (U) OTHER APPROPRIATION FUNDS: Not applicable

Program Element: #6.58.02.A Title: International Cooperative Research and Development
DOD Mission Area: #460 - International Cooperative RDT&E Budget Activity: #6 Defensewide Mission Support

F. (U) DETAILED BACKGROUND AND DESCRIPTION: Program provides for the exchange of research and development technology to reduce duplication of efforts, thereby lowering costs. Through these exchanges, cooperative research and development projects are identified, negotiated, initiated, and completed. In addition to reducing participant costs, cooperative projects promote equipment standardization and interoperability. Technology exchanges and cooperative project negotiations take place through 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. This program also defrays the US share for the NATO Industrial Advisory Group (NIAG) travel and other costs, (e.g., feasibility studies associated with that group's exploration of potential cooperative projects). US share of cooperative venture costs is charged to applicable Research, Development, Test, and Evaluation program elements.

G. (U) RELATED ACTIVITIES: This program 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 comparable NATO systems. This program provides the base data which identify NATO equipment that should be evaluated. To preclude duplication of information exchange programs between the Army, Navy, and Air Force, interservice coordination is carried out for each new program. Many exchange programs become bi-Service or tri-Service, thus enhancing standardization and assuring maximum dissemination of technology.

H. (U) WORK PERFORMED BY: US Army Materiel Development and Readiness Command, Corps of Engineers, the Surgeon General, and the Army Training and Doctrine Command are principal agencies involved. Army military and civilian personnel from these agencies, having specific research and development responsibilities, attend international meetings and forums to discuss ongoing and possible future projects.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: In 1979, the United States, the United Kingdom, the Federal Republic of Germany, and France signed a Memorandum of Understanding (MOU) for a Cooperative Program for the Multiple-Launch Rocket System. The purpose is to achieve a required operational capability without costly duplicative development programs. The goals are common logistic and support concepts, coproduction, and future product improvement. Other accomplishments were: coordination of British L16A1 mortar testing for possible Army purchase; an MOU with the Federal Republic of Germany on component standardization between the American XM1 and the German Leopard II tanks; US participation in NATO testing to select a second standard small arms cartridge; completion of joint testing on the French/German designed ROLAND; and establishment of multinational requirements for a future family of gap-crossing equipment. Coordination of US Army participation in NATO research and development activities continued.

Program Element: #6.58.02.A Title: International Cooperative Research and Development
DOD Mission Area: #460 - International Cooperative RDT&E Budget Activity: #6-Defensewide Mission Support

2. (U) FY 1980 Program: US participation in NATO will continue to emphasize standardization and interoperability of defense equipment. The United States will complete particpation in NATO testing for a second standard small arms cartridge. The United States will continue to work with the United Kingdom on Cannon-Launched Guided Weapons and Advanced Armored Vehicle Technology. As opportunities arise, the United States will negotiate agreements with other Allied countries. Established bi- and multi-lateral information exchange programs will continue.

3. (U) FY 1981 Planned Program: Programs started in previous years will continue. The US plans to participate in feasibility studies with the United Kingdom, France, and the Federal Republic of Germany leading to development of next generation antitank guided missiles. Other new cooperative programs will be pursued as they are identified through information exchanges.

4. (U) FY 1982 Planned Program: Ongoing international programs will continue. Consistent with US Government policy on behalf of enhanced inter-NATO cooperation in the production and standardization of materiel, the Army will respond positively. To this end, US representation at interallied panels and conferences will continue. NATO long-term defense planning will also continue. As Department of Defense, Congressional, and NATO policies on standardization evolve, the program will be reoriented to reflect changes. It is expected that a growing awareness and concern for increased NATO combat efficiency will produce requirements for expanded Army involvement in International Cooperative Research & Development.

5. (U) Program to Completion: This is a continuing program.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.58.03.A
Title: Technical Information Activities
DOD Mission Area: #440 - Technical Integration/Studies and Analyses
Budget Activity: #6 - Defensewide Mission Support

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional To Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	3463	3915	4844	5716	Continuing	Not Applicable
MY11	Modernized Army Research & Development Information System (MARDIS) Support	491	500	815	653	Continuing	Not Applicable
MY29	Integrated Software	168	260	336	368	Continuing	Not Applicable
M367	Automated Engineering Document Preparation System	400	0	0	0	0	4647
M720	Technical Information Functional Activities	600	550	821	935	Continuing	Not Applicable
M728	Information Technology	490	1274	694	1128	Continuing	Not Applicable
M729	Symposia-Conferences	404	400	520	621	Continuing	Not Applicable
M761	Technical Information Analysis Centers	760	781	1080	1227	Continuing	Not Applicable
M903	Signals Intelligence/ Electronic Warfare Technical Information	150	150	578	784	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Current information access techniques are significantly behind the rapidly progressing state of the art. This element supports projects to improve the technical development and operation of the Army through scientific and technical information processes. It includes research, development, and test. Planning, execution, and efficiency of Army research and development (R&D) benefit through these organized efforts to continually improve accuracy, timeliness, availability, and accessibility of scientific, technical, and management information. Major continuing advances in these sciences are exploited to enable significant improvement in information exchange, to include information delivery to any point of inquiry from any source.

Program Element: #6.58.03.A
DOD Mission Area: #440 - Technical Integration/Studies and Analyses

Title: Technical Information Activities
Budget Activity: #6 - Defensewide Mission Support

C. (U) BASIS FOR FY 1981 RDTE REQUEST: Provide mechanism for integration of Army-wide efforts in computer software R&D, including automation security software development, and to increase exchange of software technical information. Support integration and coordination of Defense Technical Information Center input information on all Army research and development (R&D) by expanding interactive capability thus reducing man-hours required to update the data base and speeding up the process by eliminating, to a significant extent, reliance on hard copy input received through the mails. Support nationwide conference and symposia programs to include youth science activities. Provides limited support to seven specialized technical information analysis centers and for the Government/Industry Data Exchange Program (GIDEP). Continue development of specialized thesauri and required unique technical references of interest to Army laboratories/activities. Support digital processing of analog information such as drawings, X-rays, and pictures. Improve information transfer processes and preclude unnecessary expenditure of other funds by making maximum use of existing knowledge. Develop information technology modalities to improve the total health care delivery capability of the Army during periods of reduced medical staffing and for potential application to periods of mobilization. Provides minor support to develop technology transfer activity.

D. (U) BASIS FOR CHANGE BETWEEN FY 1981 and FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1979	FY 1980	FY 1981	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	3463	3915	4844	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	3559	4890	4899	Continuing	Not Applicable

(U) Compared to the FY 1980 submission, the FY 1979 (actual) figure reflects the effects of the following:

1. (U) MY11, MARDIS: increase due to additional costs associated with initiation of interactive capability (real-time on-line edit/update).

2. (U) MY29 Integrated Software: decrease due to minor reduction of effort to integrate computer software R&D and adjustments to reflect incremental funding policy.

Program Element: #6.58.03.A Title: Technical Information Activities
DOD Mission Area: #440 - Technical Integration/Studies and Analyses Budget Activity: #6 - Defensewide Mission Support

(U) FY 1980 estimate is decreased as a result of a Congressional reduction. The FY 1981 estimate is reduced as a result of elimination of several small, relatively low-priority projects in favor of higher-priority requirements which are applications-oriented:

1. (U) MY11, MARDIS: increase due to fielding interactive capability.

2. (U) MY29 Integrated Software: increase to support expanding Army Automation Security program.

3. (U) M728 Information Technology: program reduced to insure support of more applications-oriented work in other projects of higher priority.

4. (U) M729 Symposia-Conferences: increase due to inflation.

5. (U) M903 Signals Intelligence/EW Tech Info: increase due to expansion of requirements for support of the SI/EW mission.

E. (U) OTHER APPROPRIATION FUNDS: Not Applicable

Program Element: #6.58.03.A
Title: Technical Information Activities
DOD Mission Area: #440 - Technical Integration/Studies and Analyses
Budget Activity: #6 - Defensewide Mission Support

F. (U) DETAILED BACKGROUND AND DESCRIPTION: Objective number one is to improve scientific, technical, and related management information activities required for the support of the Army research and development (R&D) Program and to provide technical decisionmaking options. Includes the derivation, acquisition, analysis, interpretation, storage, retrieval, processing, forwarding, dissemination, primary and secondary publishing, and use of all classes of technical and management information needed by all Army technical professional personnel. Improves the relevance, accuracy, timeliness, and accessibility of technical information flowing to and from the Army. 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. Provides for active technology transfer. Objective number 2 is to coordinate research directed toward enhancement of the software R&D technology base using the DOD software R&D technology plan as a framework and giving full consideration to similar activity in industry, the academic community, and other services so as to obtain the greatest possible benefits from software R&D funds. Objective number 3 is to provide requisite R&D support for the design, installation and operations of a scientific and technical information system to support the Army Signals Warfare Laboratory. The information system is designed to insure that necessary state-of-the-art and related data are available to Project Managers/engineers, thus eliminating duplication of effort and obtaining the greatest possible output from R&D funds. Objective number 4 is to support: the biennial Army Science Conference of Army scientists and engineers at Army Laboratories; the Junior Science and Humanities Symposia (JSHS); participation in Regional, State and International Science and Engineering Fairs (ISEF) to encourage high school students to seek careers in science; and US participation in the international Mathematics Olympiad held annually. Objective number 5 is to strengthen the activities of existing DOD Technical Information Analysis Centers (TIAC's) operated by the Army and support new TIAC's and other information centers in critical defense areas.

G. (U) RELATED ACTIVITIES: The Army participates in input and output of the Defense Technical Information 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. Complements P.E. 6.27.25.A, Computer Information Sciences, and multiple projects related to applications of advanced software tools and techniques and to developing engineering software discipline.

H. (U) WORK PERFORMED BY: Applied Data Research Services, Inc., Vienna, VA; Academy of Applied Sciences, Boston, MA; Trought Association, Belleville, NJ; Tracor-Jitco, Rockville, MD; Library of Congress, Washington, DC; Harold Davidson, Inc., Fairfax, VA. Projects are monitored by Headquarters, US Army Materiel Develoment and Readiness Command, Directorate for Development and Engineering, located in Alexandria, VA.

Program Element: #6.58.03.A
Title: Technical Information Activities
DOD Mission Area: #440 - Technical Integration/Studies and Analyses
Budget Activity: #6 - Defensewide Mission Support

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: Software research integration efforts produced improved techniques for multicommand data systems, including system simulation and modeling, computer system evaluation, interactive programming, and regional data processing; improvements were achieved in automated chemical information; conference and symposia programs for information exchange and Junior Science and Humanities Symposia and Science Fair programs were conducted; remote computer terminals were installed to increase access to field research and development (R&D) management information and also to provide direct access to the Defense Technical Information Center; automated procedures were developed for technical information analysis centers, interlibrary reference systems, and computer-aided selection of materials. Seven technical information analysis centers were operated. A cooperative effort was conducted with the Department of Commerce to remotely access and share technical information between widely separated libraries by techniques of slow scan television, telemetry, and cathode ray tube display. A technique was developed to remotely provide medical diagnostic information by converting analog data (e.g., X-rays) into digital data and forwarding the data over communications lines. Computer analog information compression techniques to conserve storage requirements were developed.

2. (U) FY 1980 Program: Continue to improve the Army scientific and technical information (STINFO) program, integrating individual task efforts (e.g., converting dialogue and graphic information into digital format) into total program needs. Continue coordination of R&D in computer software and centralization of computer program information. Continue conference and symposia program for technical information exchange and support for youth science information activities. Support the Government/Industry Data Exchange Program. Develop specialized bibliographies and glossaries and techniques for computer handling of materials information. Provide timely, accurate computer-generated data for R&D program management. Automate information access to technical information centers. Support Army Technical Information Analysis Centers and trial operation of proposed centers; and develop technical information for the specialized needs of the Army intelligence community. Continue operation and maintenance of the Modernized Army R&D Information System (MARDIS). Establish test facility and develop pilot research effort to improve Army health care capability through access to medical technical information.

3. (U) FY 1981 Planned Program: Resource information for all levels of R&D management will continue to be improved by automation. MARDIS will provide improved support of budget formulation, scheduling and apportionment processes through processing of resources, performance and milestone data. A practical system for the digital storage of drawings will be completed. Technical exchange activities in projects M729, M761, and M903 will expand. These will include trial support to an additional technical information analysis center, improving information access to signal intelligence information, and efforts to more closely integrate the management of STINFO through development of an Army-wide Technical Information Management Plan.

Program Element: #6.58.03.A Title: Technical Information Activities
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Implementation of the Technical Informati Management Plan will begin. Emphasis on medical technical information to improve health care and extend physician coverage will continue, to include remote information access, teleradiology, and teleconferencing for medical diagnostics.

4. (U) FY 1982 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. (U) Program to Completion: This is a continuing program.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.58.04.A

Title: US Army Materiel Development and Readiness Command (DARCOM) Ranges/Test Facilities

DOD Mission Area: #451 - Major Ranges and Test Facilities

Budget Activity: #6 - Defensewide Mission Support

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional To Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	171411	180264	245514	282810	Continuing	Not Applicable
DE90	Yuma Proving Ground	18521	18223	28300	27060	Continuing	Not Applicable
DE91	Aberdeen Proving Ground	21152	23297	49600	54598	Continuing	Not Applicable
DE92	Dugway Proving Ground	12188	12558	18900	22265	Continuing	Not Applicable
DE93	White Sands Missile Range	103885	108640	127400	152461	Continuing	Not Applicable
DE94	Army Electronic Proving Ground	9020	10267	13200	17016	Continuing	Not Applicable
DE95	Cold Regions Test Center	4082	4364	4964	5938	Continuing	Not Applicable
DE96	Tropic Test Center	2563	2915	3150	3472	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The Army modernization program calls for the development and fielding of many new weapon systems. The objective of this program element 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. 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 and tactical vehicles. 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 identified with a particular weapon system project. This includes modernization of instrumentation to insure that test capabilities are commensurate with the state-of-the-art systems to be tested. For example, one-quarter of the FY 1981 increase is for the development of a High Energy Laser System Test Facility at White Sands Missile Range to support the testing of all laser systems in the Department of Defense. Test support costs are also growing due to the increased test workload which is a result of the numerous complex weapon systems currently being developed and tested. Additionally, in FY 1981, funds from 47 tenant units will be transferred to Aberdeen Proving Ground to consolidate base operations at this Research, Development, Test and Evaluation (RDTE) facility. These transferred funds amount to one-third of the entire program's FY 1981 increase over FY 1980.

Program Element: #6.58.04.A Title: US Army Materiel Development and Readiness Command (DARCOM) Ranges/Test Facilities

DOD Mission Area: #451 - Major Ranges and Test Facilities Budget Activity: #6 - Defensewide Mission Support

C. (U) BASIS FOR FY 1981 RDTE REQUEST: Each facility will plan, conduct, and support development tests, 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 intelligence/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 obsolete equipment which is uneconomical to repair. A major effort to reduce the test workload backlog at the test facilities will be accomplished through contract augmentation of in-house capabilities. The DOD High Energy Laser Systems Test Facility will be instrumented and operated in preparation for the US Navy's SEALITE program.

D. (U) BASIS FOR CHANGE BETWEEN FY 1981 and FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1979	FY 1980	FY 1981	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	171411	180264	245514	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	169808	182141	192187	Continuing	Not Applicable

The current FY 1979 estimate is increased compared to last year's estimate to support the testing of the Advanced Attack Helicopter at Yuma Proving Ground. The FY 1980 estimate is decreased as a result of directed reductions in travel and overtime. The current FY 1981 estimate is increased compared to last year's, in part, because $18.3 million will be transferred to this project from 47 other projects to consolidate base operations cost for all tenant units at Aberdeen Proving Ground. The remainder of the increase provides for the development of the Department of Defense (DOD) High Energy Laser Systems Test Facility ($15.6 million) at White Sands Missile Range, the initiation of contract augmentation to reduce the test workload backlog ($7.5 million), a modest increase in the improvement and modernization of the test facilities, and for the reduction of the backlog of maintenance and repair.

Program Element: #6.58.04.A Title: US Army Materiel Development and Readiness Command (DARCOM) Ranges/Test Facilities

DOD Mission Area: #451 - Major Ranges and Test Facilities Budget Activity: #6 - Defensewide Mission Support

E. (U) OTHER APPROPRIATION FUNDS ($ in thousands)

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated
Military Construction, Army						
Funds (current requirements)	0	4050*	4718	0	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	216	15598	13320	Not Shown	Continuing	Not Applicable

FY 1980 and FY 1981 estimates are decreased compared to last year's estimate because funds are required for higher priority projects.

*In addition to the MCA funds, $37,449 thousand are programmed in FY 1980, under Title IV (Construction of Defense Agencies Facilities), for the construction of the Department of Defense (DOD) High Energy Laser System Test Facility.

Program Element: #6.58.04.A Title: US Army Materiel Development and Readiness Command (DARCOM) Ranges/Test Facilities

DOD Mission Area: #451 - Major Ranges and Test Facilities Budget Activity: #6 - Defensewide Mission Support

F. (U) 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). DT is conducted to support decisionmaking 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 specifications. 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 being 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 users of these facilities to pay for the 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 (CRTC) was known as the Arctic Test Center. The Tropic Test Center, Ft Clayton, Canal Zone, is the only humid tropic environmental test facility in the Department of Defense (DOD). TECOM has a third natural environmental test facility, Yuma Proving Ground, used for the conduct of desert environmental tests.

G. (U) RELATED ACTIVITIES: These seven test facilities plus 19 other Army, Navy, and Air Force test facilities make up the DOD Major Range and Test Facility Base. Two other Army facilities are included in the 19: Kwajalein Missile Range, financed by PE 6.53.01.A and Jefferson Proving Ground, which is not financed by the RDTE appropriations. This program, with its emphasis on testing, is related to the activities of other Army test facilities, 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 DOD 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.

H. (U) WORK PERFORMED BY: The work is primarily performed by in-house personnel (civilian and military) assigned to the US Army Test and Evaluation Command (TECOM). Approximately 35 million dollars of contractor effort was expended in FY 1978. Contractors included: Hawthorne Aviation, Charleston, SC; Bell Aerospace Company, Tucson, AZ; Dynalectron, Albuquerque, NM; RCA, Moorestown, NJ; Physical Sciences Laboratory, New Mexico University. Las Cruces, NM; International Sensor Systems, Aurora, NE; IBM, Oswego, NY; Lockheed Engineering Services Division, Houston, TX; and Vega Enterprises, El Paso, TX. Other government

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agencies that are involved include: US Army Research Office, Durham, NC; US Army Corps of Engineers, Albuquerque, NM; Lexington Army Depot, Lexington, KY; US Air Force Special Weapons Test Center, Kirtland and Holloman Air Force Bases, NM; National Bureau of Standards, Washington, DC, Navajo Army Depot, Flagstaff, AZ; and US Forces Command, Ft McPherson, GA.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: Testing was carried out to support decisionmaking on important Army developmental systems. Examples are: XM1 Tank; Improved HAWK, PATRIOT, ROLAND, LANCE, STINGER, and PERSHING Missile Systems; BLACKHAWK helicopter; CH-47 helicopter modernization; Attack Helicopters; CHAPARRAL air defense gun; 105mm, 155mm and 8" howitzers; Mortar Locating Radar; Tactical Satellite Communications; Tactical Landing System; Tactical Fire Direction System; biological protection equipment and shelters; chemical binary projectiles; smoke projectiles; and incendiary rockets. Natural cold weather and humid tropic climate tests were conducted on equipment such as COPPERHEAD (Cannon Launched Guided Projectile), TOW and DRAGON (Antitank Assault Weapons), Ultra High Frequency Satellite Communications Ground Terminal, Hand-Held Laser Rangefinder, 105mm 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, Collapsible Fabric POL Tank, Squad Automatic Weapon, Tactical CS Rocket, and Smoke Warhead Rocket. 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). Maintenance and repair of test facilities fell drastically behind due to austere funding levels in early years and the urgent need to modernize the facilities to keep pace with technology of the systems being tested; only critical repairs dictated by safety or legal requirements could be accomplished creating a huge backlog of long overdue essential maintenance and repair of facilities. A modest amount of instrumentation was procured and examples are noted in individual Congressional Descriptive Summaries for each proving ground or range.

2. (U) FY 1980 Program: FY 1980 funding was increased approximately 7% compared to FY 1979. Some of this increase was for inflation. A small provision ($180 thousand) was also made in FY 1980 to rebuild Tropic Test Center ranges and storage facilities and to move instrumentation, as a result of the Panama Canal Treaty requirement to move out of Gamboa forest. In order to continue the modest instrumentation modernization made possible in FY 1979, to provide instrumentation for a new high energy laser system test facility at White Sands Missile Range and for the testing of tactical signal intelligence/electronic warfare equipment at Army Electronic Proving Ground, and to provide for cost growth, the backlog of essential maintenance and

Program Element: #6.58.04.A Title: US Army Materiel Development and Readiness Command (DARCOM) Ranges/Test Facilities

DOD Mission Area: #451 - Major Ranges and Test Facilities Budget Activity: #6 - Defensewide Mission Support

repair of facilities has been permitted to increase. 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, the test workload has grown because the increased complexity of items being tested requires more data to determine acceptable risks. This increase in workload has been partially accommodated through improved efficiency and increased productivity; however, some test slippages will continue. 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.

3. (U) FY 1981 Planned Program: The projected workload exceeds test capability. This will be accommodated through the contract augmentation of testing capability in order to reduce the test workload backlog to a manageable level, eliminate test slippages and reduce developmental costs. Scheduled test projects include: General Support Rocket System, PATRIOT Missile Storage Reliability Program, CHAPARRAL and ROLAND II Medium-Range Air Defense Missiles, STINGER System Passive Optical Seeker, Short-Range Attack Missile, XM1 tank, Infantry Fighting Vehicle, Cavalry Fighting Vehicle, and Navy and Air Force air weapons testing. Improvement and modernization of testing capability will emphasize acquisition of instrumentation to alleviate the excess workload problem, 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 lower costs. A modest reduction is programed in the backlog of essential maintenance and repair of test facilities.

4. (U) FY 1982 Planned Program: The test facilities will continue to provide test and evaluation services to support automotive, missile, and other system development including the high energy laser program. Projected workload in FY 1982 will remain comparable to prior year levels and, therefore, will continue to exceed available capability. Major tests planned include: General Support Rocket Systems, Infantry and Cavalry Fighting Vehicles, ROLAND II Medium Air Defense System, Division Air Defense Gun System, Antiradiation Weapons System, and Navy and Air Force Air Weapons Testing. The improvement and modernization program will provide instrumentation to support the High Energy Laser System Test Facility, environmental test areas, and completion of the surveillance radar program.

5. (U) Program to Completion: This is a continuing program.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #DE90 Title: Yuma Proving Ground

Program Element: #6.58.04.A Title: US Army Materiel Development and Readiness Command (DARCOM) Ranges/Test Facilities

DOD Mission Area: #451 - Major Ranges and Test Facilities Budget Activity: #6 - Defensewide Mission Support

A. (U) DETAILED BACKGROUND AND DESCRIPTION: Yuma Proving Ground (YPG) is one of the ranges of the Department of Defense (DOD) Major Range and Test Facility Base. Its assigned mission is to plan, conduct, evaluate, report on, and support developmental and other tests of aircraft armament, long-range artillery, and air delivery and mobility systems. YPG also conducts natural desert environmental tests and provides personnel, when required, to support arctic environmental tests at the US Army Cold Regions Test Center, Fort Greely, AK, as directed by HQ, US Army Test and Evaluation Command (TECOM). It's land area comprises more than 1 million acres with restricted airspace ranging from the surface to 80,000 feet. Major facilities include a 420,000 acre artillery firing range with 21 firing positions and a 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 mobility test areas comprising 78,000 acres including gravel, hill, sand, and rock courses, test slopes of varying grades, swimming and fording facilities and a two-mile dynamometer course. 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, all of which are sensitive to inflation.

B. (U) RELATED ACTIVITIES: Project DE90 is one of seven projects comprising Program Element (PE) 6.58.04.A. These Projects are managed by the US Army Test and Evaluation Command to preclude duplication. Four of the other projects finance costs at White Sands Missile Range, NM; the Army Electronic Proving Ground, Ft Huachuca, AZ; Dugway Proving Ground, UT; and Aberdeen Proving Ground, MD. These four installations/activities, YPG, and 13 other DOD test and evaluation facilities operate under a uniform funding policy within the DOD Major Range and Test Facility Base. Under this policy, the facilities finance all indirect testing costs with the users or test proponents at these facilities paying all direct testing costs. YPG, the US Army's desert climatic test center, is one of the three Army installations/activities 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 (direct and indirect costs) wherein testing services are provided to users on a nonreimbursable basis.

C. (U) WORK PERFORMED BY: Work is performed by Department of the Army civilian and military personnel with associated contractual support. Telecommunications services are provided by the US Army Communications Command, Ft Huachuca, AZ. Navajo Army Depot, Flagstaff, AZ, provides ammunition storage support.

Project: #DE90
Program Element: #6.58.04.A

Title: Yuma Proving Ground
Title: US Army Materiel Development and Readiness Command (DARCOM) Ranges/Test Facilities

DOD Mission Area: #451 - Major Ranges and Test Facilities

Budget Activity: #6 - Defen wide Mission Support

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: Yuma Proving Ground (YPG) has developed a highly sophisticated range capability with real-time multi-target space position capability. Instrumentation includes 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 network, which gives YPG a unique capability for testing Army aircraft armament and artillery weapons. During FY79, YPG completed 136 tests: 56 R&D, 32 production and post production, 23 product improvement and malfunction investigations, and 25 others. Actual performance was 675,000 direct labor hours. Major tests of equipment and systems included: enhanced COBRA armament system; improved conventional munitions and projectiles for 8-inch and 155mm weapon systems; improved TOW vehicle; BUSHMASTER; Surface Launched Unit-Fuel Air Explosive (SLUFAE); Armored Personnel Carrier (M113A1E1); XM1 Tank; personnel, equipment, and supply drop systems; and acceptance testing of 105mm tank cartridge components.

2. (U) FY 1980 Program: Workload is projected at 1,281,000 direct labor hours, an increase of 90 percent over FY 1979 actual performance. The in-house capability will be increased through the initiation of the US Army Test and Evaluation Command's (TECOM) Contract Augmentation Plan. Augmentation, not replacement of testing capability, will reduce the test workload backlog to a manageable level, eliminate most test slippages, and prevent growth in developmental costs. The first major project to be tested under this plan will be the Advanced Attack Helicopter. Other projects scheduled for tests at Yuma include AN/USD-502 Long Range Surveillance System; Joint Global Positioning System; conventional and nuclear munitions (including projectiles and fuzes) for 8-inch and 155mm weapon systems; acceptance of 105mm tank ammunition components; and surveillance/storage tests for antitank and air defense missiles. Improvement and modernization of instrumentation includes completion of Range Command and Control System, Calibration and Support System, and Data Display Network; expansion of graphic display capability, and procurement of radar chronographs to eliminate labor intensive use of velocity coils for muzzle velocity measurement.

3. (U) FY 1981 Planned Program: The projected FY 1981 workload for Yuma exceeds the personnel capability by more than 100%. The in-house capability will be increased through the expansion of the contractor augmentation plan initiated in FY 1980. The planned augmentation will increase the testing capability by 40%. Lower priority system testing, nevertheless, will be delayed unless borrowed labor and overtime can further reduce the overload. Scheduled tests include interim high altitude airdrop resupply system; Long Range Surveillance System; Advanced Attack Helicopter; Ultra High Level Container Airdrop System;

Project: #DE90 Title: Yuma Proving Ground
Program Element: #6.58.04.A Title: US Army Materiel Development and Readiness Command (DARCOM) Ranges/Test Facilities
DOD Mission Area: #451 - Major Ranges and Test Facilities Budget Activity: #6 - Defensewide Mission Support

ammunition acceptance, renovation, and product improvement; and storage and surveillance tests of SHILLELAGH, DRAGON and TOW anti-tank missiles and STINGER and PATRIOT air defense missiles. In past years, maintenance and repair of the test facility along with improvement and modernization have been curtailed due to new higher priority requirements. The FY 1981 program will increase workload capacity, constrain further deterioration of the facility and modernize the testing capability through the acquisition of test instrumentation commensurate with weapon system development. In FY 1981, YPG will also convert about 70 military spaces (Military Police) to civilian equivalents funded by this project, DE90. A Commercial and Industrial Type Activities review, when completed, will determine whether contracting would be more effective than in-house civilian effort.

4. (U) FY 1982 Planned Program: Testing of Army materiel at YPG will continue within the limit of available funding. Workload will continue to exceed available capability. In-house expenditures will provide for maintenance of current in-house requirements. Contractual effort will continue to be required to augment in-house capability and reduce the gap between capability and workload. Major programs to be supported include High Survivability Test Vehicle; Random Time Delay Submunition Ammunition; Anti-Radiation Guided Projectile; Improved Conventional Mine System; and Global Positioning System.

5. (U) Program to Completion: This is a continuing program.

6. (U) Major Milestones: Not Applicable.

7. (U) Resources ($ in thousands):

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	18521	18223	28300	27060	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	15374	15441	19999	-	Continuing	Not Applicable

Other Appropriations: Not Applicable.

Project: #DE90
Program Element: #6.58.04.A

Title: Yuma Proving Ground
Title: US Army Materiel Development and Readiness Command (DARCOM) Ranges/Test Facilities

DOD Mission Area: #451 - Major Ranges and Test Facilities

Budget Activity: #6 - Defensewide Mission Support

The FY 1979 increase reflects the funding required to enable full support of Advanced Attack Helicopter testing. The FY 1981 increase is due to additional contract augmentation required to offset a large increase in workload ($1.9 million), the planned procurement of essential instrumentation ($4.4 million) and the repair of the test facility which is urgently required to prevent further deterioration at the proving ground ($2.0 million).

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #DE91 Title: Aberdeen Proving Ground
Program Element: #6.58.04.A Title: US Army Materiel Development and Readiness Command (DARCOM) Ranges/Test Facilities
DOD Mission Area: #451 - Major Ranges and Test Facilities Budget Activity: #6 - Defensewide Mission Support

A. (U) DETAILED BACKGROUND AND DESCRIPTION: Aberdeen Proving Ground (APG), MD, 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). The Materiel Test Directorate of APG has 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 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. This project has financed 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 instrumentation, base operations and test support. Effective in FY 1981, this project will also fund the base operations for the entire installation with funds being transferred from each tenant.

B. (U) RELATED ACTIVITIES: Project DE91 is one of seven projects that comprise Program Element (PE) 6.58.04.A. Four of the other projects finance DE90, Yuma Proving Ground, AZ; DE92, Dugway Proving Ground, UT; DE93, White Sands Missile Range, NM; and DE94, US Army Electronic Proving Ground, Ft Huachuca, AZ. These five test facilities plus 13 other test and evaluation facilities of the Department of Defense (DOD) operate under a uniform funding policy for test and evaluation services within the overall DOD Major Range and Test Facility Base. The other two projects in this element are the two environmental test centers, the Cold Regions (DE95) and Tropic (DE96) Test Centers, which are funded on a level-of-effort basis with testing services furnished on a non-reimbursable basis. The Office of the Under Secretary of Defense for Research and Engineering reviews management, operation and maintenance of all DOD 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.

C. (U) WORK PERFORMED BY: Work is performed by Department of the Army civilian and military personnel. Telecommunications services are provided by the US Army Communications Command, Ft Huachuca, AZ. Until FY80, only a small portion (about

Project: #DE91 Title: Aberdeen Proving Ground
Program Element: #6.58.04.A Title: US Army Materiel Development and Readiness Command (DARCOM) Ranges/Test Facilities
DOD Mission Area: #451 - Major Ranges and Test Facilities Budget Activity: #6 - Defensewide Mission Support

$400,000) of the Materiel Test Directorate's work was done by contractors; however, to cope with the test workload which exceeds capability by 65%, the US Army Test and Evaluation Command (TECOM) will initiate a contract augmentation plan in FY81 to augment (not replace) the in-house capability.

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: Prior accomplishments include: Testing of most current and recent Army Combat, Tactical and Support Vehicles on the Munson and Perryman automotive test courses, to include development and production testing of XM1 main battle tank; sophisticated, highly instrumented, ballistic testing of Army weapons and the families of munitions fired from them, including depleted uranium tank ammunition, improved field artillery and automatic cannon; 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. Three automotive test data terminals of the automatic data analysis and processing technique (ADAPT) system are installed and operating in conjunction with the central ADAPT computer. During FY79, the materiel testing directorate completed approximately 311 tests: 70 developmental, 128 production, and post production; 28 product improvement and malfunction investigations, and 85 other.

2. (U) FY 1980 Program: Projected workload of 1,911,000 direct labor hours exceeds FY 1979 performance by 57 percent and will cause delays in testing. Scheduled test projects included: Navy carrier survivability improvement; XM1 Tank System; 120mm Tank Gun integration, including testing of the 120mm tank gun, five different rounds of ammunition, and the tank/gun interface; XM2 Infantry Fighting Vehicle, and XM3 Cavalry Fighting Vehicle Systems; 75mm ammunition; High Mobility/Agility (HIMAG) Vehicle. Target enclosures for armor penetration testing of depleted uranium ammunition will be constructed. Four additional ADAPT terminals will be installed to support artillery testing. Instrumentation will be acquired that will provide data in digital format from vehicular tests of fire control systems, air defense systems, marine systems, and other equipment, the data being transmitted in the pulse code modulation 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 and small arms testing.

3. (U) FY 1981 Planned Program: The trend toward a very heavy test workload will continue in the area of new combat developments and munition testing. The projected workload will exceed personnel capability by 61 percent. This will be accommodated primarily through the contract augmentation of in-house capability, the use of overtime and borrowed military labor.

Project: #DE91 Title: Aberdeen Proving Ground
Program Element: #6.58.04.A Title: US Army Materiel Development and Readiness Command (DARCOM) Ranges/Test Facilities
DOD Mission Area: #451 - Major Ranges and Test Facilities Budget Activity: #6 - Defensewide Mission Support

Scheduled test projects include: continued development testing of XM1, 120mm gun and ammunition; Division Air Defense Gun; Ground Vehicle Dispensed Mine System; and combat vehicle armor and armament. Instrumentation will be acquired to support the automation of data acquisition and processing, air defense, combat fire control, weapons, munitions and automative testing. A modest reduction of the backlog of maintenance and repair is programed to constrain further deterioration of the test facility. In FY 1981, host support will be consolidated at Aberdeen as forty-seven tenant units/projects will transfer funds ($18.3 million) for base operations to the Proving Ground.

4. (U) FY 1982 Planned Program: Testing of the XM1, 120mm gun/munitions/vehicle interface will continue along with tests of the High Survival Tactical Vehicle, combat vehicle armament, mine systems, and silent power generating systems. In-house expenditures comprise civilian salaries, base operations support and other related in-house costs. Contractor effort will provide for the maintenance of instrumentation of facilities and an expansion of the augmentation of in-house testing capability.

5. (U) Program to Completion: This is a continuing program.

6. (U) Major Milestones: Not Applicable.

7. (U) Resources ($ in thousands):

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	21152	23297	49600	54598	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	21458	23450	23118	-	Continuing	Not Applicable

The FY 1979 decrease represents funds transferred to high priority major RDTE programs. For FY 1981, $18.3 million has been transferred to this project from 47 other projects to consolidate base operations costs. The remainder of the FY 1981 increase is for testing the 120mm gun for the XM1 tank and to provide increased contractor support to cope with the excess workload and to constrain further deterioration of the test facility.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #DE92 Title: Dugway Proving Ground
Program Element: #6.58.04.A Title: US Army Materiel Development and Readiness Command (DARCOM) Ranges/Test Facilities

DOD Mission Area: #451 - Major Ranges and Test Facilities Budget Activity: #6 - Defensewide Mission Support

A. (U) DETAILED BACKGROUND AND DESCRIPTION: Dugway Proving Ground (DPG), UT, 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). DPG 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 to provide overall battlefield obscurant/smoke testing support for Department of Defense (DOD) flame, incendiary, and smoke munitions systems and for other governmental agencies. Effective 1 July 1974, DPG was designated a major test facility within the DOD 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. This project finances indirect costs of testing and the costs of operating and maintaining the proving ground.

B. (U) RELATED ACTIVITIES: DPG is one of seven TECOM installations/activities in this program element. Four of the others also operate under the uniform DOD funding policy. These are: DE93, White Sands Missile Range, NM; DE90, Yuma Proving Ground, AZ; DE94, US Army Electronic Proving Ground, Ft Huachuca, AZ; and DE91, Aberdeen Proving Ground, MD. The other two projects are the Cold Regions (DE95) and Tropic (DE96) Test Centers which are funded on a level-of-effort basis wherein testing is conducted for users on a nonreimbursable basis. The Office of the Under Secretary of Defense for Research and Engineering reviews management, operation, and maintenance of all DOD 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.

C. (U) WORK PERFORMED BY: Test 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; International Business Machines (IBM), Oswego, NY; and Tri-State Maintenance (Janitorial), Salt Lake City, UT. Contractual support for FY 1981, including maintenance and repair of facilities and contract augmentation of testing capability, is estimated at $5,318,000.

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: Accomplishments included: demilitarization of chemical testing residue; on-site support in the conduct of Smoke Week; and testing of biological agent alarm, M51 Chemical/Biological Shelter System, 155mm smoke projectiles, binary projectiles, TOMAHAWK cruise missile for the US Navy, Remotely Piloted Vehicles for the US Air

Project: #DE92 Title: Dugway Proving Ground
Program Element: #6.58.04.A Title: US Army Materiel Development and Readiness Command (DARCOM) Ranges/Test Facilities
DOD Mission Area: #451 - Major Ranges and Test Facilities Budget Activity: #6 - Defensewide Mission Support

Force, and Insecticide Spray System for the US Forest Service. Investigations completed include: baseline ecological surveys of demilitarization and manufacturing sites; development of diffusion models and concepts; foreign biological threat and vulnerability assessments; and migration of hazardous substances through soil for the Evironmental Protection Agency. 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; and test data interface equipment. During FY 1979, Dugway Proving Ground (DPG) completed 46 tests: 8 research and development, 5 production, 4 product improvement, and 29 other.

2. (U) FY 1980 Program: Projected workload exceeds test capability by about 85%. This will be accommodated by a modest increase in contractor support, using overtime and deferring lower priority tests (increasing the test workload backlog). Modern instrumentation, requiring fewer personnel to operate and maintain, will continue to be procured to alleviate the excess workload problem in future years. Scheduled tests include: 155mm incapacitating projectile; soft ring airfoil projectile, XM742; lethal warhead for helicopter selective effects armament system; Deep Target Incapacitating Weapon; M43E1 Detector Units for M8 Chemical Agent Alarm; decontamination apparatus for vehicles. Investigations include: contingency disposal procedures for spray munitions, effects of environmental factors on biological decay, and technical assessment of foreign biological threats. Instrumentation acquisitions include an oven for decontamination of materiel exposed to chemical environments, improvement of the defensive test chamber for conducting inclosed chemical challenge tests of protective systems, and test data interface equipment.

3. (U) FY 1981 Planned Program: Projected test workload is increased by 35% compared to FY 1980 and is nearly 200% in excess of FY 1979 test capability. In order to prevent the test workload backlog from becoming unmanageable, to minimize the number of test slippages, and to prevent growth in development costs, DPG will sharply expand the contract augmentation of testing capability. In FY 1981, DPG will also convert about 50 military spaces serving base support functions (primarily motor pool and equipment maintenance) to civilian equivalents funded by this project, DE92. A Commercial Industrial-Type Activities review, when completed, will determine whether contracting is more effective than retention of these civilians in-house. Scheduled test projects include: 155mm smoke projectile, 155mm and 8-inch binary projectiles, jet exhaust-powered decontamination system, selective effects armament system, riot control convoy system, and detector kit for waterborne chemical agents. Support will be provided to the USAF Utah test and training range for the Air-Launched Cruise Missile and the US Navy TOMAHAWK Cruise Missile programs. Evaluations will include helicopter operation in a tropic environment, technical assessment of foreign biological threat, and development of automatic chemical analyzer Improvement and modernization will include automation

Project: #DE92 Title: Dugway Proving Ground
Program Element: #6.58.04.A Title: US Army Materiel Development and Readiness Command (DARCOM) Ranges/Test Facilities

DOD Mission Area: #451 - Major Ranges and Test Facilities Budget Activity: #6 - Defensewide Mission Support

enhancement of particulate and smoke testing capability and replacement of obsolete chemical, life sciences, photographic, and calibration equipment. Of all the test facilities, facility deterioration is taking its largest toll at Dugway; therefore, substantial effort will be devoted to maintenance and repair of the physical plant (e.g., plumbing, roads, parking lots, and exterior and interior painting of buildings).

4. (U) FY 1982 Planned Program: DPG will plan, conduct, evaluate, report on, and/or support developmental and other tests of chemical, biological defense, flame, smoke, and incendiary systems and materiel. The in-house testing capability will continue to be augmented through contracting. Efforts to prevent further deterioration of the facility will be increased, while improvement and modernization will provide for environmental chambers, upgrading of field data acquisition systems, and the enhancement of smoke test instrumentation thru acquisition of optical instrumentation.

5. (U) Program to Completion: This is a continuing program.

6. (U) Major Milestones: Not Applicable.

7. (U) Resources ($ in thousands):

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	12188	12558	18900	22265	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	12190	12640	14933	-	Continuing	Not Applicable

The FY 1980 decrease is a result of a general Congressional reduction. The FY 1981 increase reflects an increase in contract augmentation of test capability, a reduction in the backlog of maintenance and repair, modernization of the facility to establish a capability for testing commensurate with weapon system development, and conversion of military spaces to civilian equivalents.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #DE93 Title: White Sands Missile Range
Program Element: #6.58.04.A Title: US Army Materiel Development and Readiness Command (DARCOM) Ranges/Test Facilities
DOD Mission Area: #451 - Major Ranges and Test Facilities Budget Activity: #6 - Defensewide Mission Support

A. (U) DETAILED BACKGROUND AND DESCRIPTION: White Sands Missile Range (WSMR), NM, 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 to include Defense Advanced Research Projects Agency (DARPA), National Aeronautics and Space Administration (NASA), and Department of Energy (DOE). To meet increasingly complex and stringent range user requirements, a modernization program was recommended by the Army Scientific Advisory Panel and established in FY 1974 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 can be fired from off range launch sites such as Green River, UT, 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 mission to support high energy laser testing was assigned in FY 1976 and a tri-service High Energy Laser System Test Facility is being established at WSMR.

B. (U) RELATED ACTIVITIES: Project DE93 (WSMR) is one of seven projects comprising Program Element (PE) 6.58.04.A. Four of these projects finance DE90, Yuma Proving Ground, AZ; DE91, Aberdeen Proving Ground, MD; DE92, Dugway Proving Ground, UT; and DE94, Army Electronic Proving Ground, Ft Huachuca, AZ. These four test facilities, WSMR, plus 13 other test and evaluation facilities of the Department of Defense (DOD) operate under a uniform funding policy within the overall Major Range and Test Facility Base of the Department of Defense. WSMR is one of two national ranges managed by the Army, the other being Kwajalein Missile Range (KMR), PE 6.53.01.A. There is close and continuous coordination between WSMR, other national ranges, other service test and evaluation activities, and developing agencies to insure optimum support to all DOD programs and to avoid duplication and inefficiency. The Cold Regions Test Center (DE95) and Tropic Test Center (DE96), the remaining two facilities in PE 6.58.04.A, are funded on a level of effort basis wherein they perform testing services on a nonreimbursable basis.

C. (U) WORK PERFORMED BY: Contract support to WSMR will total approximately $27 million during FY 1981. 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

Project: #DE93 Title: White Sands Missile Range
Program Element: #6.58.04.A Title: US Army Materiel Development and Readiness Command (DARCOM) Ranges/Test Facilities

DOD Mission Area: #451 - Major Ranges and Test Facilities Budget Activity: #6 - Defensewide Mission Support

Special Weapons Test Center, Kirkland and Holloman Air Force Bases, NM; and Department of Commerce, National Bureau of Standards, Washington, DC.

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: White Sands Missile Range (WSMR) supported Department of Defense (DOD) and National Aeronautics and Space Administration (NASA) programs providing test and evaluation services to developers of missile and related systems. Major test projects included PATRIOT Air Defense System; PERSHING 11 and LANCE Ground-to-Ground Missile Systems; HAWK and US ROLAND Mid-Range Air Defense Missiles; CHAPARRAL and STINGER Short-Range Air Defense Missile Systems; Tactical Fire Direction System (TACFIRE); COPPERHEAD Cannon-Launched Guided Projectile; Nuclear Weapons Effects Program; Navy TOMAHAWK Cruise Missile; Navy Air Weapons; and NASA Space Shuttle. Major improvements and modernization procurement actions included equipment for the High Energy Laser System Test Facility, Distant Object Attitude Measurement System, cinetheodolite and camera modernization, and Drone Formation Control System. During FY 1979 WSMR completed 67 tests: 20 Research, Development, Test and Evaluation (RDTE), 13 production/post production, 5 product improvement, and 29 other.

2. (U) FY 1980 Program: Major projects include: Nuclear weapons effects program, General Support Rocket System, PERSHING II Ground-To-Ground Missile, CHAPARRAL and STINGER Short Range Air Defense Missiles, HAWK and ROLAND II Mid-Range Air Defense Missiles, PATRIOT Air Defense System, Air Force High Energy Laser Radar Acquisition and Tracking System, Air Force Radar Bomb Scoring System, and Navy and Air Force weapons. Instrumentation improvement and modernization procurements include equipment for the High Energy Laser System Test Facility, initiation of Environmental Test Area project, Radio Frequency Generation Equipment, completion of Drone Control/Project, Climatic Test Equipment, and Telemetry Tracking System modernization.

3. (U) FY 1981 Planned Program: Projected workload exceeds projected capability by approximately 33%. This will be accommodated primarily by increasing contractor support and using overtime. Modern instrumentation, requiring fewer personnel to operate and maintain, will continue to be procured to alleviate the excess workload problem in future years. Major tests to be supported include General Support Rocket System, PATRIOT Missile Storage Reliability Program, CHAPARRAL and ROLAND II Medium Range Air Defense Missiles, STINGER System Passive Optical Seeker, Short Range Attack Missile, and Navy and Air Force Air Weapons Testing. Improvement and modernization of testing capability will emphasize acquisition of instrumentat 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 a lower cost. A modest reduction is programed in the backlog of essential maintenance and repair of test facilities.

Project: #DE93 Title: White Sands Missile Range
Program Element: #6.58.04.A Title: US Army Materiel Development and Readiness Command (DARCOM) Ranges/Test Facilities

DOD Mission Area: #451 - Major Ranges and Test Facilities Budget Activity: #6 - Defensewide Mission Support

4. (U) FY 1982 Planned Program: WSMR will continue to operate the national range and provide test and evaluation services to support missile and other system development including the high energy laser program, projected workload in FY 1982 will remain comparable to prior year levels and, therefore, will continue to exceed available capability. Major tests planned include General Support Rocket Systems, ROLAND II Medium Air Defense System, Division Air Defense Gun System, Anti-Radiation Weapons System, and Navy and Air Force Air Weapons Testing. The improvement and modernization program will provide instrumentation to support the High Energy Laser System Test Facility, environmental test area II and completion of the surveillance radar program.

5. (U) Program to Completion: This is a continuing program.

6. (U) Major Milestones: Not Applicable.

7. (U) Resources ($ in thousands):

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
RDTE 1/						
Funds (current requirements)	103885	108640	127400	.152461	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	105270	109753	114916	Not Shown	Continuing	Not Applicable
Other Appropriations 2/						
Military Construction, Army						
Funds (current requirements)	0	3632*	995	0	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	0	5732*	3381	Not Shown	Continuing	Not Applicable

1/ The current FY 1979 and FY 1980 RDTE estimates are decreased slightly compared to last year's estimates to provide for higher priority requirements in other programs. The current FY 1981 RDTE estimate is greater than last year's estimate to

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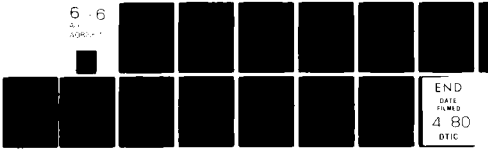

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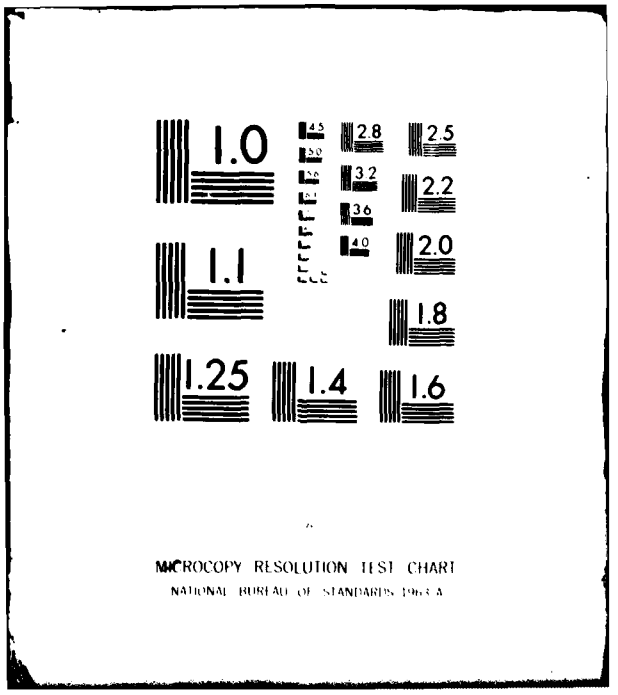
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Project: #DE93 Title: White Sands Missile Range
Program Element: #6.58.04.A Title: US Army Material Development and Readiness Command (DARCOM) Ranges/Test Facilities
DOD Mission Area: #451 - Major Ranges and Test Facilities Budget Activity: #6 - Defensewide Mission Support

provide for an increase in projected test workload and to instrument the High Energy Laser System Test Facility so it will be operational in time to support the Navy's Sealite Program in October 1983.

2/ The current FY 1980 and 1981 MCA estimates are decreased to provide for higher priority projects.

* An additional $37,449 thousand for High Energy Laser System Test Facility construction in FY 1980 has been transferred from MCA to Title IV (Construction of Defense Agencies Facilities).

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #DE94 Title: Army Electronic Proving Ground
Program Element: #6.58.04.A Title: US Army Materiel Development & Readiness Command (DARCOM) Ranges/Test Facilities
DOD Mission Area: #451 - Major Ranges and Test Facilities Budget Activity: #6 - Defensewide Mission Support

A. (U) DETAILED BACKGROUND AND DESCRIPTION: The US Army Electronic Proving Ground (AEPG), Ft. Huachuca, AZ, is a tenant on Ft. Huachuca and a Field Operating Activity of the US Army Test and Evaluation Command (TECOM), a subordinate command of the US Army Materiel Development and Readiness Command (DARCOM). The proving ground was established in 1954. Its primary mission is to plan, conduct, evaluate, and report on and/or support developmental and other tests of Army communications, electronic, electronic warfare systems and materiel and tactical automated command and control systems. Other missions are to plan, conduct, and report on electromagnetic compatiblity (EMC) and electronic countermeasure (ECM) test and analysis, and to operate and maintain two major test facilities: Electromagnetic Environmental Test Facility and System Test Facility. Responsibility for development testing formerly performed by the US Army Security Agency Test and Evaluation Center (ASATEC) was transferred to AEPG on 1 October 1977. The new mission encompasses development testing of tactical electronic warfare and signal intelligence equipment. Testing support is also provided to the other military Services. The natural quiet electromagnetic environment, real estate, and low annual rainfall of the area, together with its special facilities, make the AEPG capability unique within the Department of Defense (DOD). The majority of testing is conducted within its laboratories; in the System Test Facility, on the outdoor electronic range; and in the Electromagnetic Environmental Test Facility, which is specifically designed to simulate the intended electromagnetic environment, thus permitting analysis of equipment in operational environments.

B. (U) RELATED ACTIVITIES: Four other projects in this program element (PE) finance DE93, of White Sands Missile Range, NM; DE90, Yuma Proving Ground, AZ; DE92, Dugway Proving Ground, UT; and DE91, Aberdeen Proving Ground, Md. These four, AEPG, and 13 other DOD test and evaluaton facilities operate under a uniform DOD Funding Policy. This project provides funding for indirect testing costs at AEPG; test proponents (users) pay all direct test costs. Two other projects in this PE are the Cold Regions (DE95) and Tropic (DE96) Test Centers, which are funded on a level-of-effort basis wherein testing services are provided on a nonreimbursable basis. The Office of the Under Secretary of Defense for Research and Engineering reviews management, operation and maintenance of all DOD 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.

C. (U) WORK PERFORMED BY: Testing is performed by military and civil service personnel assigned to AEPG, with associated contractor support. Major contractor effort involves the operation and maintenance of the Electromagnetic Environmental Test

Project: 0DE94
Program Element: 06.58.04.A

Title: Army Electronic Proving Ground
Title: US Army Materiel Development & Readiness Command (DARCOM) Ranges/Test Facilities

DOD Mission Area: 0451 - Major Ranges and Test Facilities

Budget Activity: 06 - Defensewide Mission Support

Facility and the Systems Test Facility by Bell Aerospace Company, Tuscon, AZ. Contract support for FY 1981 including maintenance and repair of facilities and augmentation of in-house capability is estimated at $3,515,000.

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: Test projects included Tactical Fire Direction System; Training Devices for AH-1Q/COBRA and CH-47C/helicopters; Joint Services Intrusion Detection System; Integrated FM/Radio Wideband Security Voice Device (BANCROFT); Platoon Early Warning System; Single Channel Ground and Airborne Radio System; UHF Manpack Satellite Communications Ground Terminal; Tactical Computer System; Remotely Piloted Vehicles; Drone Program Support for the US Air Force (USAF); Flight Control Central; Regenerative Repeater MX-9331; and the Digital Transmission Evaluation Program. Instrumentation was procured to improve the capability for skin tracking and range safety through automatic acquisition of small airborne targets such as AQUILA drones at long range. Other instrumentation was procured to improve capabilities for development testing of absolute altimeters; weather balloons; and recently introduced all-digital DOD communications equipment. During FY 1979, the Electronic Proving Ground completed 80 tests: 27 research and development; 12 production, 6 product-improvement and 35 other.

2. (U) FY 1980 Program: Scheduled testing workload at US Army Electronic Proving Ground (AEPG) is 17% above personnel test capability. This excess is tolerable and provides management flexibility, making it unnecessary to keep a test facility idle when a scheduled test is unavoidably delayed. Major tests scheduled include: Central Office Communications, Automatic, AN/TTC-39 (TRI-TAC); Facility Intrusion Detection System; Digital Transmission Evaluation Program; Remotely Piloted Vehicle (RPV) Support for the USAF; and electromagnetic compatibility analysis on PATRIOT and ROLAND missile systems. Emphasis will be placed on instrumentation to establish an adequate capability for testing of signal intelligence/electronic warfare equipment. Procurement will also be initiated for a mobile, high precision tracking radar that will provide total coverage of the test range.

3. (U) FY 1981 Planned Program: Projected testing workload will be 33% above projected personnel capability. This will be accommodated primarily by increasing contractor support and using overtime. Modern instrumentation, requiring fewer personnel to operate and maintain, will continue to be procured to alleviate the excess workload problem in future years. AEPG is investigating the availability of additional potential contractors to augment its test capability and, thus, minimize the impact of the excess workload. Projected tests include: Tactical fire direction system (TACFIRE), field artillery

Project: 8E94 Title: Army Electronic Proving Ground
Program Element: 6.58.04.A Title: US Army Materiel Development & Readiness Command (DARCOM) Ranges/Test Facilities
DOD Mission Area: 8451 - Major Ranges and Test Facilities Budget Activity: 06 - Defensewide Mission Support

meteorological acquisition system, integrated inertial navigation system, advanced surface-to-air missile jammer, joint tactical microwave landing system, and division Technical Control and Analysis Center. A major segment of the FY 1981 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.

4. (U) FY 1982 Planned Program: The Proving Ground will continue to plan, conduct, evaluate, and report on and/or support developmental and other tests of Army communications electronic and electronic warfare systems and materiel. Scheduled tests include the PATRIOT air defense missile system, analytical photogrammetric positioning system, and the ROLAND air defense system. Improvement and modernization will provide instrumentation for digital communications, closed circuit TV, replacement of infrared targets, and radar test equipment.

5. (U) Program to Completion: This is a continuing program.

6. (U) Major Milestones: Not Applicable.

7. (U) Resources ($ in thousands):

RDTE[1/]	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
Funds (current requirements)	9020	10267	13200	17016	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	9033	10533	11420	Not Shown	Continuing	Not Applicable

Project: #DE94 Title: Army Electronic Proving Ground
Program Element: #6.58.04.A Title: US Army Materiel Development & Readiness Command (DARCOM) Ranges/Test Facilities
DOD Mission Area: #451 - Major Ranges and Test Facilities Budget Activity: #6 - Defensewide Mission Support

Other Appropriations 2/	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
Military Construction, Army						
Funds (current requirements)	0	418	3723	0	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	216	3449	0	Not Shown	Continuing	Not Applicable

1/ The current FY 1980 RDTE estimate is decreased slightly compared to last year's estimate due to higher priority requirements in other programs. The FY 1981 estimate has been increased to provide for contract augmentation of in-house capability to eliminate most test slippages and prevent growth in developmental costs.

2/ The FY 1980 MCA project to construct a building to house the electromagnetic test facility has been deferred until FY 1981 due to higher priorities.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: 6.58.05.A
Title: DOD Munitions Effectiveness and Explosive Safety Standards
DOD Mission Area: 7440 - Technical Integration/Studies and Analyses
Budget Activity: 6 - Defensewide Mission Support

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional To Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	5036	5461	6835	7367	Continuing	Not Applicable
D620	DOD Munitions Effectiveness	4514	4670	6001	6685	Continuing	Not Applicable
M857	Explosive Safety Standards	522	791	834	682	Continuing	Not Applicable

B. (U) 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 nonnuclear munitions and weapon 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 antiair (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/survivabilities 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 of ammunition and explosives. Results are essential to development of quantity-distance standards and cost-effective, explosion-resistant facilities designs.

C. (U) BASIS FOR FY 1981 RDTE REQUEST: Project D620 (DOD Munitions Effectiveness) will support the continuation of effectiveness evaluations for air-to-surface, surface-to-surface, and antiair munitions/weapons through updating delivery accuracy, target acquisition, and weapons 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 and hard targets, effectiveness of Soviet Warsaw Pact Weapon Systems, 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 supports the Department of Defense Explosive Safety Board through editing and publication of a new edition of TM 5-1300, "Structures to Resist the Effects of Accidental

Program Element: 06.58.05.A Title: DOD Munitions Effectiveness and Explosive Safety Standards
DOD Mission Area: 0440 - Technical Integration/Studies and Analyses Budget Activity: 06 - Defensewide Mission Support

Explosions". In support of this effort, tests will be conducted to determine the fragment hazard from large stacks of stored ammunition and the thermal effects from ammunition fires.

D. (U) BASIS FOR CHANGE BETWEEN FY 1981 and FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1979	FY 1980	FY 1981	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	5036	5461	6835	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	5036	5492	6409	Continuing	Not Applicable

B620 - FY 1981 funding increased to accommodate increased scope of effort on target acquisition, weaponeering against ships, aircraft vulnerability (missile fragments and methodologies), surface target vulnerability and increased operational user requests for weapons effects/lethality against Warsaw Pact/North Korean threats. FY80 decrease is the result of a general Congressional reduction.

E. (U) OTHER APPROPRIATION FUNDS: Not Applicable

Program Element: 06.58.05.A Title: DOD Munitions Effectiveness and Explosive Safety Standards
DOD Mission Area: 0440 - Technical Integration/Studies and Analyses Budget Activity: 06 - Defensewide Mission Support

F. (U) 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 Army Materiel Development and Readiness Command, Navy Materiel Command, Air Force Logistics Command and the 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 Logistics 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 to determine and predict nonnuclear 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 evaluation of new munitions and weapons concepts. Work in this project includes the preparation of JMEM's for air-to-surface, surface-to-surface, and antiair 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 M857 provides for full-scale and sub-scale testing and supporting analysis directed toward improvement of tri-service ammunition and explosives safety standards, published by the DOD Explosives Safety Board (DDESB) as DOD Standard 5154.4S. The DDESB, 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 DDESB also establishes design procedures and storage layout criteria for magazines and explosives handling and manufacturing facilities.

G. (U) 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. In FY 1979 and 1980, Project M857 is sponsored jointly with the Navy, the ESKIMO VI test of large, earth-covered magazines of Navy design to qualify these structures for explosives storage at the minimum separation distances permitted by standards.

H. (U) WORK PERFORMED BY: Approximately 75% of Project D620 work is accomplished by the following in-house organizations: US Army Materiel Systems Analyses Activity, the Ballistic Research Laboratory, and the Chemical Systems Laboratory of Aberdeen Proving Ground, MD; US Army Missile Command, Redstone Arsenal, AL; US Army Armament Research and Development Command, Dover,

Program Element: 6.58.05.A Title: DOD Munitions Effectiveness and Explosive Safety Standards
DOD Mission Area: 4440 - Technical Integration/Studies and Analyses Budget Activity: 76 - Defensewide Mission Support

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 Center at White Oak, MD, and Dahlgren, VA; Pacific Missile Test Center, Pt Hugu, 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; Armament Systems, Inc., of Anaheim, CA; Booze-Allen Applied Research, 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; Army Large Caliber Weapons Systems Laboratory, Dover, NJ; and Army Ballistic Research Laboratory, Aberdeen Proving Ground, MD. Since FY 1979, a major project contractor is IIT Research Institute, Chicago, IL.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 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) ammunition 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 through FY 1979, many JMEM's were updated and the Target Vulnerability manual was revised to include vulnerability data on the 23 MM Soviet Track Mounted Radar Controlled Anti-Aircraft Gun, ZSU-23-4, steel bridges, the SA-6 and SA-9 Surface-to-Air Missile Systems, POL storage, runways, the Soviet Lightly Armored Vehicle BTR-50, 155mm Self-Propelled Gun, Long Track Radar, and Railroad Rolling Stock. Effectiveness Indices were prepared for many radars and missile site components. Effects data were published on Laser Guided Bombs and the new US Navy/Air Force Bomb GBU-15 versus Soviet ships. Antiair effectiveness manuals were completed for Phalanx and Vulcan Air Defense Systems. Effort on missile effectiveness manuals for Standard Missile I, AIM-7F, and AIM-9L Air-to-air Missiles is continuing. Effort was initiated to improve effectiveness for MK-80 series general purpose bombs against hard targets. Effectiveness manuals were updated for the 8-Inch Howitzer, 175mm Gun, Lance, M60A1/A2 tanks, 8-Inch/55, 5-Inch/38; and 5 Inch/54 Naval Guns. The first visual target acquisition manual was completed. The JTCG/ME, as Chairman of the Analysis Group of the DOD/DOE sponsored Insensitive High Explosives/Propellants (IHE/P) Study, completed Phase I Study efforts, lethality data was provided in support of the Joint Test of Tactical Aircraft Effectiveness and survivability in close air support antiarmor operations (TASVAL). JTCG/ME assumed the task of providing all future estimates of weapons effects against Soviet ships. Effort is underway to identify weapons effects data available and critical voids for vulnerability/survivability of all priority Warsaw Pact/North Korean targets including

Program Element: #6.58.05.A Title: DOD Munitions Effectiveness and Explosive Safety Standards
DOD Mission Area: #440 - Technical Integration/Studies and Analyses Budget Activity: #6 - Defensewide Mission Support

appropriate ground targets for precision guided surface-to-surface systems. Project M857 completed five tests in the ESKIMO series on full-scale, earth-covered ammunition storage magazines which have led to improved, less costly structure designs and to criteria for more efficient use of land storage areas. Efforts have included evaluation of unexploded ordnance detection techniques and equipment. A continuing project effort has been testing and analysis of the fragment weight distributions and velocity profiles from exploding stacks of ammunition in order to improve standards for fragment protection. Work was begun on the initial phase of a program to evaluate thermal effects from ammunition fires.

2. (U) FY 1980 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, weapon characteristics and smoke and illumination effects. The manuals will also expand on the type targets considered and the vulnerability/survivability of weapons systems and new personnel. Support will continue on human vulnerability/vulnerability and medical workload problems. Analysis support for the Service staffs and the material development and user community will continue for major programs. Project M857 will execute the ESKIMO VI test of large, flat-roofed, earth-covered Navy magazines. Tests of large stacks of fragmenting ammunition are being conducted to obtain scaling laws for fragmentation phenomena. Thermal effects studies will be extended to characterize hazard levels as a function of event size. Data and text material will be compiled for the reissaue of TM-5-1300. Model experiments are being conducted to determine blast leakage into hardened aircraft shelters from explosions of ammunition storage magazines.

3. (U) FY 1981 Planned Program: Project D620 will continue efforts toward the joint determination, publications and use of enhanced and expanded munitions effectiveness data and will continue to conduct effectiveness analysis to support development decisions and establishment of new material requirements. Support of the Insensitive High Explosives/Propellants Phase II Study will be continued, including task leadership for the Vulnerability/Survivability and Public Safety task areas. JTCG/ME plans a tri-Service assessment of aerial target vulnerability in order to establish a base for directing priority tasks in this area. Project D620 anticipates a program in the Surface-to-Surface weapons effects area to combine the personnel and material methodology matrices of body armor, terrain shielding and strip vulnerability data into a single methodology vice separate methodologies for personnel and material. Weapons effects against the Kiev helicopter carrier is planned. A data base for hard target richochet and penetration data is planned to enable further qualification of operational weapons and to define characteristics of advance weapons. Project M857 will conduct followup studies to interpret structural response observed in ESKIMO VI. Complete editorial work on new edition of TM-5-1300. Conduct confirmatory tests of fragmenting ammunition to validate fragmentation theory. Evaluate response of exposed structures and materials to thermal effects from ammunition fires.

Program Element: #6.58.05.A Title: DOD Munitions Effectiveness and Explosive Safety Standards
DOD Mission Area: #440 - Technical Integration/Studies and Analyses Budget Activity: #6 - Defensewide Mission Support

4. (U) FY 1982 Planned Program: Project D620 will continue to conduct munitions effectiveness analyses to assist all Services in development projects and program decisions. Project M857 will conduct tests of fragmenting ammunition as necessary to fill gaps in data base. Continue thermal effects studies to characterize source-environment and output-target interactions. Circulate coordination draft of revised edition of TM 5-1300.

5. (U) Program to Completion: This is a continuing program. %t06

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D620 Title: DOD Munitions Effectiveness
Program Element: #6.58.05.A Title: DOD Munitions Effectiveness and Explosive Safety Standards
DOD Mission Area: #440 - Technical Integration/ Studies and Analyses Budget Activity: #6 - Defensewide Mission Support

A. (U) 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 Army Materiel Development and Readiness Command, Navy Materiel Command, Air Force Logistics Command, and the 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 Logistics 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 nonnuclear 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 evaluation of new munitions and weapons concepts. Work in this project includes the preparation of JMEM's for air-to-surface, surface-to-surface, and antiair 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.

B. (U) 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.

C. (U) WORK PERFORMED BY: Approximately 75% 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 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 Center at White Oak, MD, and Dahlgren, VA; Pacific Missile Test Center, Pt Mugu, 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;

Project: #D620 Title: DOD Munitions Effectiveness
Program Element: #6.58.05.A Title: DOD Munitions Effectiveness and Explosive Safety Standards
DOD Mission Area: #440 - Technical Integration/ Studies and Analyses Budget Activity: #6 - Defensewide Mission Support

Armament System, Inc. at Anaheim, CA; Booz-Allen Applied Research, Bethesda, MD; Applied Research, Bethesda, MD; Denver Research Institute, Denver, CO; and the University of Maryland Institute for Emergency Medicine, Baltimore, MD.

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 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) ammunition 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 Mideast 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 through FY 1979 many JMEM's were updated and the Target Vulnerability manual was revised to include vulnerability data on the 23mm Soviet Track Mounted Radar Controlled Antiaircraft Gun, ZSU-23-4 steel bridges, the SA-6 and SA-9 surface-to-air Missile Systems, POL storage, runways, the Soviet Lightly Armored Vehicle, BTR-50 155mm Self-propelled Gun, Long Track Radar, and Railroad Rolling Stock. Effectiveness Indices were prepared for many radars and missile site components. Effects data was published on Laser Guided Bombs and the new GBU-15 versus Soviet ships. Antiair effectiveness manuals were completed for Phalaux and Vulcan Air Defense Systems. Effort on missile effectiveness manuals for Standard Missile 1, AIM-7F and AIM-9L is continuing. Effort was initiated to improve effectiveness of MK-80 series general purpose bombs against hard targets. Effectiveness manuals were updated for the 8-Inch Howitzer, 175mm Gun, Lance, M60A1/A2 tanks, 8-Inch/55, 5-Inch/38, and 5-Inch/54 Naval Guns. The first visual target acquisition manual was completed. The JTCG/ME, as Chairman of the Analysis Group of the DOD/DOE-sponsored Insensitive High Explosives/Propellants (IHE/P) Study, completed Phase I Study efforts. Lethality data was provided in support of the Joint Test of Tactical Aircraft Effectiveness and Survivability in Close Air Support Antiarmor Operations (TASVAL). JTCG/ME assumed the task of providing all future estimates of weapons effects against Soviet ships. Effort is underway to identify weapons effects data available and critical voids for vulnerability/survivability of all priority Warsaw Pact/North Korean targets including appropriate ground targets for precision guided surface-to-surface systems.

2. (U) FY 1980 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, weapon characteristics and smoke and illumination effects. The manuals will also expand on the type of targets considered and the vulnerability/survivability of weapons systems and crew personnel. Support will continue on human survivability/vulnerability and medical workload problems. Analysis support for the Service staffs and the materiel development and user community will continue for major programs.

Project: #D620 Title: DOD Munitions Effectiveness
Program Element: #6.58.05.A Title: DOD Munitions Effectiveness and Explosive Safety Standards
DOD Mission Area: #440 - Technical Integration/ Studies and Analyses Budget Activity: #6 - Defensewide Mission Support

3. (U) FY 1981 Planned Program: Project D620 will continue efforts toward the joint determination, publication, and use of enhanced and expanded munitions effectiveness data and will continue to conduct effectiveness analysis to support development decisions and establishment of new materiel requirements. Chairmanship for the Analysis Group of the Insensitive High Explosives/Propellants Phase II Study will be continued, including task leadership for the vulnerability/survivability and public safety task areas; JTCG/ME plans a tri-Service assessment of aerial target vulnerability in order to establish a base for directing priority tasks in this area. Project D620 anticipates a program in the surface-to-surface weapons effects area to combine the personnel and materiel methodology matrices of body armor, terrain shielding and strip vulnerability data into a single methodology vice separate methodologies for personnel and materiel. Weapons effects against the Kiev helicopter carrier are planned. A data base for hard target richochet and penetration data is planned to enable further qualification of operational weapons and to define characteristics of advance weapons. Efforts will continue to provide the Automated Weaponry Optimization Program to all field users for automatically processing weaponry data.

4. (U) FY 1982 Planned Program: Project D620 will continue to conduct munitions effectiveness and analysis to assist all services in development projects and program decisions.

5. (U) Program to Completion: This is a continuing program.

6. (U) Major Milestones: Not Applicable

7. (U) Resources ($ in thousands):

	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	4514	4670	6001	6685	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	4514	4670	5887	Not Shown	Continuing	Not Applicable

FY 1981 funding was increased to accommodate increased scope of effort on target acquisition, weaponry against ships, aircraft vulnerability, surface target vulnerability and increased operational user requests for weapons effects data against red targets.

FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.58.98.A
Title: Army Management Headquarters Activities
DOD Mission Area: #471 - General Management Support
Budget Activity: #6 - Defensewide Mission Support

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

Project Number	Title	FY 1979 Actual	FY 1980 Estimate	FY 1981 Estimate	FY 1982 Estimate	Additional To Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	27690	24436	35717	33771	Continuing	Not Applicable
MH02	Army Management Headquarters Activities (AMHA)	27690	24436	35717	33771	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program supports those R&D 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 Program Element was directed by Office, Secretary of Defense, for the purpose of uniformity in programing, reporting, and justifying Management Headquarters Activities. Resources reflected in this Program Element support civilian personnel performing listed functions and associated costs (personnel benefits, travel, operating supplies, and equipment) at US Army Materiel Development and Readiness Command Headquarters and subordinate R&D commands.

C. (U) BASIS FOR FY 1981 RDTE REQUEST: Program request is based on authorized civilian personnel (salaries and related costs) performing Research, Development, Test and Evaluation management functions at US Army Materiel Development and Readiness Command Headquarters and subordinate R&D commands. Requested program supports full implementation of the Army Materiel Acquisition Review Committee recommended realignment of US Army Materiel Development and Readiness Command subordinate commands into separate R&D and Readiness commands. The identification of functions defined as Army Management Headquarters Activities coupled with the turbulence associated with the Army Materiel Acquisition Review Committee realignment has resulted in considerable intra-appropriation reprograming to this Program Element. The major portion of the increase in FY 1981 was reprogramed from Program Element 6.58.01.A (1.4 million in FY 1979 and 5.2 million in FY 1981). In addition, there were minor increases for inflation to nonpersonnel costs (travel, supplies, Army Industrial Fund support, etc.).

Program Element: #6.58.98.A
BOD Mission Area: #471 - General Management Support

Title: Army Management Headquarters Activities
Budget Activity: #6 - Defensewide Mission Support

D. (U) BASIS FOR CHANGE BETWEEN FY 1981 and FY 1980 CONGRESSIONAL DESCRIPTIVE SUMMARIES: ($ in thousands)

	FY 1979	FY 1980	FY 1981	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	27690	24436	35717	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	26350	25114	25714	Continuing	Not Applicable

The FY 1979 increase represents a transfer (+1.4 million) from Program Element 6.58.01.A. This transfer resulted from continued identification of personnel/functions considered as Army Management Headquarters Activities. Actual establishment of the Army Management Headquarters Program Element within the RDTE,A appropriation was effective with FY 1979 and considerable realignment between Army Management Headquarters Activities and other headquarters support costs is still being accomplished. The reduction in FY 1980 results from transfer of the Corps of Engineers Headquarters Activity to Program Element 6.58.01.A (-0.5 million) and the overall RDTE,A Congressional reduction for travel and overtime (-0.2 million). Additional FY 1980 reprograming between this Program Element and 6.58.01.A will be accomplished as required to support personnel/functions identified as Army Management Headquarters functions. Increased program for FY 1981 represents full support for these functions at R&D commands as identified by Office, Secretary of Defense, under the Army Materiel Acquisition Review Committee realigned US Army Materiel Development and Readiness Command structure. The major portion of the increase has been identified by corresponding decreases to Program Element 6.58.01.A (-1.4 million in FY 1979 and -5.2 million in FY 1981). The remainder of the increase represents numerous other minor intra-appropriation transfers plus inflation adjustment for nonpersonnel costs.

E. (U) OTHER APPROPRIATION FUNDS: Not Applicable

Program Element: #6.58.98.A Title: Army Management Headquarters Activities
DOD Mission Area: #471 - General Management Support Budget Activity: #6 - Defensewide Mission Support

F. (U) DETAILED BACKGROUND AND DESCRIPTION: Resource requirements for this Program Element are programed 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 Program Element. Paralleling this action, US Army Materiel Development and Readiness Command subordinate headquarters were realigned into separate R&D and Readiness commands in accordance with Army Materiel Acquisition Review Committee recommendations. This combination of changes resulted in a shift of resources between appropriations as well as between Research, Development, Test and Evaluation (RDTE) Program Elements. These resource adjustments result in increased requirements beginning in FY 1979, which was the first full year of operation under the new Program Element. The programed increases for this Program Element are offset elsewhere in the overall Army funding posture.

G. (U) RELATED ACTIVITIES: Management headquarters perform planning, programing, management, and evaluation for work performed at RDTE laboratories and test facilities.

H. (U) WORK PERFORMED BY: DARCOM Headquarters, Alexandria, VA, and DARCOM subordinate R&D commands.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1979 and Prior Accomplishments: Beginning in FY 1979, provided resources for functions identified as Army Management Headquarters Activities at US Army Materiel Development and Readiness Command Headquarters and subordinate R&D commands as directed by Office, Secretary of Defense. Prior to FY 1979, these costs were programed under Program Element 6.58.01.A, Programwide Activities.

2. (U) FY 1980 Program: Provides resources for support of Army Management Headquarters Activities as indicated above.

3. (U) FY 1981 Planned Program: Provides resources for full support of authorized civilians as currently identified for operation of the R&D Command Headquarters as indicated below. Programing includes civilian salaries and all related costs (personnel benefits, travel, supplies, and equipment). Variance between fiscal years is due to personnel turbulence (mission and function transfers, relocations, and reassignments) associated with the Army Materiel Acquisition Review Committee realignment and continued identification of Army Management Headquarters activities in accordance with Department of Defense Directive 5100.73. Specifically, the increase from FY 1980 to FY 1981 includes: (1) +6.6 million for realignment of R&D headquarters activities between Program Element 6.58.01.A support activities and those properly chargeable as Army Management Headquarters in this Program Element (this reflects the 5.2 million transfer reflected under Program Element 6.58.01.A for FY

Program Element: 06.58.90.A
BOD Mission Area: 0471 - General Management Support

Title: Army Management Headquarters Activities
Budget Activity: 06 - Defensewide Mission Support

1981 and +1.4 million corresponding to the FY 1979 transfer reflected in this submission); (2) +2.0 million for the October 1979 civilian pay raise; and (3) +2.5 million for inflation on other than direct personnel costs (such as purchased Army Industrial Fund services, travel, supplies, and equipment).

	FY 1979	FY 1980	FY 1981	FY 1982	Additional to Completion	Total Estimated Cost
Armament Research & Development (R&D) Command	5800	5365	6603	6130	Continuing	Not Applicable
Aviation R&D Command	2050	1580	2545	2503	Continuing	Not Applicable
Communications R&D Command	3500	3485	4476	4272	Continuing	Not Applicable
Electronics R&D Command	5100	4585	4578	4479	Continuing	Not Applicable
Missile R&D Command	4655	3265	6392	5895	Continuing	Not Applicable
Tank Automotive R&D Command	2300	2280	5900	5525	Continuing	Not Applicable
BARCOM Headquarters	4285	3876	5223	4967	Continuing	Not Applicable
TOTAL	27690	24436	35717	33771		

4. (U) FY 1982 Planned Program: Continue support of RDTE activities listed above.

5. (U) Program to Completion: This is a continuing program.

UNCLASSIFIED

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